



# APAO 2019 BANGKOK

THE SCIENCES  
AND ARTS OF  
OPHTHALMOLOGY

**ABSTRACT  
BOOK**

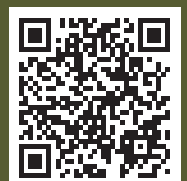
**6-9.03.2019**

THE 34<sup>TH</sup> ASIA-PACIFIC ACADEMY  
OF OPHTHALMOLOGY CONGRESS  
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THE 43<sup>RD</sup> ANNUAL MEETING  
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# INSTRUCTION COURSES

## Cataract

Mar 07, 2019 (Thu)

09:00 - 10:30

Venue: C Ground Meeting Room 2

### Conquering Capsule Complications: My Best Teaching Videos

Chief Instructor: David **CHANG**

**Objective:** To systematically illustrate prevention and management of zonular, anterior, and posterior capsule complications in a comprehensive, step-wise fashion using more than 50 edited videos.

**Synopsis:** Video cases will illustrate a spectrum of techniques for anterior and posterior capsule complications: capsular dye, vitreous tap for crowded AC, torn CCC, secondary CCC enlargement, capsular tear-out rescue technique, CCC capture of the optic, posterior CCC, early recognition of posterior chamber rupture, conversion from top/clear corneal incision to manual ECCE, posterior polar cataracts, intraocular lens (IOL) fixation with torn anterior or posterior capsule, CTR and capsule retractors for weak zonules, small pupil / IFIS strategies (hooks, Malyugin, and other expansion rings, pars plana bimanual anterior vitrectomy ( $\pm$  triamcinolone), and dispersive OVD posterior-assisted levitation + trap for descending nuclei.

**Course Outline:** Video cases will illustrate a spectrum of techniques for anterior and posterior capsule complications: capsular dye, vitreous tap for crowded AC, torn CCC, secondary CCC enlargement, capsular tear-out rescue technique, CCC capture of the optic, posterior CCC, early recognition of posterior chamber rupture, conversion from top/clear corneal incision to manual ECCE, posterior polar cataracts, IOL fixation with torn anterior or posterior capsule, CTR and capsule retractors for weak zonules, small pupil / IFIS strategies (hooks, Malyugin and other expansion rings, pars plana bimanual anterior vitrectomy ( $\pm$  triamcinolone), and dispersive OVD posterior-assisted levitation + trap for descending nuclei.

Mar 08, 2019 (Fri)

09:00 - 10:30

Venue: Boardroom 2

### Mastering Phaco Nightmares and Worst-Case Scenarios: A Video-Based Course

Chief Instructor: Amar **AGARWAL**

Instructor(s): Athiya **AGARWAL**, David **CHANG** Soon-Phaik **CHEE**

**Objective:** This interactive course will cover basic complications all the way to nightmare situations. Having attended the course, attendees will be able to master difficult phaco cases and manage various complications.

**Synopsis:** Endocapsular rings for subluxated cataracts, prosthetic irides, and pupil expanders are secret tools for mastering phaco surgery's worst-case scenarios. Intraoperative floppy iris syndrome, intraocular lens (IOL) implantation in eyes with deficient capsules, and glued IOLs will all be explained in this course. Management of vitreous loss, torn rrhexis, and other complications will also be covered. Management of dropped lenses, hard cataracts, posterior capsular ruptures, and the like will all be explained with excellent videos.

**Course Outline:** The course will cover all there is on phaco nightmares and PC ruptures.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Meeting Room 3

### Biometry: The Way Forward

Chief Instructor: N.v.Arulmozhi Varman **VARMAN**

Instructor(s): Ramesh **DORAJAN**, Atheek **SHAIK**, Jeyanthan **SOUNDARAPANDIAN**

**Objective:** Objective of the course is to make attendees understand working principles of biometers, keratometers, and topographers, and techniques to do biometry in all types of eyes.

**Synopsis:** Intraocular lens (IOL) power calculation has evolved significantly over the past few years. Techniques which were considered the gold standard are obsolete now. The course will explain basics and advanced aspects of biometry in complex situations, including post refractive surgery, long and short eyes, silicon IOL filed eyes, and post keratoplasty. Working mechanism of biometers, keratometers, and

topographers will be discussed so that attendees will be able to understand how to predict and avoid errors. Practical tips on how to ensure optimum results will be discussed.

**Course Outline:** (1) Keratometry, what we measure and what we miss - will discuss basic aspects of keratometric measurements, advantages, and drawbacks of keratometry. (2) Why topography - Will explain basic working mechanism of topographers, need for topographers, and how topographers can help us to refine corneal curvature measurements. (3) Ultrasound biometer, what we measure and what we miss - will discuss on working mechanism of ultrasound biometers, advantages, and its drawbacks. (4) Why Optical biometer - will explain working mechanism of optical biometers and how biometers help us in special situations like post refractive surgery eyes, silicon IOL filled eyes, eyes with staphyloma, and nanophthalmic eyes. (5) Modern formulae for IOL power calculation - will explain how newer generation formula score over older formulae, and significance of effective lens positioning.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Boardroom 2**

### **IOL Implantation in the Absence of Capsular Support**

**Chief Instructor:** Mohan **RAJAN**

**Instructor(s):** Manoj **KHATRI**, Sujatha **MOHAN**, Nivean **MADHIVANAN**

**Objective:** Attendee will adapt to different techniques of intraocular lens (IOL) implantation in the presence of PCR.

**Synopsis:** Course will guide both novice as well as experienced surgeons through the steps of recognition of PCR, various stages at which PCR can occur, its management depending on the stage the PCR occurs and the new technique of using the IOL as a scaffold in the presence of a rent in soft to moderate cataract. The various options of IOL implantation in the absence of capsule support, including glued IOLs and retro iris fixated IOLs, will be discussed. We will also discuss and demonstrate with the help of videos the management of a dropped nucleus and dropped IOL.

**Course Outline:** PCR is not an uncommon complication during phaco. There is always a dilemma among surgeons which IOL to implant in the presence of PCR. This course will clear all doubts regarding this particular intraoperative situation.

## **Cornea, External Eye Diseases & Eye Bank**

**Mar 06, 2019 (Wed)**

**09:00 - 10:30**

**Venue: Boardroom 2**

### **Pearls and Pitfalls in DMEK Surgery**

**Chief Instructor:** Kaevalin **LEKHANONT**

**Instructor(s):** Marcus **ANG**, Marianne **PRICE**, Francis **PRICE JR**, Alain **SAAD**

**Objective:** To review pearls and common pitfalls for beginning surgeons for performing a simplified and standard DMEK.

**Synopsis:** Descemet membrane endothelial keratoplasty (DMEK) is an effective partial-thickness corneal transplantation. This course summarizes the steps involved in DMEK, from case selections through postoperative care, including pearls and common pitfalls for beginner DMEK surgeons.

**Course Outline:** As for the first time in APAO, CSIG (Cornea Surgery Interest Group of Thailand) faculties and invited co-authors Dr. Francis Price, Dr. Marianne Price, and Dr. Marcus Ang join to give a DMEK course. This course will review a step-by-step guide to performing a simplified and standard DMEK, including initial case selections, donor tissue selections, preoperative patient preparations, donor graft preparations, methods to insert, orient, unfold, and position donor grafts, and immediate postoperative care. This course will also highlight the advances in surgical instrumentation and management of postoperative complications. Emphasis will be on pearls and common pitfalls for beginning surgeons to maximize the surgical outcomes.

**Mar 07, 2019 (Thu)**

**11:00 - 12:30**

**Venue: Boardroom 2**

### **Advances in Endothelial Keratoplasty**

**Chief Instructor:** Marcus **ANG**

**Instructor(s):** Jorge **ALIO**, Martin **DIRISAMER**, Jodhbir **MEHTA**, Gregory **MOLONEY**

**Objective:** To introduce recent trends and advances in endothelial keratoplasty, such as DMEK, femtosecond laser DSAEK, DWEK, and other new surgical techniques.

**Synopsis:** Endothelial keratoplasty (EK) has become the surgical technique of choice for treating corneal endothelial disease. Although Descemet stripping automated endothelial keratoplasty (DSAEK) is the most common technique, recent advances such as Descemet membrane endothelial keratoplasty (DMEK) are becoming popular with significant advantages over

DSAEK. In this instructional course, we have a series of lectures and case discussions to introduce the recent developments in EK, including updates on advances in DSAEK including femtosecond-laser assisted EK, new DMEK techniques, Descemetorhexis without EK (DWEK), and endothelial cell therapies with Descemet membrane transfer.

**Course Outline:** 1. Introduction and Evolution of Endothelial Keratoplasty/Therapy – Marcus Ang. 2. Advanced DSAEK and Femtosecond Laser-Endothelial Keratoplasty – Boris Malyugin. 3. DMEK made Easy – Martin Dirisamer. 4. Descemetorhexis Without EK as a Therapy (DWEK) – Greg Moloney. 5. Descemet membrane Transfer – Jod Mehta. 6. Conclusions and Case Discussions - All Faculty The 'Advances in EK' course was well attended in APAO 2018. All instructors have international experience in these endothelial keratoplasty surgical techniques, with multiple peer-reviewed publications in international journals and international presentations.

**Mar 08, 2019 (Fri)**

**16:30 - 18:00**

**Venue: Boardroom 3**

### **Comprehensive Guide to Managing Ocular Complications of Stevens-Johnson Syndrome and Toxic Epidermal Necrolysis in Asians**

*Chief Instructor: Kendrick SHIH*

*Instructor(s): Vanessa CHOW, Ka Wai KAM, Alex Lap Ki NG, Hon Shing ONG*

**Objective:** To select appropriate treatment for acute ocular surface inflammation, offer comprehensive long-term care for visual and ocular surface rehabilitation, and select appropriate patients who would benefit from surgical interventions.

**Synopsis:** The course is divided into 1) acute ocular care of patients with SJS/TEN, 2) long-term care of late ocular manifestations, and 3) surgical options for visual and ocular surface rehabilitation. The procedures discussed for this session will include autologous serum treatment, scleral contact lens fitting, amniotic membrane transplantation, mucous membrane grafting, and cataract surgery in the context of severe cicatrizing conjunctivitis. This instruction course is intended for general ophthalmologists who are keen to develop a systematic and effective approach in the management of severe inflammatory ocular surface disease.

**Course Outline:** This is a comprehensive course on management of early and late ocular complications of SJS and TEN. Dr. Kendrick Shih - Diagnosis and Classification: Prognostic Implications (10 mins) Dr. Alex Ng - Management of acute ocular surface inflammation: Paradigm shift towards early amniotic membrane transplantation (15 mins) Dr. Ka Wai Kam - Ocular surface reconstruction - Mucous

membrane grafting (20 mins) Dr. Vanessa Chow - Use of scleral contact lenses for visual and ocular surface rehabilitation (15 mins) Dr. Hon Shing Ong - Cataract Management in Cicatrizing Conjunctivitis (20 mins).

**Mar 08, 2019 (Fri)**

**11:00 - 12:30**

**Venue: Boardroom 2**

### **IEEI Surgical Video Symposium: Innovative Surgical Approaches to Challenging Cases**

*Chief Instructor: Maria CORTINA*

*Instructor(s): William MIELER, Pete SETABUTR, Elmer TU, Thasarat VAJARANANT*

**Objective:** To discuss interdisciplinary surgical techniques used for the treatment of complex ocular pathology that the attendees can easily incorporate into their surgical armamentarium.

**Synopsis:** This video symposium will feature alternative surgical techniques used for a wide spectrum of challenging pathologies that often require glaucoma, oculoplastics, cornea, and vitreoretinal surgery. High definition video and intraoperative imaging will be used to illustrate each case. Discussion and debate among speakers, expert panel, and audience will focus on surgical pearls, challenges, and complications.

**Course Outline:** Introduction: Soledad Cortina, MD Video presentations and Discussions: 7 min each with 3-minute discussion. - Penetrating ocular trauma involving the posterior segment. William Mieler, MD - Endothelial Keratoplasty in complex anterior segment pathology. Elmer Y Tu, MD - How to approach vitreoretinal surgery in the pediatric patient. RV Paul Chan, MD -Surgical tips for successful glaucoma drainage device. Thasarat Vajaranant, MD - Surgical Pearls for the beginner KPro surgeon. Soledad Cortina, MD - Eyelid procedures to optimize the success of corneal transplantation. Pete Setabutr, MD.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Meeting Room 4**

### **Recent Advances in the Diagnosis and Management of Conjunctival Tumors**

*Chief Instructor: Santosh HONAVAR*

*Instructor(s): Fairouz Puthiyapurayil MANJANDAVIDA, Kaustubh MULAY*

**Objective:** This course will enable participants to accurately diagnose and manage common conjunctival tumors.

**Synopsis:** The aim of this course is to provide a systematic overview of clinical manifestations of conjunctival tumors and to discuss recent concepts in the diagnosis, management, and prognosis. Clinical evaluation of a patient with conjunctival tumor will be

demonstrated with well-documented clinical cases. Systemic associations will be discussed. Advantages of anterior segment imaging techniques will be highlighted. Evidence-based treatment protocols, and indications and outcomes of newer treatment modalities such as topical chemotherapy and plaque brachytherapy, will be discussed. Standard surgical procedures will be demonstrated with video films.

**Course Outline:** An Overview of Conjunctival Tumors, 30 mins Medical Management of Conjunctival Tumors, 12 mins Surgical management of Conjunctival Tumors, 12 mins Histopathology of Conjunctival Tumors, 12 mins Interactive Cases, 12 mins.

## Glaucoma

Mar 07, 2019 (Thu)

16:30 - 18:00

Venue: Boardroom 3

### Microinvasive Glaucoma Surgery

*Chief Instructor: Chelvin SNG*

*Instructor(s): Keith BARTON*

**Objective:** Attendees will learn about the appropriate patient selection, surgical technique, associated complications, and postoperative management for microinvasive glaucoma surgery.

**Synopsis:** The course will provide an overview of microinvasive glaucoma surgery (MIGS) and the guidelines for appropriate patient selection. It will also present the techniques for implanting various MIGS devices (trabecular bypass devices, subconjunctival devices, and suprachoroidal devices), associated surgical complications, and the appropriate postoperative management. Videos will illustrate the correct surgical technique and tips to avoid common surgical pitfalls.

**Course Outline:** Overview — clinical need and patient selection (10 minutes). The role of MIGS in the current treatment algorithm will be discussed. The distinctions in patient selection between MIGS and trabeculectomy / tube implant surgery will be highlighted. Trabecular bypass devices (20 minutes). The surgical technique for implanting trabecular bypass devices (iStent) will be illustrated by surgical videos. Evidence for the efficacy of these devices and the postoperative management will be discussed. Subconjunctival devices (20 minutes) The surgical technique for implanting subconjunctival devices (XEN-45, InnFocus microshunt) will be illustrated by surgical videos. The preliminary results of the XEN-45 Phase IV study will be discussed. Potential complications and postoperative management will be highlighted. Suprachoroidal devices (15 minutes). The surgical technique for implanting suprachoroidal devices (Cypass) will be illustrated by surgical videos.

Evidence for the efficacy of Cypass and postoperative management will be discussed. Summary (5 minutes). Questions & Answers (10 minutes).

## Ocular Imaging

Mar 08, 2019 (Fri)

16:30 - 18:00

Venue: Boardroom 2

### Advanced Interpretation of OCT and OCTA for General Ophthalmologists: Front to the Back of the Eye

*Chief Instructor: Anna TAN*

*Instructor(s): Marcus ANG, Yvonne CHUNG, Dolz-Marco ROSA, Leopold SCHMETTERER, Adnan TUFAIL*

**Objective:** To educate general ophthalmologists on the clinical applications of OCT and OCTA in retina, glaucoma, anterior segment, and orbital diseases and to identify common OCT limitations, pitfalls, and misdiagnoses.

**Synopsis:** Optical coherence tomography (OCT) and OCT angiography (OCTA) is a non-invasive, high-resolution technology to study structure and vasculature of ocular structures in greater detail than ever before. In this instructional course, we have a series of lectures and case discussions to introduce the basic concepts of OCT, OCTA, and its clinical applications to diseases in the retina, choroid, optic disc, anterior segment, and the orbit. All instructors have international experience with this relatively new technology and have published multiple peer-reviewed publications in *Ophthalmology*, *Eye*, *IOVS*, *Retina*, and the *British Journal of Ophthalmology*.

**Course Outline:** (1) Introduction to OCT, OCTA and an approach to OCTA interpretation. (2) Common OCT misdiagnosis. (3) Challenging OCTA cases in the retina and choroid. (4) Pearls and pitfalls of OCT and OCTA imaging of the optic nerve. (5) Advanced interpretation of anterior segment OCT and OCTA. (6) OCTA of orbital diseases. (7) Case Discussions - All faculty.

# Ocular Oncology & Pathology

Mar 07, 2019 (Thu)

09:00 - 10:30

Venue: Boardroom 2

## Retinoblastoma 2019: They Live and See

Chief Instructor: Santosh **HONAVAR**

Instructor(s): Fairouz Puthiyapurayil **MANJANDAVIDA**,  
Kaustubh **MULAY**

**Objective:** To enable the participants to incorporate recent advances in the diagnosis and management of retinoblastoma into their practice, with improved life, eye, and vision salvage.

**Synopsis:** Recent advances in the diagnosis and management of retinoblastoma have contributed to improved outcome. Modern diagnostic and treatment strategies such as wide-field imaging; optical coherence tomography; transpupillary thermotherapy; brachytherapy; and intravenous, superselective intra-arterial, periocular, and intravitreal chemotherapy are effective in improving eye and vision salvage. Minimal manipulation enucleation has been optimized. Adjuvant therapy for histopathologic risk factors identified following enucleation has reduced the risk of systemic metastasis. A multimodal protocol is effective in orbital retinoblastoma. Genetic studies now help in prenatal diagnosis and screening. This course will highlight the practical aspects in the current standard of care for retinoblastoma.

**Course Outline:** (1) Diagnosis of Retinoblastoma and Differential Diagnosis. (2) Classification of Retinoblastoma. (3) Eye and Vision Salvage Therapy in Retinoblastoma. (4) Management of Advanced Retinoblastoma. (5) Histopathology of Retinoblastoma – Standardized Reporting and Prognostic Factors.

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: C Ground Meeting Room 1

## The Killer 'Pearl' That Masquerades: Retinoblastoma

Chief Instructor: Manabjyoti **BARMAN**

Instructor(s): Kasturi **BHATTACHARJEE**, Santosh **HONAVAR**, Vikas **KHETAN**, Pukhraj **RISHI**

**Objective:** To generate awareness about diagnosis and management of retinoblastoma, with special emphasis on difficulties in timely diagnosis and management of this tumor.

**Synopsis:** Retinoblastoma is one of the most common and treatable malignancies of childhood with a high survival rate if treated at the right time. However,

often the condition is misdiagnosed or diagnosed late, primarily due to lack of sufficient awareness at various levels. This instruction course is intended to give an insight view of how to diagnose retinoblastoma with basic ophthalmic knowledge and skills, along with various treatment options and outcome. The course will cover the red flag signs, diagnostic challenges including uncommon presentations, and strategies of management and follow-up of this killer tumor.

**Course Outline:** The course will be covered under 5 sub-topics by 5 speakers with experience in the field of ocular oncology. It is structured to cover all aspects of retinoblastoma management in a simple way to make it understandable among all levels of ophthalmologists, with an intent to improve overall retinoblastoma care. The course will start with the topic on importance of leucocoria in children and varied presentations of retinoblastoma, then will cover advances in local and systemic management of retinoblastoma and their follow-up, uncommon presentations including adult retinoblastoma, and the role of enucleation along with management of enucleated socket in retinoblastoma patients.

# Orbital and Oculoplastic Surgery

Mar 06, 2019 (Wed)

11:00 - 12:30

Venue: Boardroom 2

## Lessons Learned in East Asian Eyelid Surgery

Chief Instructor: Audrey **LOOI**

Instructor(s): Kasturi **BHATTACHARJEE**, Chaiteck **CHOO**,  
Sunny **SHEN**, Gillian, Hui Jun **TEHX**

**Objective:** This course aims to familiarize participants with the unique features of the East Asian eyelid and equip them with clinical pearls that enhance ptosis repair and blepharoplasty in this population.

**Synopsis:** The journey towards successful East Asian eyelid surgery begins with a better understanding of the unique anatomical features in the Oriental eyelid. What is the significance of the lower-positioned transverse ligament or the medial pretarsal adipose tissue? Advancing from anatomy, how does one design the upper lid crease? Is medial epicanthoplasty indicated? Why are some ptosis repairs successful and others not quite so? Which lower blepharoplasty technique works best in the East Asian eyelid? Can filler injection augment surgical lower blepharoplasty? This course has been designed to provide the essential information that will allow these questions to be answered comprehensively.

**Course Outline:** Understanding structural differences

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in the East Asian eyelid (Dr Gillian The). Understanding the pitfalls in East Asian upper blepharoplasty (Dr Audrey Looi). True lifting in ptosis surgery (Dr Sunny Shen). Lower blepharoplasty – Do it right and fix it right (Dr Chai-Teck Choo). Filler augmentation in lower blepharoplasty (Dr Kasturi Bhattacharjee).

**Mar 07, 2019 (Thu)**

**14:30 - 16:00**

**Venue: Boardroom 2**

### **Orbital Venolymphatic Malformations: Toolbox for Management**

*Chief Instructor: Daniel **ROOTMAN***

*Instructor(s): Weerawan **CHOKTHAWEESEK**, Pornchai **MAHAISAVARIYA**, Bunyada **PUTTHIRANGSIWONG***

**Objective:** To update the classifications and provide an approach to the diagnosis and management for both simple and complex orbital and periorbital venolymphatic anomalies.

**Synopsis:** Vascular anomalies are disorders of vasculogenesis that affect arteries, capillaries, veins, or lymphatics. These disorders are increasingly understood as a spectrum of disease, with individual lesions containing varying vascular components. This course will provide updates on the classification of these disorders and guidance in management. The lesions are broken down into the constituent components, and through an understanding of the physiology and morphology of each element, specific treatment is described.

**Course Outline:** 1) Lecture: Overview of the classification for orbital and periorbital vascular anomalies 2) Lecture: Venolymphatic malformations (clinical manifestation, classification, pathogenesis, imaging, management) - Venous Malformations: Distensible/ Non-distensible lesions -Lymphatic Malformations: Macrocyst/Microcyst lesions 3) Case discussion 4) Questions & Answers.

**Mar 08, 2019 (Fri)**

**16:30 - 18:00**

**Venue: C Ground Meeting Room 1**

### **Orbit, Oculoplastic Surgery, Ophthalmic Oncology: What's New**

*Chief Instructor: Gangadhara **SUNDAR***

*Instructor(s): Santosh **HONAVAR**, Dongmei **LI**, Toru **SUZUKI**, Kyung In **WOO***

**Objective:** The aim of the course was to highlight recent advances in the diagnosis and management of complex and challenging congenital and acquired eyelid, lacrimal, and orbital disorders.

**Synopsis:** Several advances have been made in the current understanding and pathogenesis of varied orbit and oculoplastic conditions, their diagnosis,

thresholds for intervention, and their management. These advances include imaging modalities, along with both medical and surgical innovations. The instructors, experts in their own field, will share how practice has changed from traditional approaches with their outcomes to more advanced, minimally invasive, multimodality approaches to congenital and acquired challenging and complex conditions that affect the eyelids, lacrimal system, and orbits.

**Course Outline:** The instruction course comprising global experts and pioneers from various Asia Pacific nations in the field of ophthalmic plastic surgery shall share the most recent advances and developments in their fields with topics as follows: (1) Nonsurgical correction of eyelid retraction in TED. (2) Cone beam CT scan in lacrimal drainage disorders. (3) Challenges and advances in cryptophthalmos management. (4) What's new in ophthalmic oncology - ocular and orbital tumors. (5) What's new in orbital trauma.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: C Ground Meeting Room 1**

### **Expanding Horizons in Oculofacial Aesthetic Surgery: Frontiers to Maximize Pearls and Minimize Perils**

*Chief Instructor: Kasturi **BHATTACHARJEE***

*Instructor(s): Yip **CHEE CHEW**, Shu-Lang **LIAO**, Akshay **NAIR**, Hunter **YUEN***

**Objective:** Aging of 1 or more facial units leads to aesthetic and functional disharmony. This course aims to present the nuances of oculofacial aesthetic surgery with step-by-step video illustrations.

**Synopsis:** This instructional course will present the dynamics of oculofacial aging, along with pertinent anatomy related to oculofacial aesthetic surgery. The course will demonstrate step-by-step video illustrations of browlift surgery, upper and lower eyelid blepharoplasty, lateral canthopexy, and pearls in midface lift surgery. Moreover, it will highlight revision eyelid surgery in managing unrealistic patient expectations. Examples will be provided by careful analysis of pre and postoperative photos and pearls shared for managing complications. At the end of the course all participants will understand the nuances of oculofacial aesthetic surgery as well as management of postoperative complications for the procedures discussed.

**Course Outline:** It is reported that the number of oculofacial aesthetic surgeries has increased every year, with eyelid surgery being among the top 5 common aesthetic surgeries performed globally. In this instructional course, a panel of speakers from different Asian countries will highlight their experiences of performing oculofacial aesthetic surgeries with an Asian standpoint, as beauty standards differ with race

and ethnicity. The speakers are global oculoplastic fellowship preceptors with years of experience in teaching and training. This course will highlight step-by-step video illustrations of the anatomical paradigms in facial aging, the surgical nuances of Asian upper and lower eyelid blepharoplasty, browlift surgery, revision blepharoplasty in managing unrealistic patient expectations, steps of adjunctive internal lateral canthopexy, and pearls in fat reposition with midface lift surgery. The course will help the participants develop a framework to improve patient selection, patient communication, and expectation management with enhanced surgical judgment and skill.

## Pediatric Ophthalmology & Strabismus

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Meeting Room 2

### Overview of Innovations in Pediatric Cataract Surgery

*Chief Instructor: Harsha BHATTACHARJEE*

*Instructor(s): Nilutparna DEORI, Kanwal 'Ken' NISCHAL, Abhay VASAVADA, Phanthipha WONGWAI*

**Objective:** This course aims to teach and discuss the cutting-edge advances in pediatric cataract surgery, intraocular lens (IOL) implantation, and postoperative rehabilitation.

**Synopsis:** Evolving technology has witnessed a paradigm shift in maximizing the quality of vision in the management of pediatric cataracts. This video-based Masterclass is an endeavor to familiarize the delegates with the recent Innovations in the field of pediatric cataract surgery, where renowned experts in the field will discuss the evolving technologies from selection of appropriate IOL power, to use of intraoperative optical coherence tomography (OCT) and Femtosecond laser-assisted cataract surgery. It will also elucidate the approach to management of neonatal cataracts, and shall address the neuro-developmental assessment of children undergoing cataract surgery.

**Course Outline:** (1) Newer approaches to management of neonatal cataracts. (2) Role of intraoperative OCT in pediatric cataract surgery. (3) Optic capture and femtosecond laser in pediatric surgeries. (4) Advances in pediatric IOL power calculation (5) Updates in neuro-developmental assessment following pediatric cataract surgery.

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: Meeting Room 4

### Treatment of Retinopathy of Prematurity: Diagnosis and Management

*Chief Instructor: Anna ELLS*

*Instructor(s): Atchara AMPHONPHRUET, Wai-Ching LAM, Wei-Chi WU*

**Objective:** Discuss and reinforce both standard and advanced approaches to medical and surgical treatments for retinopathy of prematurity (ROP) with an emphasis on innovative techniques.

**Synopsis:** This instructional course will include 4 segments of ROP treatment and management. The first section will discuss primary and secondary laser treatment and insight into laser to the vascular and avascular retina. Tips and tricks will be provided to help attendees maximize regression of ROP using laser. The second section will review the indications, procedures, instrumentation, and advancements involved in surgical management of ROP. The third section will provide an overview of pharmacological options, such as intravitreal anti-VEGF treatment, and include a discussion of pivotal clinical trials. The fourth section will include presentation and discussion of interesting ROP cases.

**Course Outline:** (1) Discussion of primary and secondary laser treatment and insight into laser to the vascular and avascular retina. Tips and tricks to maximize regression of ROP using laser. (2) Review of indications, procedures, instrumentation, and advancements involved in surgical management of ROP. (3) Overview of pharmacological options, such as intravitreal anti-VEGF treatment, and discussion of pivotal clinical trials. (4) Presentation and discussion of interesting ROP cases.

## Retina (Surgical)

Mar 08, 2019 (Fri)

11:00 - 12:30

Venue: Boardroom 3

### Management of RRD in 2019

*Chief Instructor: Pear PONGSACHAREONNONT*

*Instructor(s): Nicola GAN, Srinivas JOSHI, Wai-Ching LAM, Sherman VALERO*

**Objective:** The objective of this course is to provide a review of the rational approach of decision-making, patient evaluation, and approach to management in RRD.

**Synopsis:** The management of rhegmatogenous retinal detachment (RRD) has evolved from scleral buckle

surgery from over 50 years to modern-day small gauge vitrectomy. In fact, there are also other surgical options at the disposal of the surgeon such as pneumatic, suprachoroidal injection, etc. This course will present the rational approach of decision-making, patient evaluation, and management of RRD in the current era. Topics covered will include classification and prognosis of RRD, choice of RRD treatments, role of combined lens removal and vitrectomy, management of RRD in complicated situations (dislocated IOL, post corneal transplantation, etc.), and latest advances in vitrectomy.

**Course Outline:** The outline of this IC are: (1) The evolution of classification scheme on RRD, clinical evaluation of RRD, and prognosis of RRD. (2) Step-by-step approach of various techniques for RRD treatment, from traditional scleral buckle, pneumatic retinopexy, vitrectomy, and modern techniques eg: suprachoroidal buckle. (3) Vitrectomy surgery and role of lens removal with RRD, including special consideration: IOL selection, IOL calculation. (4) RRD management in complicated situations, such as decentering of IOL, endophthalmitis, and post penetrating keratoplasty, etc. (5) Update with the latest advances in technology for RRD surgery in 2019, including new vitrectomy machine and hypersonic vitrectomy.

# FREE PAPERS

## Academia, Research, Teaching and Education in Ophthalmology

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: Plenary Hall 3

### Anti-Vascular Endothelial Growth Factor A/ Anti-Angiopoietin-2 Bispecific Antibody Faricimab in Diabetic Macular Edema: Efficacy and Safety Results From the Phase 2 BOULEVARD Randomized Clinical Trial

First Author: Gemmy **CHEUNG**

Co-Author(s): Meike **PAULY-EVERS**, Shamil **SADIKHOV**, Jayashree **SAHNI**, Piotr **SZCZESNY**, Robert **WEIKERT**

**Purpose:** Faricimab is the first bispecific antibody designed for intraocular use, and simultaneously binds and neutralizes angiopoietin-2 and vascular endothelial growth factor A (VEGF-A). The efficacy and safety of faricimab versus ranibizumab in diabetic macular edema (DME) was evaluated.

**Methods:** The phase 2, prospective, multicenter BOULEVARD trial (NCT02699450) recruited patients with center-involving DME, who received monthly intravitreal 0.3 mg ranibizumab, or 1.5 mg or 6.0 mg faricimab for 20 weeks, followed by a 16-week off-treatment observation period. The primary efficacy outcome measure was mean change in best-corrected visual acuity (BCVA) from baseline to week 24 in treatment-naïve DME patients.

**Results:** A total of 168 treatment-naïve and 61 previously anti-VEGF treated patients were enrolled. In treatment-naïve patients, BCVA improved in all arms, with 6.0 mg faricimab resulting in statistically significantly greater BCVA gain than ranibizumab (+3.6 letters,  $P = 0.03$ ). At week 24, the proportion of patients gaining  $\geq 15$  letters increased by 32% with 6.0 mg faricimab relative to ranibizumab, and CST improved in all arms. The proportion of patients experiencing a  $\geq 2$ -step diabetic retinopathy severity score improvement was greater with 1.5 mg faricimab (28%) and 6.0 mg faricimab (39%) than with ranibizumab (12%), as were the proportions maintaining disease stability in the off-treatment period. Faricimab was well-tolerated, with a safety profile comparable with ranibizumab.

**Conclusions:** BOULEVARD met its primary endpoint, with 6.0 mg faricimab demonstrating clinically meaningful and statistically significant greater visual acuity gains versus ranibizumab in patients with DME. These results support further investigation of the efficacy, safety and durability of faricimab.

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: Plenary Hall 3

### Anti-Vascular Endothelial Growth Factor-A / Anti-Angiopoietin-2 Bispecific Antibody Faricimab in Neovascular Age-Related Macular Degeneration: Results of Phase 2 Trials

First Author: Timothy **LAI**

Co-Author(s): Karen **BASU**, Aaron **OSBORNE**, Shamil **SADIKHOV**, Jayashree **SAHNI**, Piotr **SZCZESNY**

**Purpose:** Faricimab is the first bispecific antibody designed for intraocular use, and simultaneously binds and neutralizes both angiopoietin-2 (Ang-2) and vascular endothelial growth factor-A (VEGF-A). The efficacy and safety of faricimab has been evaluated in 2 phase 2 trials in patients with choroidal neovascularization (CNV) secondary to neovascular age-related macular degeneration (nAMD).

**Methods:** AVENUE (NCT02484690) and STAIRWAY (NCT03038880) are multi-center, randomized, comparator-controlled, parallel-group phase 2 trials that enrolled patients with CNV due to nAMD. In AVENUE, patients ( $n = 273$ ) were randomized 3:2:2:2:3 to 5 arms: 0.5 mg ranibizumab q4w (every 4 weeks); 1.5 mg faricimab q4w; 6.0 mg faricimab q4w; 6.0 mg faricimab for 4 doses at q4w followed by q8w (every 8 weeks); or 0.5 mg ranibizumab for 3 doses at q4w followed by 6.0 mg faricimab q4w. In STAIRWAY, patients ( $n = 76$ ) were randomized 2:2:1 to 3 arms: 6.0 mg faricimab for 4 doses at q4w followed by q12w (every 12 weeks) or q16w (every 16 weeks); or 0.5 mg ranibizumab q4w. The primary efficacy endpoint was mean best-corrected visual acuity (BCVA) change from baseline at week 36 in AVENUE and at week 40 in STAIRWAY.

**Results:** The AVENUE and STAIRWAY trials recruited 273 and 76 nAMD patients, respectively. Both trials have completed, with 36-week primary endpoint data from AVENUE and 52-week full data from STAIRWAY now available.

02

FREE PAPERS

**Conclusions:** The faricimab nAMD phase 2 program assessed the safety, efficacy, and durability of faricimab. Results from the phase 2 trials, assessing dual VEGF/Ang-2 inhibition by the bispecific faricimab antibody, will be presented.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Boardroom 2**

### **Corneal Rim and Tackdriver as Innovative Minimally Invasive Glaucoma Surgery Training Models**

*First Author: Malcolm **GOOI***

*Co-Author(s): Anish **ARORA**, Helen **CHUNG**, Bryce **FORD**, Dani **WANG**, Danielle **WENTZELL***

**Purpose:** To introduce Corneal Rim ("K-RIM") and "Tackdriver" as 2 innovative angle surgery skills development models for minimally invasive glaucoma surgeries (MIGS).

**Methods:** Human cadaveric corneoscleral rims are used in both models for simulation of iStent and Gonioscopy-Assisted Transluminal Trabeculotomy (GATT) procedures. In the K-RIM model, the specimen is trephinated at surgical 3 and 9 clock hours with two 9-mm trephines, fixated upwards on a 30-degree angle Styrofoam base. Medical lubricant was used as the optical coupler, filling the anterior chamber. In the Tackdriver model, the apex of inverted corneoscleral rims was secured with tacks. To maximize tissue use, iStent procedures were completed before GATT procedures.

**Results:** High-volume surgical skills development for MIGS procedures can be done with both of the described training models, requiring very little preparation and setup. The Tackdriver model provided more stability, consistency, and was slightly easier to assemble. Both models were economical and ergonomic in their utilization, providing realistic tactile feedback during bimanual technique training with gonioscopy. Both models allowed for multiple iStent placements and GATT procedures, although Schlemm's canal buckling in the K-RIM model made GATT procedures problematic.

**Conclusions:** Using cadaveric corneoscleral rims for surgical skills training in MIGS procedures provides a means to recreate in vivo conditions for training purposes. These models are inexpensive and efficient approaches to simulate MIGS procedures and can be useful additions to the small number of available MIGS training resources.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Boardroom 4**

### **The Effect of SS31 on ARPE-19 Cells During Oxidative Stress**

*First Author: Zejun **CHEN***

*Co-Author(s): Yuan **HE***

**Purpose:** To establish the model of oxidative injury on ARPE-19 cells with H<sub>2</sub>O<sub>2</sub> treatment and investigate the effect of SS31 on ARPE-19 cells during oxidative stress.

**Methods:** ARPE-19 cells were cultured and treated with H<sub>2</sub>O<sub>2</sub> at 150, 200 and 250 µmol/L respectively to establish the model of oxidative injury. Cell morphology was observed by inverted phase contrast microscope. The cell viability was detected by MTT and the optimal concentration of H<sub>2</sub>O<sub>2</sub> was detected. The concentration of 200 µmol/L H<sub>2</sub>O<sub>2</sub> was chosen to establish the model. The experiment was divided into control group, H<sub>2</sub>O<sub>2</sub> injury group, H<sub>2</sub>O<sub>2</sub>+10 nmol/LSS31 group, H<sub>2</sub>O<sub>2</sub>+100 nmol/LSS31 group and H<sub>2</sub>O<sub>2</sub>+1 µmol/LSS31 group.

**Results:** It was found that H<sub>2</sub>O<sub>2</sub> can significantly reduce the viability of ARPE-19 cells at a dose-dependent manner. 200 µmol/L H<sub>2</sub>O<sub>2</sub> reduced the survival rate of ARPE-19 cells by 60% compared with the control group. The cell survival rate of H<sub>2</sub>O<sub>2</sub> group was decreased to 58.11% (+12.87) when compared with the control group 82.69% (+5.96), which showed statistically significant differences. The elevation of cell survival rate in 1 µmol/LSS31 group was most obvious. With the increase of H<sub>2</sub>O<sub>2</sub> concentration, the number of living cells was decreased and the cells were wizened gradually in morphology. With the increase of SS31 concentration, the number of living cells increased and the cells tended to be normal in morphology gradually.

**Conclusions:** We speculate that SS31 presents a kind of protective function on ARPE-19 cells under oxidative injury.

## **Cataract**

**Mar 07, 2019 (Thu)**

**11:00 - 12:30**

**Venue: Boardroom 3**

### **Alignment of Toric IOL via Automated Femtosecond Laser-Assisted Capsular Marks**

*First Author: Detlev **BREYER***

*Co-Author(s): Gerd **AUFFARTH**, Philipp **HAGEN**, Hakan **KAYMAK**, Karsten **KLABE**, Florian **KRETZ***

**Purpose:** A recent study has shown that approximately 30% of the postoperative angular misalignment of toric intraocular lenses (IOLs) is caused by inaccurate IOL

placement during surgery. Via novel laser capsulotomy patterns, the implantation axis markings can now be incorporated as opposing tabs on the capsulotomy edge. Thus, a very precise line is defined that allows for an accurate matching between the IOL axis and the implantation axis, and potential tilt errors are minimized. The aim of this retrospective analysis was to evaluate the intraoperative as well as the postoperative IOL axis alignment.

**Methods:** We included 90 eyes (consecutive cases) with cataract surgery or refractive lens exchange by LENSAR (Topcon) with automated iris registration using Cassini (i-Optics) and toric IOL axis alignment by capsular marks using IntelliAxis-L (Topcon). Afterwards, phacoemulsification and implantation of the toric IOL was performed. Directly after surgery as well as 3 months postoperatively, the eye was photographed such that intraoperative misalignment and postoperative rotation could be determined.

**Results:** The intraoperative alignment error was  $0.83^\circ \pm 0.86^\circ$ , which is roughly half as much as the recently reported literature-value  $1.87^\circ \pm 2.11^\circ$  using the manual marking technique. The postoperative rotation was  $0.53^\circ \pm 5.01^\circ$ . The correction index was  $1.08 \pm 0.32$ , and the index of success was  $0.31 \pm 0.30$ .

**Conclusions:** From our data analysis, we see a further reduction in intraoperative misalignment of toric IOLs by using femtosecond laser-assisted automated capsular marks. Although the factor of this reduction is of the order of 0.5 compared to manual axis alignment, its effects on astigmatic correction in our data are not significant.

Mar 07, 2019 (Thu)

11:00 - 12:30

Venue: Boardroom 3

### Associated Factors Influencing the Full-Distance Visual Acuity After Refractive Rotationally Asymmetric Multifocal Intraocular Lens Implantation

First Author: Yong **WANG**

Co-Author(s): Xiao **WANG**

**Purpose:** To investigate the independent factors associated with distance, intermediate, and near visual acuity in patients implanted with refractive rotationally asymmetric multifocal intraocular lens (MIOL).

**Methods:** A total of 34 eyes of 25 patients who underwent unilateral cataract surgery, followed by implantation of rotationally asymmetric MIOLs were included. Uncorrected and corrected distance visual acuity (UCVA, CDVA), intraocular aberrations, mesopic and photopic pupil diameters, mesopic and photopic kappa angles, and pupil center shift were assessed. The Spearman correlation analysis was performed on the above factors and the logMAR visual acuity (VA) of +1.0

diopter (D) to -4.0 D defocus, UDVA, and CDVA.

**Results:** Significant improvements in UDVA and CDVA were found postoperatively ( $P < 0.05$ ). The horizontal trefoil aberration was inversely correlated with logMAR VA of -0.5 D ( $r = -0.377$ ,  $P < 0.05$ ) and -1.0 D ( $r = -0.369$ ,  $P < 0.05$ ) defocus. The vertical trefoil aberration was inversely correlated with logMAR VA of -2.5 D defocus ( $r = -0.347$ ,  $P < 0.05$ ). Total high-order aberration in the eye was inversely correlated with logMAR VA of -0.5 D to -3.5 D defocus. Furthermore, the positive correlation was observed between photopic kappa angle and logMAR VA of -0.5 D ( $r = 0.315$ ,  $P < 0.05$ ). Spherical aberration was positively correlated with full-distance logMAR VA corresponding defocus curve.

**Conclusions:** Refractive rotationally asymmetric MIOL provided satisfying visual acuity for distance and near with a good range of intermediate vision. The introduction of total high-order and trefoil aberrations may play an important role in achieving good VA. However, spherical and coma aberration may limit the potential visual benefit. And a limited but statistically inverse correlation of the photopic kappa angle with the far vision.

Mar 07, 2019 (Thu)

11:00 - 12:30

Venue: Boardroom 3

### Clinical Outcomes with an Extended Range of Vision Intraocular Lens with and without Toricity. Australian Results of the CRESCENDO Multicenter Study

First Author: Frank **HOWES**

**Purpose:** To analyze the clinical results of a multicenter study (CRESCENDO study) with an extended range of vision (ERV) intraocular lens (IOL).

**Methods:** Retrospective/prospective multicenter study including 84 patients of Australian study sites to evaluate the clinical outcomes with the toric and non-toric version of the ERV IOL Tecnis Symphony (Johnson & Johnson Vision). Visual acuity, refraction, patient satisfaction, and photic phenomena were evaluated at 4 to 8 weeks and at 4 to 6 months after surgery.

**Results:** A significant reduction in manifest cylinder and improvement in corrected distance visual acuity was found with surgery ( $P < 0.001$ ). At 4-6 months postoperatively, 90.48%, 85.19% and 71.08% of eyes achieved 0.0 logMAR binocular uncorrected distance (UDVA), intermediate (UIVA), and near visual acuity (UNVA), respectively. A total of 98.8%, 91.7%, and 62.5% of eyes were spectacle independent for distance, intermediate, and near visual activities, respectively. With respect to photic phenomena, 87.5%, 94.0%, and 96.4% of eyes did not perceive halos, glare, or starbursts at the end of the follow-up, respectively.

Almost all patients (98.8%) would choose the same IOL again and would recommend the surgery to a relative or friend. The results with the toric model of the ERV IOL were also excellent, with 89.3% of eyes showing a manifest cylinder of 0.50 D or below at 4 to 6 months postoperatively.

**Conclusions:** The ERV IOL Tecnis Symphony is an effective option to restore visual function across distances after cataract surgery with minimal incidence of disturbing photic phenomena.

**Mar 07, 2019 (Thu)**

**11:00 - 12:30**

**Venue: Boardroom 3**

### Comparison of Intraocular Lens Calculation Formulas for Phacoemulsification After Corneal Refractive Surgery at a Single Eye Center in the Philippines

*First Author: Cris Martin JACOBA*

*Co-Author(s): Ellen SY*

**Purpose:** To compare the different intraocular lens (IOL) calculation formulas available with the American Society of Cataract and Refractive Surgery (ASCRS) IOL power calculator in eyes with previous corneal refractive surgery.

**Methods:** A retrospective cohort study of 145 eyes in 105 patients who had phacoemulsification and previous laser in situ keratomileusis (LASIK) or photorefractive keratectomy (PRK) was done. Through using the actual manifest refractive spherical equivalent (MRSE) after phacoemulsification as target refraction, predicted IOL power for each formula was calculated. Refractive PE was computed by assuming that 1 diopter (D) of IOL PE produces 0.7 D of refractive error at the spectacle plane.

**Results:** With the Shammas, Haigis-L, Barrett True K no history, ASCRS average no history, Barrett True K, and ASCRS Average with  $\Delta$ MR, the mean IOL prediction error was -0.44 D, -0.58 D, -0.24 D, -0.41 D, -0.20 D, -0.26 D respectively, the median refractive PEs were 0.41 D, 0.50 D, 0.36 D, 0.38 D, 0.36 D, 0.32 D respectively, and the percentage of eyes within 0.5 D of refractive PE were 42.1%, 45.5%, 49%, 44.8%, 48.4%, and 54% respectively. The Haigis-L IOL PE was significantly higher than the Barrett True K ( $P < 0.05$ ), and the Haigis-L refractive PE was significantly higher than the ASCRS average with  $\Delta$ MR ( $P < 0.05$ ). The ASCRS average with  $\Delta$ MR produced a significantly smaller variance of IOL PE than the other formulas ( $P < 0.05$ ).

**Conclusions:** For no history method the Barrett True K No History is a promising formula, while for methods with  $\Delta$ MR either the Barrett True K or the ASCRS average can be used. The Haigis-L has the highest IOL and refractive PE.

**Mar 07, 2019 (Thu)**

**11:00 - 12:30**

**Venue: Boardroom 3**

### Evaluating the Role of Chamber Depth and Lens Thickness on the Choice of Intraocular Lens Calculation

*First Author: Khanh TRAN*

*Co-Author(s): Nguyen Xuan HIEP, Linh VU THI THUY*

**Purpose:** To evaluate the role of chamber depth and lens thickness on the choice of intraocular lens (IOL) calculation and to propose the formulas in accordance with each patient.

**Methods:** A prospective, descriptive study of the patients with normal AL and astigmatism  $\leq 1.5$  diopters (D) undergoing uncomplicated phaco with IOL implantation. The ocular biometry was measured with LENSTAR LS900. For analysis, preoperative ACD was divided into 3 subgroups:  $\leq 3$ , 3–3.5, and  $\geq 3.5$  mm. LT was divided into 2 subgroups:  $< 4.5$ ,  $\geq 4.5$  mm. The ME and MAE of each formula (SRKT with Olsen formulas) was compared for each subgroup at 3 months' follow-up. The difference between the ME and MAE of the formulas were compared for each ACD subgroup.

**Results:** A total of 137 eyes of 114 patients were followed. The mean ACD was  $3.16 \pm 0.51$  mm, mean LT was  $4.35 \pm 0.49$  mm. MAE were  $0.42 \pm 0.29$  D and  $0.28 \pm 0.26$  D with SRKT and Olsen formulas, respectively. The difference was statistically significant ( $P < 0.001$ ). With ACD (3.0–3.5 mm), there is no difference between SRKT and Olsen formulas. However, with ACD  $\leq 3.0$ ;  $\geq 3.5$  mm and LT  $< 4.5$ ;  $\geq 4.5$  mm, Olsen formula was a significantly better predictor than SRKT ( $P < 0.01$ ). There was a strong correlation between ACD and LT with  $r = -0.67$  and  $P < 0.001$ .

**Conclusions:** ACD and LT were important factors in IOL power calculation. The Olsen formula was the best choice for all ACD and LT subgroups in patients with normal AL.

**Mar 07, 2019 (Thu)**

**11:00 - 12:30**

**Venue: Boardroom 3**

### How Good is the American Society of Cataract and Refractive Surgery Online Calculator in Predicting Cataract Surgery Outcomes in Patients Post LASIK and Post Radial Keratotomy?

*First Author: Sudhir RACHAPALLE REDDI*

*Co-Author(s): Saurav CHOWDHURY, Padmanabhan PREMA, Jayasree RAMANAN*

**Purpose:** To assess the accuracy of ASCRS online calculator in predicting cataract surgery outcomes in patients Post Lasik and Post Radial Keratotomy surgery.

**Methods:** Retrospective review of all patients who underwent cataract surgery following Lasik or Radial keratotomy in a tertiary eye care center who were evaluated between 2006 and 2018. Using the postoperative refractive data that is available, the emmetropic intraocular lens (IOL) power was back-calculated. ASCRS online calculator was used with the data from the Pentacam and from WavelightAlegreto Biograph to calculate the IOL power required for achieving emmetropia. The IOL prediction error is calculated as a difference between the back-calculated IOL and IOL value obtained from ASCRS average, minimum, and maximum of all formulas.

**Results:** A total of 169 eyes of 119 post-Lasik cataract surgery patients and 73 eyes of 49 post-RK cataract surgery patients were analyzed. The prediction error was the least  $0.39 \pm 0.20$  diopters (D) ( $P = 0.06$ ) with ASCRS minimum of all formulas for post-Lasik eyes compared to IOL value obtained from average or maximum of ASCRS formulas. Similarly, in post-RK eyes ASCRS minimum of all formulas had least predictive error  $0.70 \pm 0.35$  D ( $P = 0.046$ ). ASCRS minimum had best prediction when compared with different axial length categories except in high myopes with axial length greater than 30 mm.

**Conclusions:** IOL power obtained from the ASCRS minimum of all formulas gives less prediction errors both in post-Lasik and post-RK eyes and can be safely used.

**Mar 07, 2019 (Thu)**

**11:00 - 12:30**

**Venue: Boardroom 3**

### **Incidence and Outcomes of Toric IOL Repositioning Surgery**

*First Author: Haripriya **ARAVIND***

*Co-Author(s): David **CHANG***

**Purpose:** To analyze the incidence and outcome of toric intraocular lens (IOL) repositioning.

**Methods:** Retrospective case series of patients who underwent toric IOL repositioning using iTrace planner between 2015 and 2017 at Aravind eye hospital, Madurai.

**Results:** Of 4273 toric IOLs, 100 (2.34%) were advised and 70 (1.64%) underwent repositioning. 1.5% (11/733) of hydrophobic acrylic and 1.67% (59/3540) of hydrophilic acrylic toric IOLs underwent repositioning ( $P = 0.89$ ); IOL rotation required was  $44.9^\circ \pm 15.9^\circ$  and  $51.6^\circ \pm 18.8^\circ$ , respectively ( $P = 0.59$ ). Mean interval from cataract surgery was  $20.03 \pm 14.52$  days and follow-up was  $6.3 \pm 8.2$  months. Repositioning surgery reduced preoperative astigmatism from  $1.89 \pm 0.5$  diopters (D) to  $0.73 \pm 0.9$  D ( $P < 0.001$ ), IOL rotation from  $50.6^\circ \pm 18.2^\circ$  to  $5.7^\circ \pm 4.9^\circ$  ( $P < 0.001$ ), and improved unaided vision from  $0.49 \pm 0.2$  to  $0.14 \pm 0.2$  ( $P < 0.001$ ).

**Conclusions:** Toric IOL repositioning was done in 1.64% of eyes, and significantly reduced residual astigmatism and improved visual outcome.

**Mar 07, 2019 (Thu)**

**11:00 - 12:30**

**Venue: Boardroom 3**

### **Influence of Pupil Dilation on Predicted Postoperative Refraction and Recommended IOL Power Calculated by Barrett Universal II IOL Power Calculation Formula**

*First Author: Takeshi **TESHIGAWARA***

*Co-Author(s): Akira **MEGURO**, Nobuhisa **MIZUKI***

**Purpose:** We have previously reported a significant influence of pupil dilation on 4th generation intraocular lens (IOL) calculation formulas, but not 3rd generation. The purpose of this study was to evaluate the influence of pupil dilation on predicted postoperative refraction (PPR) and recommended IOL power calculated by a new generation formula, Barrett Universal II.

**Methods:** This study included 164 eyes. PPR and recommended IOL power were calculated by Barrett Universal II formula pre- and post-dilation, and the influence of dilation on PPR and recommended IOL power were analyzed. ACD and LT were also measured pre- and post-dilation, and correlation between changes in PPR and changes in ACD or LT pre- and post-pupil dilation was analyzed.

**Results:** Mean absolute change pre- and post-dilation in PPR was significant. ACD and LT significantly changed pre- and post-dilation. Change pre- and post-dilation in PPR showed positive correlation with change in ACD and negative correlation with change in LT. In a significant number of cases, recommended IOL power changed pre- and post-dilation.

**Conclusions:** PPR and recommended IOL power calculated by Barrett Universal II were significantly changed by dilation. ACD and LT were significantly changed by dilation. Given the significant correlation between the change in PPR pre- and post-dilation and the change in ACD and LT, the change of ACD and LT is key in the influence of dilation. Conversance to dilation's influence on Barrett Universal II formula is key to improve IOL calculation.

**Mar 07, 2019 (Thu)**

**11:00 - 12:30**

**Venue: Boardroom 3**

### **Ray-Tracing Biometry Formula in Intraocular Lens Calculation in Post-LASIK Eyes Using a Double Scheimpflug Intferferometry Biometer**

*First Author: Daphne **HAN***

**Purpose:** To analyze and report on the outcome of

Okulix ray-tracing biometry in predictability, refractive and visual outcome in eyes undergoing cataract surgery post-LASIK for myopia.

**Methods:** Retrospective case series of up to 20 eyes.

**Results:** Excellent results were obtained in refractive predictability and visual outcome.

**Conclusions:** The Okulix ray-tracing program in conjunction with the Galilei G6 double Scheimpflug infra-red biometer represents a novel and effective method in post-LASIK biometry calculation for cataract surgery.

Mar 07, 2019 (Thu)

11:00 - 12:30

Venue: Boardroom 3

### Refractive Outcome After Clear Lens Extraction with Posterior Chamber Intraocular Lens Implantation for Anterior Lenticonus in a Patient of Alport Syndrome

First Author: Shifat **TOUFIQE**

Co-Author(s): Sarwar **ALAM**, Mamunur Rashid **CHOWDHURY**, Quazi **IFTEKHAR**, Mohammad **MOSTAFA HOSSAIN**

**Purpose:** To describe the refractive outcome after clear lens extraction with posterior chamber intraocular lens (PCIOL) implantation for anterior lenticonus in a patient of Alport syndrome.

**Methods:** A male patient aged 17 years presented himself with bilateral painless progressive diminution of vision and bilateral hearing difficulty for last 12 years. On examination, unaided visual acuity (VA) in right eye was 2/60 and in left eye was 6/60. Best-corrected visual acuity (BCVA) in right eye was 6/60 with -4.50 cyl x 180° and in left eye was 6/36 with -3.50 cyl x 180° in both eyes. Ophthalmic examination revealed oil droplet reflex and anterior lenticonus. Systemic investigations confirmed hereditary nephritis. All other ophthalmic findings were normal. Clear lens phacoemulsification with PCIOL implantation was done.

**Results:** On 1st postoperative day, VA in both eyes was 6/24 unaided. Final postoperative visual acuity after 1 month were 6/6 in both eyes, with -0.75 cyl x 170° in right eye and -0.50 cyl x 150° in left eye. Refractive lenticular astigmatism dramatically decreased, and no ocular complications developed during follow-up period.

**Conclusions:** Clear lens phacoemulsification and foldable intraocular lens implantation is a safe and effective therapeutic choice for patients of Alport syndrome with anterior lenticonus in whom VA is not improved with spectacles.

Mar 07, 2019 (Thu)

11:00 - 12:30

Venue: Boardroom 3

### Results of Astigmatism Correction After Phacoemulsification with Implantation of AT TORBI 709 M Toric IOL

First Author: Khanh **TRAN**

Co-Author(s): Thanh **HOANG**

**Purpose:** To evaluate the results of astigmatism correction after phacoemulsification with implantation of AT TORBI 709 M intraocular lens (IOL) during a 3-month follow-up.

**Methods:** Prospective study including 51 consecutive eyes of 45 patients (mean age: 60.67 ± 20.55 years, 13–86 years) with corneal astigmatism ≥1 diopter (D) (0.98–4.15 D) and undergoing uncomplicated cataract surgery with implantation of AT TORBI 709 M toric IOL. Visual, refractive, and keratometric outcomes as well as IOL rotation were evaluated 1 week, 1 month, and 3 months follow-up. At the end of the follow-up, patient satisfaction and perception of optical/visual disturbances were also evaluated using a subjective questionnaire.

**Results:** At 3 months after surgery, mean logMAR UDVA and CDVA were 0.23 ± 0.11 and 0.13 ± 0.10, respectively. UDVA of 20/40 or better was achieved in 86.3% of eyes and 20/25 or better in 25.5%. CDVA was 20/40 or better in 96.1% of eyes and 20/25 or better in 74.5%. Mean refractive cylinder decreased significantly from -2.26 ± 0.59 to -0.61 ± 0.28 D (P < 0.001) while keratometric cylinder did not change significantly. IOL rotation was lower than 5 degrees in 72.5%. Mean patient satisfaction score was 8.08 ± 1.02, using a scale from 0 (not at all satisfied) to 10 (very satisfied).

**Conclusions:** Phacoemulsification with implantation of the AT TORBI 709 M intraocular lens is a predictable and effective procedure for visual rehabilitation in eyes with cataracts and low-to-high corneal astigmatism, providing a quite good postoperative ocular optical quality.

Mar 07, 2019 (Thu)

11:00 - 12:30

Venue: Boardroom 3

### Silicone IOLs ... Breaking the Superstition

First Author: Jeyanthan **SOUNDARAPANDIAN**

Co-Author(s): Raghupathy **A**, Nivean **MADHIVANAN**, Atheek **SHAIK**, Rithulaa **R**

**Purpose:** To analyze the intraoperative behavior and postoperative outcomes of silicon intraocular lenses (IOLs), used in cataract surgery by phacoemulsification at a secondary eye care center.

**Methods:** This was a prospective, interventional study

on 300 eyes with age-related cataracts and variable axial length, which underwent phacoemulsification with silicon IOL implantation. It was a single surgeon case series, done in a period of 6 months, from January 2017 to June 2017. All were followed up for a period of 1 year. Intraoperative behavior of the IOL and postoperative outcomes were assessed, both objectively and subjectively through a questionnaire.

**Results:** Loading, insertion, and unfolding of the IOL was controlled and convenient. Positioning of IOL in bag was stable. Minimal manipulation was required. No complaints of visual distortions / disturbances were noted by the patients. Satisfaction level was considerably better as judged by the questionnaire. No calcification / surface modification was noted at 1-year follow-up.

**Conclusions:** Silicon IOLs are safe and effective options in routine cataract surgery. The intraoperative handling is easy. Postoperative complications are minimal. Postoperative incidence of PCO is less in our study in the 1-year follow-up period, in contrast to the previous studies. Silicon IOLs deliver a high degree of satisfaction for patients and surgeons alike.

**Mar 07, 2019 (Thu)**

**11:00 - 12:30**

**Venue: Boardroom 3**

### Vector Analysis of Anticipated Residual Astigmatism and Actual Residual Astigmatism in Toric IOL Implantation Using Callisto Eye

*First Author: Kukuh **PRASETYO***

*Co-Author(s): Johan **HUTAUROK**, Ucok **PASARIBU**, Setiyo Budi **RIYANTO***

**Purpose:** The aim of this study was to investigate the differences of actual residual astigmatism and anticipated residual astigmatism using Alpin's Vector Analysis from toric IOL implantation using Image Guided System (Callisto Eye) and other method.

**Methods:** This was a retrospective case series study done in Jakarta Eye Center. Data were taken consecutively from medical records of Toric IOL implantation from January 2016 to November 2017. Primary data taken were demographic data, anticipated residual astigmatism, and refractive examination both subjectively and objectively. Secondary data was analyzed using Alpin's Vector Analysis to subtract anticipated residual astigmatism from actual residual astigmatism. Spherical equivalent and axis shifting also taken from refractive examination results. Data was divided into subgroup of Toric IOL implantation using Image Guided System and subgroup of Toric IOL implantation using other method.

**Results:** There was a statistically significant difference of subjective refraction vector analysis results between subgroups with difference of 0.312 D ( $P =$

0.004). Objective refraction vector analysis shows no statistically difference between two subgroups ( $P = 0.286$ ). Axis shifting from refractive examination also not statistically significant differ between two subgroups ( $P = 0.432$  and  $0.358$ ). Uncorrected visual acuity at day 1 statistically significant differ between groups with  $P = 0.001$ .

**Conclusions:** Difference between actual residual astigmatism from subjective refraction and anticipated residual astigmatism is lower when using Callisto Eye. Uncorrected visual acuity at day 1 is better when using Callisto Eye compared when using other method.

**Mar 07, 2019 (Thu)**

**11:00 - 12:30**

**Venue: Boardroom 3**

### Visual Quality and Stereoacuity After Binocular Implantation of Extended Range of Vision Intraocular Lens

*First Author: Jeewan **TITIYAL***

*Co-Author(s): Neha **BHARTI**, Manpreet **KAUR**, Namrata **SHARMA***

**Purpose:** To evaluate the visual quality and stereopsis after bilateral implantation of extended range of vision (ERV) intraocular lens (IOL).

**Methods:** Prospective interventional study of 50 patients (100 eyes) bilaterally implanted with ERV IOL after phacoemulsification. Primary outcome measures were visual quality (assessed by iTRACE) and stereopsis (distance and near Randot). Secondary outcome measures were visual acuity and patient satisfaction. Follow-up was performed on day 1 and at 1, 3, 6, and 12 months.

**Results:** The mean age of the patients was  $58.9 \pm 8.9$  years. At 1 year, the mean distance stereopsis was  $103.6 \pm 49.1$  sec arc (range, 60–200 sec arc), and near stereopsis was  $21.1 \pm 2.3$  sec arc (range, 20–30 sec arc). A total of 80% patients had perfect near stereopsis of 20 sec arc, and 82% (41/50) had good distance stereopsis of 100 sec arc or better. Significant inverse correlation was observed between stereopsis and patient satisfaction score ( $P < 0.001$ ) and between distance stereopsis and average internal MTF ( $P < 0.015$ ). Strehl ratio was  $0.029 \pm 0.021$ , average MTF was  $0.24 \pm 0.08$ , total higher order aberrations were  $0.62 \pm 0.41 \mu\text{m}$ , and coma was  $0.25 \pm 0.18 \mu\text{m}$ . The mean binocular decimal visual acuities were  $0.98 \pm 0.07$  for distance,  $0.82 \pm 0.09$  for intermediate, and  $0.64 \pm 0.08$  for near vision. Mean patient satisfaction score was  $9.08 \pm 1.1$ , and no case required an IOL explant due to visually disturbing phenomena or lack of satisfaction.

**Conclusions:** We observed normal binocular interaction with ERV IOLs, which correlated with patient satisfaction and quality of vision.

Mar 08, 2019 (Fri)  
14:30 - 16:00  
Venue: Boardroom 3

### A Comparative Study to Assess 3 Biometric Measurements in Different Axial Length

First Author: Yong **WANG**

Co-Author(s): Bichao **CHEN**, Xueting **LI**, Huang En **LI**

**Purpose:** To assess the level of agreement among the OA-2000 (Tomey, Nagoya, Japan), and the Lenstar LS900 (Haag-Streit, Koeniz, Switzerland) and the IOLMaster500 (Carl Zeiss Meditec, Jena, Germany) in different axial length.

**Methods:** In this prospective clinical study, 479 patients (479 eyes) were measured by Lenstar LS900, IOLMaster500 and OA2000. They were divided into 4 groups according to axial length (AL): short:  $AL \leq 22$  mm (55 eyes), normal:  $22 \text{ mm} < AL \leq 25$  mm (283 eyes), long:  $25 \text{ mm} < AL \leq 28.5$  mm (74 eyes), and extremely long :  $AL > 28.5$  mm (67 eyes). Ocular biometric parameters, including the anterior chamber depth (ACD), AL, keratometry (K): keratometry for the flattest meridian(Kf), keratometry for the steepest meridian(Ks) were obtained. Heterogeneity among devices was assessed by the ANOVA statistic. Bland-Altman plots were used to assess agreement among the instruments.

**Results:** The mean values of the AL, ACD, Kf, Ks differed very little and the differences were not significant regardless of the group (all,  $P > 0.05$ ). As for AL, the agreement was good; 95% LoA of ACD obtained from the OA2000 and the Lenstar LS900 were 0.32 mm, 0.41 mm, 0.29 mm, and 0.11 mm respectively, and the consistency was good especially in the extremely long eye group. However, the high percentage of 95% LoA of K greater than 1 diopter in the most groups is noteworthy.

**Conclusions:** In clinical practice, the IOLMaster500, the Lenstar LS900, and the OA2000 can be used interchangeably for AL measurements. The Lenstar LS900 and the OA2000 agree regarding ACD measurements, especially for the extremely long eye group. As to K, however, they are not interchangeable in clinical uses.

Mar 08, 2019 (Fri)  
14:30 - 16:00  
Venue: Boardroom 3

### A Prospective Comparative Study on Endothelial Cell Loss and Morphology After Femtosecond Laser-Assisted Cataract Surgery and Phacoemulsification Surgery

First Author: Aditya **KELKAR**

Co-Author(s): Jai **KELKAR**, Abhishek **PANDIT**, Priya **SHINDE**

**Purpose:** To compare changes in endothelial cell count and morphology at 6 months follow-up in eyes undergoing femtosecond laser-assisted cataract surgery (FLACS) and conventional phacoemulsification.

**Methods:** This was a prospective, comparative, open-label study. All consenting patients between 50 and 75 years of age with uncomplicated cataracts underwent either FLACS or conventional phacoemulsification based on their preference and were followed up on day 15 and at 2 and 6 months postoperatively. The endothelial cell count (ECC), % of hexagonal cells, and coefficient of variation were noted at baseline and at each follow-up visit and compared between groups.

**Results:** A total of 189 eyes, ( $n = 98$  in phaco vs  $n = 89$  in FLACS) were enrolled. At 15 days follow-up, there was a significant decline in the endothelial cell count in both groups ( $187 \pm 156$  in phaco vs  $193 \pm 240$  in FLACS,  $P < 0.001$ ). In subsequent visits, the ECC remained stable (8% decline in phaco vs 7.7% decline in femto,  $P = 0.87$ ) till last follow-up at 6 months. The % of hexagonal cells also decreased significantly at 15 days postop ( $P < 0.001$ ), but did not show any change in subsequent visits. The coefficient of variation in ECC did not change significantly throughout the study period. Eyes with higher endothelial cell count at baseline tended to lose more cells ( $b = 25.7 \text{ cells/mm}^3$ , 95% CI = 16–35 cells,  $P = 0.01$ ) irrespective of age and type of surgery.

**Conclusions:** Both procedures are equally safe with  $<10\%$  ECC loss at 6 months. Longer studies are required to determine influence of FLACS on ECC.

Mar 08, 2019 (Fri)  
14:30 - 16:00  
Venue: Boardroom 3

### Comparison and Evaluation of Biometers Using Swept-Source Optical Coherence Tomography Compared to Partial-Coherence Interferometry and Optical Low-Coherence Interferometry

First Author: Yong **WANG**

Co-Author(s): Bichao **CHEN**, Xueting **LI**, Huang En **LI**

**Purpose:** To compare measurements taken using an optical low-coherence reflectometry (Lenstar), a swept-

source optical coherence tomography (OA2000) and partial-coherent interferometry (IOLMaster500) in the aspects of agreement, failure rates, and operability.

**Methods:** A total of 469 eyes were scanned with the 3 biometers. Axial length (AL), anterior chamber depth (ACD), keratometry (K), and other parameters were obtained. The number of unobtainable axial length measurements were recorded and grouped as per the type and severity of cataract based on the Lens Opacities Classification System III. In addition, the patient information input time, the examination time, the time from the intraocular lens (IOL) calculation to the printing, and the total time were recorded and compared.

**Results:** The mean values of the AL, ACD, K differed very little ( $P > 0.05$ ). The 95% LoA of AL obtained were good; 95% LoA of ACD obtained from the OA2000 and the Lenstar was 0.46 mm and the consistency was good. The failure rate was 9 eyes (1.9%) with the OA2000, 94 eyes (20%) with the Lenstar, and 117 eyes (24.9%) with the IOLMaster500. The chi-square test showed a significant difference ( $P < 0.01$ ). The total operating time of OA2000 was the shortest ( $109.33 \pm 52.22$  s). Examination with the OA2000 ( $73.47 \pm 40.68$  s) took significantly shorter than IOLMaster500 ( $81.92 \pm 27.46$  s) and Lenstar ( $99.35 \pm 39.14$  s) (both  $P < 0.01$ ). There was no significant difference among the input time and the time from the IOL calculation to the printing (all  $P > 0.01$ ).

**Conclusions:** OA2000, the SS-OCT based biometer, was user friendly, less time consuming, and more effective at obtaining biometric measurements.

Mar 08, 2019 (Fri)

14:30 - 16:00

Venue: Boardroom 3

### Comparison of Different Methods for Photopic and Scotopic Pupil Diameter Measurement and Clinical Analysis on Pupil Diameter Changes of Cataract Patients

First Author: Yong **WANG**

Co-Author(s): Xiao **WANG**

**Purpose:** The purpose of this study was to compare different methods of pupil diameter (PD) measurement using Lenstar LS 900 (Haag-Streit AG), OA-2000 (Tomey, Japan), iTrace (ray-tracing; Tracey Technologies, Houston, TX), and OPD-Scan III (NIDEK, Inc., Fremont, CA) and to analyze the pupil diameter changes in cataract patients.

**Methods:** To analyze the PD of 267 eyes from 148 age-related cataract patients in our hospital from January to September in 2017. Patients were divided into 3 groups: group 1 aged  $\leq 60$  years (78 eyes), group 2 aged 61 to 70 years (95 eyes), and group 3 aged  $> 70$  years (94 eyes). The measurement of photopic PD

was performed by OA-2000 and Lenstar LS 900, and scotopic PD measurement was performed by iTrace and OPD Scan-III before the operation. Statistical analysis of data done using SPSS 23.0 software.

**Results:** Comparison in photopic PD at different ages: group 2 was larger than group 1, with statistical differences ( $P < 0.05$ ), and group 3 showed a significant decrease ( $P < 0.05$ ). There were significant differences of photopic PD measurement used by 3 methods in group 1 and group 2 ( $P < 0.05$ ). And there were no statistical differences of scotopic PD measurement using the 2 methods in each group.

**Conclusions:** There were significant differences of photopic PD measurements in age-related cataract patients among Lenstar LS 900, OA-2000, OPD Scan-III, and iTrace. OPD Scan-III and iTrace showed no statistical differences for scotopic PD measurement. The photopic PD of 3 methods had a decreased tendency correspondingly with ages more than 70 years old.

Mar 08, 2019 (Fri)

14:30 - 16:00

Venue: Boardroom 3

### Outcomes of Cionni-Modified Capsule Tension Ring Implantation in Eyes with Subluxated Lenses

First Author: Mohsin **KHAN**

**Purpose:** To evaluate the intraoperative and postoperative performance of Cionni-modified ring (CTR) aided phacoemulsification and intraocular lens (IOL) implantation in a subluxated lens.

**Methods:** The study population comprised 30 eyes of 25 patients with sub-luxated lenses that underwent lens extraction, capsular bag fixation with modified CTR and in-the-bag (IOL) implantation. Main outcome measures were intraoperative performance and postoperative best corrected visual acuity (BCVA), IOL centration, and complications.

**Results:** The mean age was 36.77 years (4–75 years). Mean extent of subluxation was  $7.1 \pm 2.0$  clock hours. Preoperatively, vitreous was detected in the anterior chambers of 3 eyes (10.0%). Two-port anterior chamber vitrectomy was performed in 3 eyes. Mean follow-up was 24 months. Mean preoperative BCVA was  $0.83 \pm 0.60$  logMAR (30 eyes). Mean postoperative BCVA at final follow-up was  $0.28 \pm 0.32$  logMAR (30 eyes) ( $P < 0.001$ ). In 1 eye (3.33%), IOL decentration was noted and repositioned. Posterior capsule opacification developed in 2 eyes (6.67%) and required Nd:YAG capsulotomy in both cases. Other complications included capsular phimosis in 1 eye (3.33%) and posterior synechiae in 1 eye (3.33%).

**Conclusions:** In-the-bag implantation of a Cionni's modified CTR with IOL appears to be a safe option in

eyes with subluxated cataract, ensuring a stable IOL with few complications.

**Mar 08, 2019 (Fri)**

**14:30 - 16:00**

**Venue: Boardroom 3**

### **Punchorhexis**

*First Author: Mohan **RAJAN***

*Co-Author(s): Sujatha **MOHAN***

**Purpose:** To do a perfect rhexis in white intumescent cataract.

**Methods:** A total of 250 eyes of 250 patients with white intumescent cataract were taken up for this study. Trephine blue was used to stain the anterior capsule. The punchorhexis was done using a straight 15-degree phaco tip bevel down using 40% phaco power, 350 - 400 mm Hg vacuum on the stellaris phaco machine. Once a punch was made, the rhexis was completed either with the phaco needle itself (phaco rhexis) or with uttrata forceps.

**Results:** In all eyes except 1, the punchorhexis was successful.

**Conclusions:** Punchorhexis is an effective method of achieving good rhexis in white intumescent cataracts, thereby preventing argentina flag sign sign.

**Mar 08, 2019 (Fri)**

**14:30 - 16:00**

**Venue: Boardroom 3**

### **Study of Demographic Effects on Intraocular Lens Attributes Preference**

*First Author: Shu-Wen **CHANG***

*Co-Author(s): Wan-Lin **WU***

**Purpose:** To analyze the demographic factors on intraocular lens (IOL) attributes preference.

**Methods:** This retrospective study enrolled 4213 eyes that underwent smooth phacoemulsification by a single surgeon from January 2005 to June 2018. The analyzed attributes included asphericity, astigmatism-correction, presbyopia-correction, and blue-blocking function. Patients were grouped according to their gender, year of surgery, and selected IOL attributes separately. The patients were further divided into 6 age subgroups, ie,  $\leq 40$ , 41-50, 51-60, 61-70, 71-80, and  $\geq 81$  years. Differences in age between genders and among the years at the time of surgery was analyzed. Distribution of selected IOL attributes between gender and among different age groups was also examined.

**Results:** The patients averaged  $68.3 \pm 11.6$  years old at the time of surgery. There was no significant difference between male and female ( $P = 0.405$ ). There were 47.0% selected spheric IOL, 19.5% selected multifocal IOL, 2.2% selected toric IOL, and 20.4% selected

blue-blocking IOL. There was a significant increase in aspheric and multifocal IOL adoption during the study period ( $P < 0.001$ ). More younger patients selected aspheric and multifocal IOL ( $P < 0.001$ ) and the change in trend of adoption over the years was also most significant in the young group ( $P < 0.001$ ). The proportion of patients that selected blue-blocking IOL decreased significantly after 2011 ( $P < 0.001$ ). There was no gender preference in aspheric, multifocal, and toric IOL selection. However, there were more male patients that selected blue-blocking IOL ( $P = 0.018$ ).

**Conclusions:** The adoption of IOL with emerging technology increased significantly over the year. Younger patients tend to adopt advanced technology IOL more than the older ones.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Plenary Hall 1**

### **A Novel Technique for Safe Phacoemulsification in Posterior Polar Cataracts**

*First Author: Minu **MATHEN***

**Purpose:** To evaluate the safety and efficacy of a new phacoemulsification technique for posterior polar cataracts, and to validate the usefulness of a newly designed phaco needle to suit this technique.

**Methods:** This was a prospective case series of 23 consecutive cases of posterior polar cataracts identified by slit lamp examination. No hydroprocedure or nucleus rotation was performed. A novel technique of peripheral coring of central nucleus, with a specially designed phaco needle, was employed. The central nucleus was then emulsified without rotation. The remaining epinucleus and cortex were dissected by manual as well as visco-assisted techniques. The newly designed phaco tip and the technique will be demonstrated by videos. Intraoperative complications, postoperative corneal oedema, iritis, specular microscopy (pre- and postoperative) and best corrected visual acuity at 3 weeks postoperative were noted.

**Results:** There were 10 males 13 females. Successful phacoemulsification with intraocular lens (IOL) implantation was achieved in all cases. Intraoperative complications included 1 capsulorhexis tear during nucleus emulsification and 1 posterior capsule rupture at the end of epinucleus/cortex aspiration. For both these cases, multipiece hydrophobic IOL was implanted in the sulcus. There was no case of nucleus drop. Postoperative corneal edema and iritis were minimal in all cases. The mean endothelial cell count pre and 3 months postoperative were  $2342 \pm 35$  and  $2276 \pm 29$  cells/mm<sup>2</sup>, respectively. Best-corrected visual acuity was 6/6 in all cases after 3 weeks.

**Conclusions:** This novel coring technique using the new

phaco tip design is safe and efficient to prevent nucleus drop in posterior polar cataracts.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Plenary Hall 1

### An Outbreak of Multidrug-Resistant *Pseudomonas aeruginosa* Endophthalmitis After Cataract Surgery Caused by Contaminated Trypan Blue Ophthalmic Solution

First Author: Pritam **BAWANKAR**

Co-Author(s): Manabjyoti **BARMAN**, Chintan **DESAI**, Pushkar **DHIR**, Diva **MISRA**, Ronel **SOIBAM**

**Purpose:** To report the investigation of an outbreak of multidrug-resistant (MDR) *Pseudomonas aeruginosa* endophthalmitis in 13 patients after cataract surgery, and to emphasize the importance of clinical profile, risk factors, and treatment outcomes.

**Methods:** This was a hospital-based, retrospective case study. All 13 consecutive patients who had manual small incision cataract surgery with intraocular lens (IOL) implantation developed acute postoperative *P. aeruginosa* endophthalmitis. The anterior chamber taps, vitreous aspirates, and environmental surveillance specimens were inoculated for culture. Antibiotic susceptibility testing was performed by agar diffusion method. Pulsed-field gel electrophoresis (PFGE) was used to determine the relatedness of bacterial isolates recovered from case patients and contaminated surveillance samples.

**Results:** *Pseudomonas aeruginosa* was isolated from all 13 eyes with acute postoperative endophthalmitis and trypan blue solution used for the surgery. Sensitivity tests revealed that all isolates had an identical resistance to multiple drugs and was found susceptible to only imipenem drug. Genomic DNA typing of *P. aeruginosa* isolates recovered from case patients and trypan blue solutions showed an identical banding pattern on PFGE. Despite the prompt use of intravitreal antibiotics and early vitrectomy with IOL explantation in some patients, outcome was poor in at least 50% of cases.

**Conclusions:** Positive microbiology and the genomic DNA typing results proved that contamination of trypan blue solution was the source of infection in this outbreak. Postoperative endophthalmitis caused by *P. aeruginosa* is often associated with a poor visual prognosis despite prompt treatment with intravitreal antibiotics. The detection of multidrug-resistant isolates is a serious problem, jeopardizing an appropriate choice of treatment.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Plenary Hall 1

### Assessment of Corneal Thickness After Manual Small Incision Cataract Surgery

First Author: Arjun **SHRESTHA**

**Purpose:** To determine the corneal edema and visual acuity after manual small incision cataract surgery (MSICS).

**Methods:** This was a prospective study involving 40 cataract surgeries in outreach surgical camps in Nepal. An experienced optometrist measured the biometry indices like axial length, keratometry, anterior chamber depth (ACD), and central corneal thickness (CCT) preoperatively with A scan and pachymetry from Nidek Company, Japan. A standard MSICS was carried out by an experienced eye surgeon with hydro expression technique. The technique involved conjunctival peritomy and sclerocorneal tunnel from superior incision followed by linear capsulotomy, hydro dissection, nucleus extraction with hydro expression, and posterior chamber intraocular lens (PC-IOL) implantation according to biometry findings. The Incision was frown shaped, with wound size of roughly 6.5 to 7 mm according to the size of nucleus and 2 mm posterior to the limbus. CCT was also done on the first postoperative day after portable slit lamp examination and postoperative visual acuity test with Snellen's E chart at a distance of 6 meters.

**Results:** The mean CCT was 519 mm preoperatively and AC depth was 2.73 mm. There was a mean 9 mm corneal edema, ranging from 0 to 25 mm in the first postoperative day. There was a negative correlation of corneal edema with the ACD measurement. All patients had good visual acuity 6/6 to 6-18 on the first postoperative day. There was no intra and postoperative complications.

**Conclusions:** MSICS is safe and induced the minimal corneal edema. CCT can be a marker for corneal edema assessment in MSICS.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Plenary Hall 1

### Changes in Aqueous Oxidative Stress, Prostaglandin, and Cytokines: Comparisons of Low-Energy Femtosecond Laser-Assisted Cataract Surgery vs Conventional Phacoemulsification

First Author: Yu-Chi **LIU**

Co-Author(s): Marcus **ANG**, Jodhbir **MEHTA**, Melina **SETIAWAN**, Gary **YAM**

**Purpose:** To compare the aqueous oxidative stress,

prostaglandin (PGE), and cytokine levels following low-energy femtosecond laser-assisted cataract surgery (FLACS) versus conventional phacoemulsification, and to evaluate the effect of non-steroidal anti-inflammatory (NSAID) on the aqueous profiles.

**Methods:** This was a randomized controlled trial. Thirty-five patients were randomized to receive conventional phacoemulsification in 1 eye and FLACS (Ziemer) in the fellow eye. Another matched prospective cohort of 35 patients was included to receive FLACS with preoperative NSAID (FLACS-N). Aqueous humor was collected after laser or at the beginning of surgery (conventional phacoemulsification), and at the end of phacoemulsification. The levels of aqueous malondialdehyde (MDA), PGE<sub>2</sub>, cytokines/chemokines/growth factors, were analyzed. Postoperative aqueous flare levels were evaluated.

**Results:** Compared with the conventional group, the FLACS group had a significantly higher PGE<sub>2</sub> ( $P = 0.01$ ) and interleukin-1 receptor antagonist levels ( $P = 0.04$ ). Preoperative NSAID significantly reduced the PGE<sub>2</sub> surge ( $P = 0.002$ ) and mean reduction in pupil diameter ( $P = 0.02$ ). The MDA concentrations before phacoemulsification were  $0.24 \pm 0.18$ ,  $0.51 \pm 0.41$ , and  $0.59 \pm 0.52$   $\mu\text{mol/L}$  for the conventional, FLACS and FLACS-N groups ( $P = 0.42$ ). After phacoemulsification, the PGE<sub>2</sub> and MDA levels increased in all groups. The MDA induction was significantly correlated with the phacoemulsification time ( $P = 0.002$ ). The postoperative flare was insignificantly higher in the FLACS than conventional group.

**Conclusions:** Compared with conventional phacoemulsification, LDV FLACS induced a significantly higher PGE<sub>2</sub> level. The MDA and postoperative aqueous flare level were insignificantly higher. Preoperative NSAID reduced the PGE<sub>2</sub> surge and occurrence of intraoperative miosis. The oxidative stress induced during phacoemulsification was strongly correlated with phacoemulsification time.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Plenary Hall 1

### Endocapsular Ring Implantation for Subluxated Cataract: Modified Techniques

First Author: Basant **KUMAR SINGH**

Co-Author(s): Arun **SINGH**, Satya **SINGH**, Vinod **SINGH**, Chandraprakash **OLI**

**Purpose:** To establish the modifications in techniques for endocapsular ring insertion and its scleral fixation in subluxated cataract that causes minimal stress to capsulo-zonular complex.

**Methods:** The study population consisted of 29 eyes with various degrees of subluxated cataracts that underwent endocapsular ring implantation with techniques modified by us, followed by

phacoemulsification and implantation of intraocular lens (IOL) in the capsular bag.

**Results:** We could implant the intended endocapsular ring in 28 out of 29 eyes (96.55%). Mean preoperative best-corrected visual acuity (BCVA) was  $+0.68 \pm 0.22$  logMAR (24 eyes). Mean postoperative BCVA at final follow-up was  $+0.27 \pm 0.16$  logMAR (28 eyes). In 2 eyes (7.14%), mild IOL decentration was noted. Other complications included cystoid macular edema in 1 eye (3.57%), and mild uveitis in 3 eyes (10.71%).

**Conclusions:** With our modified techniques for endocapsular ring insertion and its scleral fixation, we could smoothly and safely implant the endocapsular rings in the subluxated cataract.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Plenary Hall 1

### Endophthalmitis Reduction with Intracameral Moxifloxacin Following Posterior Capsule Rupture

First Author: Haripriya **ARAVIND**

Co-Author(s): David **CHANG**, Ravindran **RAVILLA**

**Purpose:** To compare the postoperative endophthalmitis (POE) rate before and after initiation of routine intracameral moxifloxacin prophylaxis (ICMP) in eyes with posterior capsule rupture (PCR).

**Methods:** Retrospective study of all cataract surgeries performed from 2012 to 2017 at the 10 Aravind eye hospitals. Pre- and post-ICMP POE rates were compared for all eyes and the sub-group with PCR.

**Results:** PCR occurred in 22,381 (1.45%) of 1,541,867 consecutive surgeries. Without ICMP, PCR increased the POE rate >6-fold from 0.07 (526/766,660) to 0.44% (51/11,706). ICMP reduced the POE rate to 0.02% (138/775,207) overall, and 0.19% (20/10,675) in eyes with PCR ( $P < 0.001$ ). The reduction in POE with PCR was significant with both phaco (12/4219 vs 3/4281;  $P = 0.019$ ) and manual small-incision cataract surgery (39/6878 vs 17/6260;  $P = 0.009$ ).

**Conclusions:** ICMP significantly reduced POE in eyes with PCR and should be considered in these high-risk eyes by surgeons not routinely using intracameral prophylaxis.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Plenary Hall 1

### Hyadex: A Slow-Release Anti-Inflammatory Treatment Following Cataract Surgery

First Author: Amir **SAMADI**

Co-Author(s): Hammurabi **BARTUMA**, Maria **KUGELBERG**

**Purpose:** To study the efficacy and safety of Hyadex, a new slow-release formulation of Dexamethasone covalently linked to hyaluronic acid, injected in the anterior chamber (ac) after lens extraction.

**Methods:** Two formulations of Hyadex, differing in viscosity, were studied on 20 New Zealand white rabbits divided into 5 groups. First, lens extraction was performed on right eyes, followed by Hyadex1 injection in the ac. Then, ac fluid was extracted for each group at given postoperative time points up to 144 h and analyzed for dexamethasone concentrations and interleukin-6 (IL-6) and prostaglandin E2 (PGE2). Intraocular pressure (IOP) was measured preoperatively and from 8 h postoperatively. In week 3, the protocol was repeated with Hyadex2 in left eyes.

**Results:** The dexamethasone concentration in Hyadex2 at 0.5 h was 3860 ng/mL, twice that of Hyadex1. By 8 h it had reduced to 1391 ng/mL, about 5 times that of Hyadex1. By 24 h, only dexamethasone from Hyadex2 could be measured at 115 ng/mL, and by 144 h it had diminished in both groups. PGE2 peaked at 24 h in both eyes and finished higher in Hyadex1. IL-6 was overall higher in Hyadex1, however at 144 h they were similar in both groups. The IOP peaked at 8 h in both groups, increasing 2-fold in Hyadex1 and 3-fold in Hyadex2. By 144 h the IOP in Hyadex2 was 40% higher than preoperatively, somewhat higher than for Hyadex1.

**Conclusions:** Due to a higher viscosity, Hyadex2 showed higher and more sustainable concentrations of Dexamethasone in the ac and more potent anti-inflammatory effects. However, IOP was much higher in this group.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Plenary Hall 1

### Outcomes of Precision Pulse Capsulotomy in Phacoemulsification Surgery and Its Comparison with Manual (Needle-Assisted) and Femtosecond Laser-Assisted Capsulorhexis

First Author: Aditya **KELKAR**

Co-Author(s): Jai **KELKAR**, Pankaj **BENDALE**, Swyambhu **GHOSH**, Abhishek **PANDIT**

**Purpose:** To study the surgical outcomes of precision

pulse capsulotomy (PPC).

**Methods:** In this prospective study of 150 eyes of 120 consecutive patients who underwent phacoemulsification with PPC through a 2.8 mm clear corneal incision were studied. The size, shape of capsulotomy, intraoperative capsulotomy related and surgery related complications were noted. Visual outcome, intraocular lens (IOL) stability, and signs of capsular opacification/contraction were evaluated at 3 and 6 months. The outcomes were compared to the needle-assisted and femtosecond laser-assisted techniques of capsulorhexis.

**Results:** The mean age of patients was  $52.5 \pm 7.8$  years. Complete, circular capsulotomy averaging 5.5 mm diameter was achieved in 139 of 150 eyes. In 11 eyes, we experienced complications like capsulorhexis tear ( $n = 9$ ) and inadvertent iris capture ( $n = 2$ ). Probe malfunction occurred in 6 cases. Stable intracapsular IOL fixation and centration was achieved in all eyes. None of the eyes had any significant posterior capsular opacification or capsular contraction at 3 and 6 months. In one eye, anterior capsular opacification at the capsulotomy edge was noted at 6 months. The incidence of rhexis runoff was higher in PPC than manual group but it was not statistically significant. Whereas, it was significantly higher in PPC compared to femtosecond laser-assisted technique ( $P < 0.05$ ).

**Conclusions:** PPC is a useful device for achieving a perfectly round capsulorhexis. However, it has a learning curve and chances of skip areas in capsulorhexis, capsular tag, and its extension should be kept in mind.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Plenary Hall 1

### Postoperative Complications After Cataract Surgery in Patients with Sjögren Syndrome

First Author: Sepehr **SADEGHI**

Co-Author(s): Jay **MEYER**

**Purpose:** To evaluate the types and frequency of postoperative complications and visual outcomes after cataract extraction and intraocular lens implantation in patients with Sjögren's syndrome (SS).

**Methods:** This was a retrospective study of patients with SS that underwent planned cataract extraction and intraocular lens implantation between 2006 and 2018 through the Auckland District Health Board, New Zealand. Preoperative characteristics and postoperative outcomes and complications were recorded, including: cystoid macular oedema, persistent uveitis, scleritis, corneal complications, and infection.

**Results:** Overall, 14 eyes of 12 patients (10 female) with SS were identified. All patients had keratoconjunctivitis sicca preoperatively, and none had a history of

uveitis or other ocular inflammation. Eight patients were on systemic immunosuppressive medications preoperatively. No intraoperative complications occurred, and 71.5% of eyes had improvement in final best-corrected visual acuity (BCVA) following surgery. One eye experienced persistent anterior chamber inflammation beyond the 1-month postoperative visit, which resolved with topical corticosteroid treatment. One eye developed postoperative cystoid macular edema, which resolved with topical corticosteroid and non-steroidal anti-inflammatory treatment (final BCVA 6/18). One eye experienced a paracentral corneal melt without perforation (final BCVA count fingers). One eye developed postoperative (*Streptococcus pneumoniae*) endophthalmitis and complete loss of vision. There were no cases of persistent corneal oedema or scleritis.

**Conclusions:** Patients with SS have a high risk of postoperative complications after cataract surgery. These individuals should be counseled adequately preoperatively and monitored closely postoperatively. Preoperative optimization of the ocular surface might reduce the risk of some postoperative complications such as corneal melting.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Plenary Hall 1**

### **RAPID, an En Masse Technique, for Soft Cataract Phacoemulsification**

*First Author: Tushya OM PARKASH*

*Co-Author(s): Shruti MAHAJAN, Rohit PARKASH*

**Purpose:** To present new en masse non-fragmentation step-by-step technique of phacoemulsification in purely soft cataracts with no associated nuclear emulsification.

**Methods:** RAPID technique was performed in 54 eyes (mean age,  $46.35 \pm 3.95$  years) using Centurion phacoemulsification system. Purely soft cataracts, without nuclear sclerosis, in young and middle-aged individuals were included. Technique was performed with 475 mm Hg vacuum, AFR - 0–45 mL/min in linear mode using torsional phacoemulsification. In acronym RAPID technique, R stands for rotation of nucleus, A alignment of phaco tip, P placement of tip adjacent to nuclear rim, I impaling of tip into nuclear rim, and D devouring wherein nucleus is aspirated/emulsified in multi-planes in rotational manner with second instrument coordination.

**Results:** In all cases, overly soft cataract was emulsified safely. Cumulative dissipated energy was  $1.03 \pm 0.61$ . Total ultrasound time for nucleus emulsification was  $3.84 \pm 3.27$  seconds. Estimated fluid used was  $10 \pm 2.35$  mL. Cataract surgery with IOL implantation was performed successfully with no complications. Mean endothelial cell loss was  $7.05 \pm 2.65\%$  (mean endothelial cell count,  $2383.75 \pm 105.21$  cells/mm<sup>2</sup>

preoperatively and  $2215.78 \pm 114.9$  cells/mm<sup>2</sup> 3 months postoperatively).

**Conclusions:** RAPID is a non-fragmentation technique for overly soft cataracts wherein complete nuclear division is challenging. Step-by-step, multi-plane, en masse technique requires neither any specialized instrumentations nor use of high vacuum/ complimenting surge preventing software, thereby making it an easy to learn and perform technique. Nucleus is emulsified in a safe zone away from posterior capsule and cornea.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Plenary Hall 1**

### **Should Macular SD-OCT be Included as a Screening Tool Prior to Routine Cataract Surgeries?**

*First Author: Himali KAPANIA*

*Co-Author(s): Chaitra JAYADEV, Mathew KURIAN, Rohit SHETTY*

**Purpose:** To evaluate the role of preoperative macular spectral-domain optical coherence tomography (SD-OCT) in patients undergoing cataract surgery.

**Methods:** This study was performed on 2884 eyes having immature senile cataracts, scheduled for cataract surgery. All the patients underwent preoperative vision, refraction, and anterior and posterior segment evaluation. Following this, the eyes were subjected to macular SD-OCT. The scans were analyzed to rule out pathologies of the retina, retinal pigment epithelium, and vitreo-macular interface. After cataract surgery, postoperative vision (1 month) and refraction were recorded. For subgroup analysis, the following particulars were collected: age, gender, eye to be operated, and systemic illness.

**Results:** Macular pathologies were found in 683 eyes (23.68%) but detected clinically only in 401 eyes (13.89%). Most common condition was age-related macular degeneration (ARMD) in 237 eyes (34.65%), followed by epiretinal membrane (ERM) in 216 eyes (31.65%). ERM with foveal traction was found in 43 eyes. Vitreo-macular traction (VMT) was found in 75 eyes (10.97%), and with foveal traction was found in 14 eyes. There were 17 eyes (2.53%) with cystoid macular edema and 3 eyes (0.4%) with full thickness macular hole. A significant change in treatment plan was required in 11.39% of eyes.

**Conclusions:** Routine use of preoperative macular SD-OCT revealed up to 11% of outcome-altering macular pathologies, which can otherwise go undetected with routine clinical examinations. This can help in averting significant postoperative surprises and should hence be a routine screening tool, especially in a busy, high-volume cataract set-up.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Plenary Hall 1

### T Soft: New Technique for Soft Cataract

First Author: Rajendra **PRASAD**

**Purpose:** To describe a new surgical technique, T Soft, the equatorial chop for soft cataracts with some brittleness, which can be easily adopted for safe and effective removal of soft cataracts.

**Methods:** While much attention is rightly paid to handling dense, rock hard nuclei, quite often softer cataracts also present a challenge. Soft nuclei are quite sticky, gelatinous, adherent to the capsular bag, and lack sufficient brittleness. It's really difficult to separate, rotate, grip, and crack these soft nuclei. Current chopping and cracking techniques are often ineffective. High vacuum and high-power settings to hold the nucleus for chopping in soft cataracts results in the soft lens material aspirating into the phaco probe with resultant loss of suction. Sharp choppers and the phaco probe cheese wire through the soft lens and make it difficult to hold and crack the nucleus. There is also the risk of the phaco tip going rapidly through the soft lens material and through the capsular bag, resulting in a posterior capsule rupture. We aimed to describe T- Soft, a new surgical technique which utilizes a unique mechanical force, with the help of a specially designed chopper named "terminator" to break and split the soft nuclei into 2 complete segments with much ease and minimal manipulation.

**Results:** This was a retrospective study of 1000 cases results 'TBD.

**Conclusions:** T Soft allows complete full thickness nuclear segmentation for quick and safe emulsification of the nuclear halves with safe and consistent results.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Plenary Hall 1

### Terminator a Wedge Tool: Modified Classical Simple Machine to Crack and Break the Hard Cataract

First Author: Rajendra **PRASAD**

**Purpose:** Hard cataracts have a special character in them. They are generally very rigid, compact, and unbreakable like hard rock. Breaking them with outside in crushing compressive forces is really difficult because these hard cataracts, similar to the solid hard rocks, are also resistant to compressive forces, so they are not easily crushed, incised, chopped, sculpted, or broken into pieces by forcibly pulling them apart with lateral separation forces to induce fracture.

**Methods:** In order to break these hard cataracts, it

is much easier to crack them first, then split to break into complete full thickness free segments with inside out dispersive mechanical forces. In the mechanics of nuclear cracking, we need a chopper which could induce inside out dispersive cracking force, the way wedges have been used in rock excavation systems to crack and break these solid hard rocks.

**Results:** Based on the principle of a wedge tool, one of the 6 classical simple machines which are used to separate 2 objects or induce, crack, or fracture an object, we have designed a new chopper to crack and break the hard cataracts named as TERMINATOR a wedge tool.

**Conclusions:** Terminator, the new wedge tool, makes surgical maneuvers easier, facilitating the overall procedure. It achieves a higher level of efficiency and safety, especially in difficult cases such as mature hard cataracts or mature rock-hard cataracts. Terminator initiates a full thickness nuclear crack at the weakest soft and thin equator which simply traverses through the entire nucleus, breaking it into 2 complete pieces.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Plenary Hall 1

### Visual Outcome, Endothelial Cell Loss, and Complications After Retropupillary Iris Claw Lens Implantation in Patients with Deficient Posterior Capsule

First Author: Satya **SINGH**

Co-Author(s): Basant **KUMAR SINGH**, Arun **SINGH**, Vinod **SINGH**

**Purpose:** To study visual outcome, endothelial cell loss, and complications after retropupillary iris claw lens implantation, and to compare with SFIOL and ACIOL.

**Methods:** This prospective study included 33 patients who underwent retropupillary iris claw lens implantation in patients with posterior deficient capsule.

**Results:** The mean preop logMAR was 0.5338 while it improved to 0.3149, 3 months postoperatively which is equivalent to 6/12. The mean endothelial cell loss was 14.95%. There was no significant increase in intraocular pressure. Macular oedema was observed in 18 (54.54%) cases, which decreased in follow-up, and pigment dispersion was seen in 12 (36.36%) cases. No disenclavation was seen in any case.

**Conclusions:** Retropupillary iris claw lens implantation is less time-consuming, is cost-effective, and is a predictable and safe procedure capable of delivering good visual outcomes and associated with fewer complications.

02

## Cornea, External Eye Diseases & Eye Bank

Mar 06, 2019 (Wed)

11:00 - 12:30

Venue: Boardroom 3

### Can We Quantify Corneal Stiffening After Accelerated Corneal Cross Linking?

First Author: Himali **KAPANIA**

Co-Author(s): Mathew **FRANCIS**, Abhijit **SINHA ROY**, Rohit **SHETTY**

**Purpose:** The study was aimed to understand changes in corneal stiffness after accelerated corneal crosslinking (CXL; 9 mW/cm<sup>2</sup> for 10 mins).

**Methods:** Our study included 111 eyes with keratoconus. All these eyes underwent CXL and were analyzed 3 months post-surgery. Corvis-ST and Pentacam HR was done preoperatively and 3 months postoperatively. An analytical biomechanical model was used to derive corneal stiffness parameter (kc) by decomposing the deformation waveform. The cohort was then divided into decreased (< -5%), no change ( $\pm 5\%$ ), and increased (> +5%) kc group.

**Results:** The 3 groups had similar preoperative keratometry, Bad D, and pachymetry. 79% of eyes had no change or increase in corneal stiffness at 3 months. The decreased, no change, and increased kc groups had -17% ( $102.28 \pm 3.23$  to  $84.82 \pm 2.57$  N/m;  $P < 0.001$ ), <0.5% ( $87.46 \pm 1.57$  and  $87.04 \pm 1.67$  N/m;  $P = 0.48$ ), and +19% ( $86.68 \pm 3.67$  and  $102.85 \pm 3.48$  N/m;  $P < 0.001$ ) percentage change in stiffness after surgery respectively. There was a decrease in deformation amplitude and deflection amplitude with improvement in the corneal stiffness. Lower order aberration decreased by 19% and higher order aberrations decreased by 23% in increased kc (> +5%) group, while the aberrations grossly remained unchanged in the other 2 groups. Keratometry, CBI (corvis biomechanical index), and TBI (tomographic biomechanical index) did not show any significant change at 3 months within each kc group.

**Conclusions:** Waveform analyses of corneal deformation yielded corneal stiffness, which was significantly modulated after accelerated corneal crosslinking. Change in stiffness correlated with topographical indices like aberrometry. Keratometry, CBI, and TBI were insensitive to corneal stiffness changes after CXL.

Mar 06, 2019 (Wed)

11:00 - 12:30

Venue: Boardroom 3

### Clinical Outcomes of OCT-Guided Intracorneal Ring Segment Implantation and Corneal Collagen Cross Linking Surgery

First Author: Minoru **TOMITA**

**Purpose:** To evaluate postoperative vision and refractive outcomes of intracorneal ring segment implantation (ICRS) using femtosecond laser, and corneal collagen cross-linking (CXL) surgery injecting intracorneal riboflavin to increase strengths of collagen fiber bonds and prevention of keratoectasia without removing corneal epithelium.

**Methods:** The study involved 242 eyes of 166 keratoconus patients. All eyes underwent the optical coherence tomography (OCT)-guided femtosecond laser-assisted corneal ring implantation followed by CXL. Injecting 0.25% riboflavin into the tunnel first, then the tunnel was washed with BSS after waiting for 5 minutes. Finally, the UVA exposure of 18mW for 5 minutes was applied. Visual acuity, refraction, and keratometry data were statistically analyzed at preoperative, 1, 3, and 6 months, and 1 year postoperative.

**Results:** Preoperative uncorrected distance visual acuity [UDVA (logMAR)] was  $1.13 \pm 0.46$ , corrected distance visual acuity [CDVA (logMAR)] were  $0.23 \pm 0.29$ . Manifest refraction spherical equivalent (MRSE) were  $-8.49 \pm 6.51$  D. Kmax was  $60.3 \pm 10.0$  D and Kmean was  $50.2 \pm 5.58$  D. UDVA (logMAR) was  $0.74 \pm 0.45$ , CDVA (logMAR) was  $0.14 \pm 0.25$ , MRSE was  $-6.01 \pm 4.81$  D, Kmax was  $60.3 \pm 9.89$  D, and Kmean was  $47.5 \pm 5.36$  D at postoperative 1 year. UDVA (logMAR), CDVA (logMAR), Kmax, and Kmean were significantly improved in 1 year ( $P < 0.05$ ).

**Conclusions:** The OCT guided femtosecond laser-assisted Keraring implantation (ICRS) followed by CXL is a safe and efficient treatment for keratoconus patients. The analysis outcomes and statistics data showed significant improvement in visual acuity, refraction, and keratometry after the treatments.

Mar 06, 2019 (Wed)

11:00 - 12:30

Venue: Boardroom 3

### Descemet Membrane Endothelial Keratoplasty for Failed Penetrating Keratoplasty: Visual Outcomes and Graft Survival

First Author: Anand **PASARI**

Co-Author(s): Francis **PRICE**, Marianne **PRICE**

**Purpose:** To evaluate outcomes and survival of

Descemet membrane endothelial keratoplasty (DMEK) for failed penetrating keratoplasty (PK).

**Methods:** A total of 93 consecutive DMEK procedures performed in 84 eyes of 77 patients were retrospectively reviewed. The main outcomes were corrected distance visual acuity (CDVA) and graft survival assessed with Kaplan-Meier survival analysis and proportional hazards modeling, taking follow-up into consideration.

**Results:** A total of 69 eyes had 1 previous failed PK, 13 had 2, 1 had 3, and 1 had 4. Ten eyes had a failed Descemet stripping endothelial keratoplasty (DSEK) performed under the failed PK. Fifteen cases (16%) had prior glaucoma filtration surgery (10 trabeculectomy alone; 5 trabeculectomy and aqueous shunt). Median follow-up was 21 months (range, 1 month to 7 years). The median Snellen CDVA improved from 20/100 preoperatively (range, 20/30 to count fingers) to 20/30 at 6 months postop (n = 73; range, 20/20–20/200). Rebubbling rates were 53% when DMEK was oversized, 27% when same-sized, and 33% when undersized relative to the prior PK. Two grafts (2%) experienced an immunologic rejection episode, and 15 (16%) failed, including 5 primary/ early failures and 10 late failures. Prior glaucoma surgery was the only significant risk factor for failure (relative risk, 5.8; 95% confidence interval, 1.9–18.2). The 1-, 2-, and 3-year graft survival rates were 95%, 88%, and 88% without versus 84%, 57%, and 42% with prior glaucoma surgery.

**Conclusions:** Treatment of failed PK with DMEK produced similar 4-year survival (76%) and better visual outcomes than previously reported with DSEK or an initial PK regraft.

Mar 06, 2019 (Wed)

11:00 - 12:30

Venue: Boardroom 3

### Effect of Smoking on Corneal Biomechanics in Adults and Children

First Author: *Nerrisa K.y. LAM*

Co-Author(s): *Shumin TANG, Jason YAM*

**Purpose:** To investigate (1) the direct effects of smoking on corneal biomechanics in adults, and (2) and its indirect effects in children.

**Methods:** A total of 8540 eyes from 4270 primary school children aged 6–12 years and 3864 eyes from 1932 parents were recruited from Hong Kong Children Eye Study for the analysis. Detailed smoking status of parents, including the quantity of cigarette smoked per day, years of smoking, smoking during pregnancy, and the quantity and years of smoking after childbirth, were collected from parental-administrated questionnaires. Corneal biomechanics (A1 length and velocity, A2 length and velocity, maximum deformation amplitude, peak distance, and radius) were collected using Corvis ST. Multivariate linear mixed models were

used to identify the effect of smoking status on corneal biomechanics with adjusted age, sex, IOP, central corneal thickness, corneal curvature and axial length in adults and children. Results: In adults, a paired *t*-test showed a significant decrease in A2 velocity in those who smoke ( $P = 0.0329$ ) and in children who exposed to second hand smoking ( $P = 0.0032$ ). Furthermore, the A2 velocity of heavy smoker ( $>0.5$  pack/day) (coefficient = 0.0316,  $P = 0.003$ ) and long-term smoker (years of smoking  $>15$  years) (coefficient = 0.0192,  $P = 0.003$ ) in adults were also significantly decreased. Similarly, there is a statistically significant association between maternal smoking status in pregnancy and decrease A2 velocity in children (coefficient = 0.0102,  $P = 0.032$ ).

**Conclusions:** Smoking is associated with changes in corneal biomechanics, with a significant decrease in A2 velocity in both direct smokers (parents) and passive smokers (children).

Mar 06, 2019 (Wed)

11:00 - 12:30

Venue: Boardroom 3

### Femtosecond Laser-Assisted Anterior Lamellar Keratoplasty in Anterior Corneal Opacities

First Author: *Ruchita MANAKTALA*

Co-Author(s): *Uma SRIDHAR*

**Purpose:** To evaluate the visual outcomes of sutureless FALK in patients with anterior corneal opacities.

**Methods:** Twelve eyes of 12 patients with anterior stromal corneal opacities  $<250\ \mu$  in depth due to various corneal pathologies underwent sutureless FALK at a tertiary level teaching eye hospital in north India. The primary objective was to study the pre- and postoperative best corrected distance visual acuity (BCVA). Secondary outcomes were to assess the change in thickness of the cornea following FALK, and to evaluate the safety and efficacy of the procedure.

**Results:** The mean BCVA improved from  $1.06 \pm 0.29$  (logMAR) preoperatively to  $0.40 \pm 0.10$  postoperatively, with all the eyes having a postoperative BCVA of  $>0.5$ , and 42% of eyes having a BCVA of  $>0.3$ . The mean improvement in BCVA postoperatively was 61%, which was statistically highly significant. The mean change in the pre- and postoperative central corneal thickness was not significant. The mean corneal astigmatism improved from  $4.01 \pm 2.54$  diopters (D) preoperatively to  $2.48 \pm 1.35$  D postoperatively, with the mean change being 38%, which was statistically significant. Two eyes underwent photo-therapeutic keratectomy for residual scars. One patient had epithelial ingrowth involving 2.5 clock hours at 3 months, for which no further intervention was done. No other intraoperative or postoperative complications were noticed.

**Conclusions:** FALK is a safe and effective procedure for

management of anterior corneal opacities, without the intraoperative and postoperative complications seen in penetrating keratoplasty or the technical difficulties seen while performing deep anterior lamellar keratoplasty.

**Mar 06, 2019 (Wed)**

**11:00 - 12:30**

**Venue: Boardroom 3**

### **Ocular Surface Immune Trafficking and Eye Rubbing in Keratoconus, and Its Impact on Treatment Outcomes**

*First Author: Sharon **DSOUZA***

*Co-Author(s): Prerna **AHUJA**, Arka **GHOSH**, Pooja **KHAMAR**, Swaminathan **SETHU**, Rohit **SHETTY***

**Purpose:** To study the status of ocular surface immune cells, tear inflammatory factors, and plasma IgE in keratoconus (KC) patients with eye rubbing, and their influence on cross-linking outcomes.

**Methods:** 25 KC patients (n = 25) and 15 healthy controls (n = 15) were included in the study. KC patients who had history of eye rubbing but no signs of ocular were included. After detailed slit lamp and topography assessments, ocular surface immune cells and tear fluid were collected. Ocular surface wash was performed using sterile saline, and immune cells were stained for cell type specific markers and phenotyped using a flow cytometer to identify neutrophils, macrophages, Natural Killer cells (NK), Natural Killer T cells (NKT), and gamma delta T cells (gdT). Tears collected by Schirmer's strips were analyzed for tear IgE and other cytokines by cytometric bead array (multiplex ELISA). Blood samples were collected and analyzed for the levels of plasma IgE.

**Results:** Significantly ( $P < 0.05$ ) higher levels of NKT and gdT cells were observed on the ocular surface of KC patients compared to controls. In addition, elevated levels of plasma IgE, tear IgE, and IL-13 were observed in KC patients. Higher levels of tear IgE were observed with increasing grades of KC with eye rubbing. Increased tear inflammatory factors were found to be negatively associated with cross-linking outcome.

**Conclusions:** High levels of plasma IgE, tear IgE, and its receptor (Fc epsilon receptor) bearing immune cells on the ocular surface of KC suggests their role in eye rubbing, KC pathogenesis, potential novel targets for treatments, and the need for desensitization prior to ensure optimal cross-linking outcomes.

**Mar 06, 2019 (Wed)**

**11:00 - 12:30**

**Venue: Boardroom 3**

### **Outcome of Therapeutic Penetrating Keratoplasty in a Tertiary Eye Care Center, Thailand**

*First Author: Rungravee **SAJJANUKOOL***

*Co-Author(s): Ngamjit **KASETSUWAN**, Vilavun **PUANGSRICHARERN**, Usanee **REINPRAYOON**, Supalukana **TIEMMEKA***

**Purpose:** To study related factors which may affect the outcome of therapeutic penetrating keratoplasty (TPK) for infectious keratitis.

**Methods:** Medical records of 111 patients who underwent therapeutic penetrating keratoplasty between January 2001 and December 2015 at King Chulalongkorn Memorial Hospital (KCMH), Bangkok Thailand were retrospectively reviewed. Data obtained included demographic data, indication for TPK, risk factors, severity, causative organisms, donor profile, and timing of surgery. Therapeutic success was assessed at 3 months postoperatively. Restoration of globe integrity and complete eradication of primary infection after keratoplasty were defined as anatomical success. Best-corrected visual acuity (BCVA) with at least 20/200 was defined as functional success.

**Results:** There were 111 eyes of 111 patients, median age was 56.0 years (age range, 3 months to 86 years). 57.66% was male. Fungus (68.2%) was the leading pathogens. Functional and anatomical success were achieved in 31 eyes (27.9%) and 79 eyes (71.2%). Fungal keratitis was a significant risk factor for poor functional success (22.4% vs 45.8%,  $P = 0.034$ ). Graft size less than 9 mm showed a statistically significant higher anatomical success (75% vs 46.2%,  $P = 0.05$ ). In our series, there were 8 eyes of pythium keratitis, where 4 eyes had anatomical success and 3 out of those 4 eyes also had functional success. Six eyes (100%) of microsporidial keratitis had anatomical success, and 3 of these eyes also had functional success.

**Conclusions:** Fungal keratitis, especially pythium keratitis, was the worst prognostic factor compared to other organisms. Small graft size, less than 9 mm, but covering the total infected area showed better anatomical outcome.

Mar 06, 2019 (Wed)  
11:00 - 12:30  
Venue: Boardroom 3

### Outcomes of Corneal Cross-Linking for Keratoconus From Routine Clinical Practice Across Australia and New Zealand: Results From the Save Sight Keratoconus Registry

First Author: Stephanie **WATSON**  
Co-Author(s): Alexander **FERDI**, Marco **GARCIA**, Mark **GILLIES**, Vuong **NGUYEN**

**Purpose:** To report the 12-month outcomes of 282 eyes undergoing corneal cross-linking for keratoconus performed in routine clinical practice across Australia and New Zealand.

**Methods:** Index visit characteristics, such as visual acuity [VA, in logarithm of the Minimal Angle of Resolution (logMAR) letters], maximum keratometry (Kmax), pachymetry, as well as treatment parameters (epithelial status, riboflavin type, UV duration), outcomes (VA, Kmax, pachymetry), and ocular adverse events were recorded in a prospectively designed electronic database. Index visit characteristics associated with the 12-month VA outcome were identified using mixed effects linear regression.

**Results:** The mean change in VA in the cohort after 12 months was 4.6 logMAR letters [95% confidence interval (CI), 2.8–6.5]; Kmax -1.3 D (95% CI, -1.7 to -0.8) and pachymetry -14.3 (95% CI, -17.8 to -10.7) microns. There was a significant improvement in VA ( $P < 0.001$ ), reduction in Kmax ( $P < 0.001$ ), and reduction in pachymetry was found at 12 months ( $P < 0.001$ ). VA at the index visit was the strongest predictor for the 12-month outcomes. Epithelial off-treatment was performed in 275 cases; short duration UV exposure (10 mins) in 175 eyes and long duration (30 mins) in 107 eyes. Adverse events reported were clinically significant haze ( $n = 80$ ), microbial keratitis ( $n = 5$ ), persistent epithelial defect ( $n = 3$ ), progressive keratoconus ( $n = 2$ ), scarring ( $n = 4$ ), sterile infiltrates ( $n = 4$ ), and stromal oedema ( $n = 1$ ) from a total of 46 eyes.

**Conclusions:** These findings indicate that corneal cross-linking can improve visual acuity and stabilize corneal parameters when used in routine clinical practice.

Mar 06, 2019 (Wed)  
11:00 - 12:30  
Venue: Boardroom 3

### Rejection After Deep Anterior Lamellar Keratoplasty: All is Not Lost!

First Author: Rishi **SWARUP**  
Co-Author(s): Pradeep **SWARUP**

**Purpose:** (1) To assess for preoperative, intraoperative, and postoperative factors related to rejection after

DALK. (2) To assess the types of rejection, duration between DALK and rejection episode, response to therapy, and final outcome of rejection after DALK.

**Methods:** Case records of all cases of rejection after DALK were reviewed to look for preoperative indications, intraoperative findings, and postoperative complications, including details of rejection, management, and final outcome.

**Results:** Of 412 DALKs performed at a tertiary private referral center between October 2008 and February 2018, only 11 graft rejections (11 eyes of 10 patients) were noted. All were cases of keratoconus except 1 case of post-viral scar. Four were Big Bubble DALK, whereas the rest were performed manually using Groove and Peel technique of near-descemetec/pre-descemetec DALK. Four cases had intraoperative perforation, whereas the rest were uncomplicated. Two cases had more than 100 microns residual stroma left in the host bed. Mean duration of rejection was 16 months (range, 2–33 months) after DALK. Two had sub-epithelial rejection, 9 had stromal rejection. One case had epithelial rejection along with stromal rejection. All cases resolved with medical therapy, with clear grafts except 1 that interface vascularization and lipid keratopathy. Nine or 11 cases had final BSCVA of 6/12 or better. One had poor vision due to gyrate atrophy and 1 developed glaucoma. The follow-up period ranged from 20 to 96 months.

**Conclusions:** Although DALK is not “rejection-proof”, rejection is limited to epithelial, sub-epithelial, and stromal types that resolve well with treatment. Intraoperative perforation and pre-descemetec DALK may be risk factors.

Mar 06, 2019 (Wed)  
11:00 - 12:30  
Venue: Boardroom 3

### Topo-Guided Removal of Epithelium in Keratoconus and Accelerated Cross Linking: Novel Tissue-Sparing Customized Treatment of Keratoconic Eyes

First Author: Pavitra **PATEL**  
Co-Author(s): Pooja **KHAMAR**, Abhijit **SINHA ROY**, Rohit **SHETTY**

**Purpose:** To assess visual, topographic, and aberrometric outcomes of a novel tissue-saving customized surgical approach for keratoconus (KC) combined with cross linking (CXL).

**Methods:** A prospective, interventional, non-randomized, longitudinal study in a tertiary eye center in South India. Epithelial thickness was measured in 50 eyes using optical coherence tomography (Optovue). A customized elliptical ablation was planned, centered at the steepest point on the anterior tangential map. PTK-CAM module of Schwind-Sirius topographer was

used. Total ablation was limited to 75  $\mu\text{m}$  followed by manual removal of surrounding epithelium over central 8 mm and accelerated CXL (0.1% riboflavin 20 mins and UV-A irradiation 9 mW/cm<sup>2</sup> 10 minutes). Eyes were evaluated for visual acuity, keratometric and aberrometric outcomes up to 1 year.

**Results:** Preoperatively, uncorrected distance visual acuity (UDVA) and corrected distance visual acuity (CDVA) in logMAR were  $0.74 \pm 0.05$  and  $0.24 \pm 0.03$  respectively. Postoperatively, these improved to  $0.46 \pm 0.05$  ( $P = 0.001$ ) and  $0.15 \pm 0.03$  ( $P = 0.01$ ) at 1 year. Only 2.27% of eyes lost 1 Snellen line on UDVA and CDVA. On UDVA and CDVA, 25% and 54.55% of eyes had no change in Snellen lines, at the same time 54.55% and 18.18% of eyes gain 2 Snellen lines or more respectively. Postoperatively, there was significant reduction in mean K ( $2.418 \pm 1.211$  D), spherical aberration ( $0.690 \pm 0.396$   $\mu\text{m}$ , 63% decrease), vertical coma ( $0.562 \pm 0.641$   $\mu\text{m}$ , 29% decrease) and RMS of higher order aberration ( $-0.618 \pm 0.53$   $\mu\text{m}$ , 21.6% decrease).

**Conclusions:** TREK with CXL is an effective procedure with “true” customization to the patient’s needs. It significantly minimized the amount of stromal ablation in KC patients while delivering superior outcomes than topo-guided PRK.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Lotus Room**

### 15-Year Results of a Randomized Controlled Trial Comparing 0.02% Mitomycin-C, Limbal Conjunctival Autograft vs Combined Mitomycin C and Limbal Conjunctival Autograft in Recurrent Pterygium Surgery

*First Author: Ka Wai KAM*

*Co-Author(s): Alvin YOUNG*

**Purpose:** To compare the long-term outcome of recurrent pterygium surgery between 3 different techniques.

**Methods:** We performed a 15-year follow-up study of a randomized controlled study cohort that was performed at the Prince of Wales Hospital more than 15 years ago (April 2001 to March 2003): group 1 received limbal conjunctival autograft (LCAT); group 2 received intraoperative mitomycin C (MMC) 0.02% for 5 minutes; and group 3 received combined LCAT + MMC 0.02% for 5 minutes. Consecutive patients enrolled in the original study were invited to return for a detailed clinical examination to document the long-term outcome of the 3 groups.

**Results:** The mean age of the patients at the time of operation was  $54.3 \pm 10.7$  years and the mean time from operation to time of current study was  $15.8 \pm 0.5$  years. Only 1 of the 40 eyes included for analyses

developed a recurrence over 15 years. The patient received LCAT for a temporal recurrent pterygium with a 2.2 mm recurrence. The overall risk of recurrence was 2.5% and there was no statistical difference of recurrence risk between the 3 treatment groups ( $P = 0.500$ ). The use of intraoperative MMC was associated with inferior bed appearance ( $P = 0.007$ ). Symblepharon was observed in 1 eye upon follow-up in MMC group.

**Conclusions:** All 3 techniques produced favorable outcomes for patients with recurrent pterygium with a low risk of recurrence over 15 years. The use of LCAT, with or without concurrent MMC was associated with a better cosmetic appearance.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Meeting Room 3**

### Clinical Features and Cytokine Profile in Patients with Recalcitrant SJS

*First Author: Bhaskar SRINIVASAN*

*Co-Author(s): Shweta AGARWAL, Geetha IYER*

**Purpose:** To correlate the clinical features with the cytokine profile in patients with recalcitrant SJS (persistence of ocular surface inflammation a few months post the acute attack of SJS). To compare cytokine profile of recalcitrant SJS with normal controls and with other SJS patients whose ocular surface inflammation responded to treatment of dry eye and lid margin keratinization.

**Methods:** This was a prospective case control study where parents diagnosed as having SJS (no 32) were recruited for tear cytokine analysis. The subset of patients (8) who had recurrent inflammation were analyzed as a separate group of recalcitrant SJS to better understand the underlying immune process and correlate with the clinical finding. A detailed ophthalmic evaluation was done. Bio-Plex multiplex assay (Bio-Plex Human Cytokine 27-plex panel, Bio-Rad Laboratories, Hercules, CA, USA) was used to measure the concentrations of 27 human tear cytokines from SJS patients and healthy control.

**Results:** Pro-inflammatory cytokines were high in spite of the patients being on topical/systemic steroids and immune suppression. Cytokines IL4, IL 1b/ILRA, IL 8, IL 9, IL 12p70, TNF alpha, and IFNG causing inflammation and epithelial break down seemed to be playing a crucial role. There was a decrease in level of IL 13, bFGF, IP10, IL10, and GM-CSF. There seems to be a pro angiogenic profile with increased IL-1 $\beta$ , IL-8, PDGF-bb, IL-9, Eotaxin, VEGF, TNF- $\alpha$ , IL-12p70, MCP-1, bFGF, GM-CSF, IL-6 and decreased anti-angiogenic profile of IL-13, IP-10, and IL-10.

**Conclusions:** Thus, the cytokine profile revealed a skew towards Th2 type immune response with increased inflammation, epithelial apoptosis, increased

angiogenesis, and epithelial defects matching the clinical findings.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Lotus Room**

### **Clinical Severity Grading Tool for Cicatrising Conjunctivitis: A Validation Study**

*First Author: Hon Shing **ONG***

*Co-Author(s): John **DART**, Jodhbir **MEHTA**, Darwin **MINASSIAN**, Saaeha **RAUZ***

**Purpose:** Cicatrising conjunctivitis (CC) refers to a group of sight-threatening conditions associated with conjunctival scarring and inflammation. No validated clinical system exists for measuring the severity and activity of CC. We have designed an objective tool based on previously described activity, damage indices of ocular surface disease, and findings of a cross-sectional study in mucous membrane pemphigoid (MMP).

**Methods:** This was a cross-sectional cohort study. A total of 74 patients (147 eyes) with CC were tested for inter-observer variability. All patients underwent clinical assessment by 2 independent examiners using the grading tool at a single visit. To test for intra-observer variability, all patients returned within 2 weeks and clinical assessment using the same tool was repeated. In Stevens-Johnson Syndrome (SJS) patients, we compared our tool to a published but non-validated grading system for ocular SJS (Sotozono et al, 2007).

**Results:** A total of 55 patients (109 eyes) had ocular MMP and 19 patients (38 eyes) had ocular SJS [mean age:  $64.0 \pm 15.5$  years; 42/74 (56.8%) female]. Grading parameters with good to excellent inter- and intra-observer agreement included: ocular inflammation, lower and upper FDM, symblepharon measurement, corneal vascularization, and corneal opacity (ICC > 0.75). Overall, this assessment tool delivered good inter-observer (ICC 0.94,  $P < 0.001$ ) and intra-observer agreement (ICC 0.96,  $P < 0.001$ ). In SJS cases, there was good correlation between our tool and the Sotozono system (Pearson  $r = 0.92$ ,  $P < 0.001$ ); this was also observed when the Bland-Altman plot was applied.

**Conclusions:** This study validates our severity grading tool, demonstrating that it is a reliable method for assessing patients with CC. This tool can be used for clinical documentation and in future studies evaluating therapies.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Meeting Room 3**

### **Corneal Nerve Morphology Analysis in Healthy and Diseased Cornea Using Novel Software in Confocal Microscopy**

*First Author: Anjana **KARUNAKARAN***

*Co-Author(s): Prerna **AHUJA**, Pooja **KHAMAR**, Swaminathan **SETHU**, Rohit **SHETTY***

**Purpose:** To quantify corneal nerve morphological changes in vivo confocal microscopy (IVCM) images using a novel software in healthy and diseased corneas.

**Methods:** Corneal sub-basal nerve plexus (SBNP) morphological features were studied in patients with evaporative dry eye (EDE), keratoconus (KC), and post-LASIK ectasia (PLE). IVCM images were analyzed using Automated CCmetrics software, version 1.0 to determine SBNP features (corneal nerve fiber length—CNFL, fiber density—CNFD, fiber width—CNFW, total branch density—CTBD, nerve branch density—CNBD, and fiber area—CNFA). SBNP features were measured in EDE (52 eyes), KC (33 eyes), PLE (12 eyes), post-LASIK eyes with no ectasia (14 eyes), and matched healthy controls (43 eyes). Statistical analysis was done using GraphPad Prism and  $P < 0.05$  was considered to be statistically significant.

**Results:** We observed a significant ( $P < 0.05$ ) decrease in CNFL, CNFD, CNFW, CTBD, CNBD, and CNFA in EDE patients compared to controls. CNFD and CNFL was observed to be significantly ( $P < 0.05$ ) lower in the KC eyes compared to both unaffected contralateral eyes and that of controls, with no significant changes in CNBD, CTBD, CNFA, and CNFW. In PLE, CNFL, and CNFD was observed to be significantly ( $P < 0.05$ ) lower in the eyes with higher degree of ectasia in the PLE eyes, however, no such differences were observed in SBNP features in the post-LASIK eyes without ectasia.

**Conclusions:** IVCM analysis using Automated CCmetrics software offers a fast, unique, and non-invasive method to study corneal nerve morphology in a variety of ocular surface conditions, and may be used as an imaging marker for early diagnosis of disease and monitoring the response to treatment.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Lotus Room**

### **Corneal Sustained Release Antimicrobial Implants: A Novel Therapy for Posterior Corneal Infection**

*First Author: Lional **DANIEL RAJ PONNIAH***

**Purpose:** To demonstrate the efficacy of implantable intracorneal sustained release antimicrobials in

posterior corneal infections and abscesses.

**Methods:** Posterior corneal infections were subjected to intrastromal sustained release implantable antimicrobials in a deeper corneal plane, created manually or by Femto lasers and removed in 3-5 days and re-implanted if required. Implants were used in the interface during therapeutic lamellar keratoplasties also. Documented everyday clinically and by corneal OCT.

**Results:** Ten cases were enrolled, 7 primary deep corneal infections and 2 were therapeutic DALK interfaces, and 1 segmental infection in a Post DALK. Four were fungal, 5 bacterial, 1 nocardial. Healing started in 1-3 days, and in 2 cases re-implanted and healed. All cases required reduced/no topical antimicrobials. No surface toxicities were seen.

**Conclusions:** Intrastromal corneal sustained release antimicrobial implants have a promise in deep corneal infections and abscesses in terms of effective drug penetration and reduced surface toxicities and could be an alternative drug delivery system.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Meeting Room 3**

### **Cytokine and Matrix Metalloproteinase-9 Profile in Keratoconus Patients' Tear Fluid**

*First Author: Jana GERTNERE*

**Purpose:** To determine the level of inflammatory cytokines like interleukin 6 (IL-6), tumor necrosis factor alpha (TNF- $\alpha$ ), and matrix metalloproteinase 9 (MMP-9) in tears from both eyes of unilateral and bilateral KC patients, and to compare it with the control group tear fluid.

**Methods:** In this prospective case-control study, we analyzed 20 patients (40 eyes) with diagnosed KC disease, 10 patients (20 eyes) of this group with unilateral KC (UKC), 10 patients (20 eyes) with bilateral KC (BKC), and 10 health control subjects (20 eyes). Tears (110  $\mu$ L) were collected from each eye with the Schirmer test tear-collecting method. The concentration of cytokines (IL-6 and TNF-L) and MMP-9 in the tears were measured by ELISA.

**Results:** The case group (n = 20; 40 eyes) and control group (n = 10; 20 eyes) had statistically significant difference in cytokine laboratory analysis between the groups (P < 0.001). Median TNF-L value in UKC was 165.35 (IQR, 208.08), in BKC 113.60 (IQR, 65.45), in control group was 30.80 (IQR, 39.30), but median IL-6 value in UKC was 168.30 (IQR, 37.07), in BKC 154.50 (IQR, 43.25), but in control group was 8.80 (IQR, 8.68). Also, statistically significant difference was found between the groups analyzing MMP-9 median values (P < 0.001).

**Conclusions:** IL-6, TNF-Land MMP-9 are overexpressed

in the tears of patients with unilateral and bilateral keratoconus. These results radically change classical understanding of the keratoconus pathogenesis and indicate that keratoconus disease may involve inflammatory events.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Lotus Room**

### **Diagnosis of Bacterial Ocular Infectious Disease by Nested PCR**

*First Author: Keisuke NAKAYAMA*

*Co-Author(s): Nobuhisa NAO-I*

**Purpose:** To investigate the utility of nested PCR assay for diagnosis of bacterial ocular infectious disease. Furthermore, to develop a new protocol using nested PCR suitable for analysis of the samples derived from keratitis that contains indigenous and/or non-pathogenic bacteria.

**Methods:** Two sets of universal primers for nested PCR were designed on the bacterial 16S rRNA gene and used to obtain PCR product with total DNA extracted from the samples as a template. Identified the causative bacteria by sequencing and database searching of the product. Furthermore, in order to analyze the specimens that are difficult to determine the nucleotide sequence of the product due to bacterial contamination, original 2nd primer sets were prepared for each 10 bacterial species that could cause keratitis, perform 2nd round of nested PCR.

**Results:** A total of 237 samples from patients with bacterial ocular infectious disease were analyzed. Amplified products could be obtained only for 25 samples (10.5%) in the 1st round of Nested PCR. However, it was possible to obtain the products for 189 samples (79.7%) in the 2nd round. Pathogenic bacteria were identified for 81 samples (42.9%) by sequencing of the product. For 71 samples (37.6%), determination of the nucleotide sequence of the PCR product was impossible due to contamination of indigenous bacteria. The new protocol was applied to these samples and pathogenic bacteria were identified for 58.3% of them.

**Conclusions:** Use of our nested PCR assay seems to be clinically useful for identifying causative bacteria of ocular infections disease including keratitis.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Lotus Room

### Donor and Tissue Profiling at the Time of Eye Donation at a Tertiary Care Hospital in Western India

First Author: Aditi **PAI**

Co-Author(s): Atul **KAMATH**

**Purpose:** To analyze the donor and tissue profiling of eyes donated at a tertiary care center in western India.

**Methods:** Eye bank records were analyzed for the period of December 2014 to December 2016. Variables studied included donor demographics (age, gender, ethnicity), cause of death of donor, consent for donation, whether the donation was voluntary or motivated, death to preservation interval, preservation to utilization interval, corneal suitability for transplantation, and corneal tissue utilization.

**Results:** During this study period, 200 corneal tissues were retrieved from 100 donors (male:female = 33:17). The mean age of donors was 63 years (range, 18–91 years). Most common age group of donors belonged to 70–79 year age group. Most of the donors belonged to the class III of socio-economic status (35%). The most common cause of death was cardiorespiratory arrest (63%). Majority of donors were voluntary (71%). Most consent for eye donation was given by sons (51%) or daughters (17%). Most of the donations were done at the deceased houses (64%). Mean death to preservation interval was 2.8 hours. Total corneas suitable for transplantation were 43%, out of which 20% were utilized with the most common cause for disuse being septicemia (23%) and poor quality of tissue (57%). Majority of patients had comorbidities, with hypertension being most common (76%).

**Conclusions:** With fairly less corneal tissue utilization, there is a need for awareness among people in order to know the proper technique of preservation of eyes once death occurs and to increase motivational donations.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Lotus Room

### Efficacy of Autologous Blood Clot in Primary Pterygium Excision Compared with Suture Technique

First Author: Md.Iftekher **IQBAL**

Co-Author(s): Fariah **OSMAN**

**Purpose:** To evaluate the efficacy among patients undergoing pterygium excision and conjunctival autografting using autologous blood clot or sutures (10-0 monofilament nylon).

**Methods:** A randomized controlled trial with a study period of 1 year 5 months was conducted with 60 eyes from 60 patients having primary nasal pterygium and for conjunctival autografting: Arm-A (30) was treated with autologous blood clot and Arm-B (30) was treated with sutures (10-0 monofilament nylon). Preoperative and postoperative outcomes were evaluated and compared statistically where follow-up was done up to 6 months postoperatively. The main outcome variables were total surgical time, postoperative discomfort, graft stability, and recurrence.

**Results:** The mean ( $\pm$  SD) age of patients was  $46.77 \pm 7.04$  (range, 33–58 years) in Arm-A (30) and  $46.17 \pm 7.53$  (range, 22–58 years) in Arm-B (30). The numbers of male and female were 22 (73.3%) and 8 (26.7%) in Arm-A, and 20 (66.7%) and 10 (33.3%) in Arm-B. Total surgical time required was  $24.73 \pm 3.69$  minutes in Arm-A and  $32.23 \pm 4.59$  minutes in Arm-B ( $P < 0.001$ ). Follow-up at 1st and 7th postoperative day (POD) showed marked discomfort in Arm-B (mean rank 41.82 and 40.62) compared with Arm-A (mean rank 19.18 and 20.38) respectively ( $P < 0.001$ ). At the 1st POD, there were 3 (10%) graft retraction in Arm-A only. Within 6 months of follow-up, all grafts were stable and there was 1 (3.3%) recurrence and 1 (3.3%) granuloma in Arm-B only.

**Conclusions:** In primary pterygium excision, autologous blood clot showed excellent postoperative outcomes with no recurrence as well as reduced surgical time.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Lotus Room

### Efficacy of Gancyclovir in Treatment of Adenoviral Keratitis

First Author: Shahrina **MAHFOOZ**

Co-Author(s): Ahsanul **HUQ**, Dilara **KHATUN**, Sharah **RAHMAN**

**Purpose:** To evaluate the efficacy of gancyclovir in treatment of adenoviral keratitis.

**Methods:** This randomized clinical trial included 60 cases of adenoviral keratitis having similar signs, and were randomly treated with topical gancyclovir gel 0.15%, topical artificial tear-study group and topical steroid, artificial tear-control group. Follow-up done on day of presentation, 1st week, 2nd week, and 6th week. The pre- and post-treatment average signs (visual acuity, corneal lesion) were noted and scored. Later, all scores were added up to find out the total sign score of each group. The average score was then calculated.

**Results:** The mean ( $\pm$  SD) age was  $27.97 \pm 2.39$  and  $29.77 \pm 2.39$  years in the study group and control group respectively. Mean score of sign in study group was 3, 1.90, 1.00, and 0.70 at beginning, after 1st, 2nd, and 6th weeks respectively. In the control group, mean score of signs was 3, 2.23, 1.37, and 1.13 at beginning,

after 1st, 2nd, and 6th weeks respectively. In the study group, the total numbers of patients relieved of signs were 3 (10%), 6 (20%), and 14 (46%) respectively on 2nd, 4th, and 6th week after starting treatment. In the control group, total numbers of patients relieved of signs were 2 (6%), 4 (13%), and 8 (26%) respectively on 2nd, 4th, and 6th week after starting treatment which is statistically significant ( $P < 0.05$ ).

**Conclusions:** The significant clinical improvement demonstrates that this therapeutic modality is an effective method for treatment of adenoviral keratitis.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Meeting Room 3**

### Expansive Mortar: A New Ocular Hazard

*First Author: Sanjiv DESAI*

*Co-Author(s): Devanshi DESAI, Rashmi SHARMA*

**Purpose:** To document, demonstrate, and characterize the nature, extent, severity, and significance of expansive mortar injuries — a new etiopathogenetic cause of ocular injuries in stone quarry workers.

**Methods:** This was a retrospective study of records of quarry workers presenting at our hospital with expansive mortar injuries in a 1-year period.

**Results:** A total of 16 cases (22 eyes) reported to us with alkaline burns due to injury with chemical spurts from blow out shoots of the expansive mortar. Most eyes (72.8%) had severe burns that led to stem cell deficiency irreversible corneal opacification. The visual recovery was less than 6/60 in 18% of eyes, and a similar number of patients were left with either no perception of light or vision that was counting finger close to face at the end of treatment. One eye underwent a keratoprosthesis with 1-meter vision recovery, and one went phthisical even with treatment.

**Conclusions:** A new ocular hazard has been identified in the stone quarry industry. Its presentation and visual outcomes after treatment have been recorded.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Lotus Room**

### Freeze-Dried Human Amniotic Membrane Transplant in Treating Bacterial Corneal Ulcer: A Randomized Trial

*First Author: Made SUSIYANTI*

*Co-Author(s): Ratna SITOMPUL*

**Purpose:** To investigate and evaluate the clinical outcome of treatment of bacterial corneal ulcer using freeze-dried amniotic membrane (AM).

**Methods:** Randomized, unmasked, prospective clinical trial of 24 new patients diagnosed with moderate to

severe bacterial corneal ulcer. Subjects were divided equally into 2 groups: experimental (AMT) and control (non-AMT). Pre-experimental examinations (visual acuity, ulcer condition, corneal photography, and gram staining examination) were performed to all subjects. Both groups were initially given the same antibiotic regimen of 5% levofloxacin; however, subjects in the AMT group also underwent AMT within the next 24 to 72 hours. Evaluations were done on day 1 and 7, as well as on the 2nd, 3rd, and 4th week post-therapy for both groups. Duration for complete epithelialization and cicatrix formation, evaluation of corneal ulcer and cicatrix (size and degree), and changes in visual acuity were evaluated as main outcome.

**Results:** There was a significant difference in the duration for complete epithelialization and cicatrix formation between the 2 groups ( $P < 0.05$ ). The AMT group reached complete epithelialization and total cicatrix faster than the non-AMT group. In addition, there was no significant difference in the pre-treatment best-corrected visual acuity (BCVA) between the 2 groups ( $P > 0.05$ ), whereas there was a significant difference in the BCVA on week 4 ( $P < 0.05$ ). Better improvement in BCVA was observed in the AMT group compared to the non-AMT group.

**Conclusions:** Freeze-dried amniotic membrane transplant was able to treat a bacterial corneal ulcer faster by forming less dense cicatrix compared to traditional and conservative therapies.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Meeting Room 3**

### Functional Evaluation of 2 Corneal Endothelial Cell-Based Therapies for Corneal Endothelial Dysfunction: Tissue-Engineered Construct and Cell-Injection Therapy

*First Author: Hon Shing ONG*

*Co-Author(s): Khadijah ADNAN, Heng-Pei ANG, Jodhbir MEHTA, Gary PEH, Xin-Yi SEAH*

**Purpose:** Vision impairment from corneal endothelial dysfunction can be restored with corneal transplantation. Global shortage of donor tissues has driven the development of cell-based therapies. With the capacity to propagate regulatory compliant human corneal endothelial cells (CECs), this study evaluated the functionality of propagated CECs delivered via tissue-engineered endothelial keratoplasty (TE-EK) or cell-injection (CE-CI) using rabbit models of bullous keratopathy.

**Methods:** Isolated primary human CECs were propagated for 1-2 passage using a dual-media culture approach. For CE-CI, rabbit endothelium was scraped from its Descemet's membrane (DM) or DM was stripped. Approximately  $6 \times 10^5$  CECs in media containing Y-27632 were injected into the anterior

chamber. Rabbits were immediately positioned eyes down (3 hours). For TE-EK, a TE-EK graft was prepared at least 2 days before. The graft was inserted as per standard Descemet's stripping endothelial keratoplasty.

**Results:** In rabbits with TE-EK grafts, central corneal thickness (CCT) increased to  $>1000\ \mu\text{m}$  postoperatively. Gradual thinning with improvements in corneal clarity was observed from week 1. CCT at week 3 was  $484.3 \pm 73.7\ \mu\text{m}$ . Rabbits with CE-CI maintained corneal clarity throughout, and CCT at week 3 was  $582.5 \pm 171.5\ \mu\text{m}$ . Control corneas remained significantly edematous throughout the study period compared to respective experimental groups ( $P < 0.05$ ). Excised corneas showed a cellular monolayer with heterogeneously shaped CECs in both TE-EK and CE-CI. Immunohistochemistry demonstrated reactivity to anti-human specific nuclei antibody attributing corneal recovery to the functional human CECs.

**Conclusions:** Our regulatory compliant cell-based therapies can be delivered by both TE-EK and CE-CI. Translation into clinical practice holds great promise as alternatives to traditional corneal transplantation.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Lotus Room**

### Intraocular Pressure Elevation and Glaucoma in Cases with Cytomegalovirus-Related Corneal Endotheliitis

*First Author: Toshihide IKEDA*

*Co-Author(s): Hideki FUKUOKA, Tsutomu INATOMI, Shigeru KINOSHITA, Noriko KOIZUMI, Chie SOTOZONO*

**Purpose:** To analyze intraocular pressure (IOP) elevation between diseased eyes and healthy fellow eyes in patients with cytomegalovirus (CMV)-related corneal endotheliitis.

**Methods:** We reviewed 50 eyes of 49 patients (34 males, 15 females; mean age:  $66.1 \pm 9.5$  years) with CMV-related corneal endotheliitis diagnosed via clinical manifestations and detection of CMV DNA in aqueous humor samples seen at our university hospital from January 2008 to January 2018. IOP and scores of glaucoma eye drops in the diseased eyes at initial visit were evaluated. Central corneal thickness (CCT) and retinal ganglion cell complex thickness were compared between the diseased eyes and the healthy fellow eyes.

**Results:** The mean IOP of the diseased eyes ( $20.2 \pm 9.4\ \text{mm Hg}$ ) was significantly higher than that of the healthy fellow eyes ( $14.5 \pm 3.3\ \text{mm Hg}$ ) ( $P = 0.0002$ ). The mean scores of glaucoma eye drops in the diseased eyes was 1.96. Over 90% of the patients (42 of 45 eyes) underwent steroid eye drop treatment (in 5 eyes, treatment unknown). Mean CCT of the diseased and fellow eyes was  $525.6 \pm 80.1\ \mu\text{m}$  and  $521.8 \pm 34.3\ \mu\text{m}$ ,

respectively, and no significant difference was observed ( $P = 0.18$ ). The mean retinal ganglion cell complex thickness was significantly thinner in the diseased eyes than in the fellow eyes ( $P = 0.002$ ).

**Conclusions:** Our findings showed that in CMV-related corneal endotheliitis patients, IOP is elevated in the diseased eye, even when there is no significant difference in CCT between the diseased eye and the healthy fellow eye, and that most patients underwent treatment with steroids and anti-glaucoma eye drops. CMV-related endotheliitis may cause uncontrolled IOP elevation.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Meeting Room 3**

### Involvement of Anterior and Posterior Corneal Surface Area Imbalance to Detect Forme Fruste Keratoconus

*First Author: Koji KITAZAWA*

*Co-Author(s): Osamu HIEDA, Motohiro ITOI, Shigeru KINOSHITA, Chie SOTOZONO, Isao YOKOTA*

**Purpose:** We previously reported the method to measure the corneal surface area using anterior segment optical coherence tomography (AS-OCT). The purpose of this present study was to investigate the anterior and the posterior corneal surface area in order to detect forme fruste keratoconus (FFKC) eyes.

**Methods:** To assess the pathological change of keratoconus (KC), the anterior-posterior surface area ratio (As/Ps) was measured using AS-OCT at the central 5.0 mm diameter areas. Fourteen eyes of 14 patients with FFKC, 29 eyes of 29 patients with KC (as reference group), and 40 eyes of 40 patients with normal subjects were enrolled. The comparison between that of normal eyes and FFKC eyes was performed using the Mann-Whitney U test. Area under the receiver operating characteristic (AUROC) was calculated by the overall predictive accuracy of the test parameters.

**Results:** The posterior surface area at the central 5.0 mm areas in the FFKC eyes ( $20.430\ \text{mm}^2$ ) and KC eyes ( $20.917\ \text{mm}^2$ ) seemed to become larger than that of normal eyes ( $20.389\ \text{mm}^2$ ), and the As/Ps of the corneal surface area in the FFKC eyes (0.986) and the KC eyes (0.976) was significantly smaller than that of the normal eyes (0.988) (normal vs FFKC;  $P < 0.01$ ). The As/Ps showed the large AUROC (0.948; confidence interval, 0.890–1.000) to detect FFKC.

**Conclusions:** Anterior and posterior corneal surface area imbalance may reflect keratoconic eyes at the early stage of the disease.

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: Meeting Room 3

### Long-Term Outcome of Mucous Membrane Grafting for Lid Margin Keratinization in Stevens-Johnson Syndrome

First Author: Pavani **PENUGONDLA**

Co-Author(s): Shweta **AGARWAL**, Geetha **IYER**, Bhaskar **SRINIVASAN**

**Purpose:** To study the efficacy of mucous membrane grafting (MMG) as a surgical technique to address lid margin keratinization (LMK), an important cause for chronic blink-related microtrauma in Stevens-Johnson Syndrome (SJS).

**Methods:** In a retrospective analysis over 13 years from a tertiary eye center (Jan 2005 to April 2018), improvement in the symptoms, ocular surface status based on fluorescein staining, and change in best corrected visual acuity (BCVA) following MMG were studied. The keratinized strip of conjunctiva along the lid margin was excised and replaced by lip mucous membrane using fibrin glue.

**Results:** Of 626 eyes of 371 patients that underwent MMG, 98.5% patients showed improvement/stabilization in ocular comfort as assessed by fluorescein staining. BCVA improved/stabilized in 96.4% of patients. The mean follow-up was 51.5 months.

**Conclusions:** MMG for LMK is seen to eliminate the lid-wiper induced epitheliopathy and continued limbal stem cell damage caused by LMK in the largest series reported so far from a single tertiary eye care center. MMG not only improves patient comfort, the ocular surface status, and visual acuity but also prevents further deterioration of the ocular surface.

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: Meeting Room 3

### Nature and Nurture Model of Keratoconus: From Genetics to Gene Expression

First Author: Anjana **KARUNAKARAN**

Co-Author(s): Arka **GHOSH**, Pooja **KHAMAR**, Rohit **SHETTY**

**Purpose:** To understand the contribution of underlying genetic basis (nature) and the environmental basis (nurture) in the pathogenesis of keratoconus (KC).

**Methods:** Nature: Blood from 3KC families after pedigree charting was analyzed (exome sequencing) for collagen genes among other and compared to non-KC (control). Nurture: Tears were analyzed for alterations in collagen isoforms (COLI, COLIV), inflammatory markers (IL6, TNF $\alpha$ ), and collagen cross linking enzyme (LOX) through gene expression studies in 23KC eyes

and 25 control subjects.

**Results:** A novel mutation in collagen gene (COLIV) was noted, which could be causative in the disease. The levels of COL IV isoforms were significantly reduced in KC cohort compared to controls ( $P < 0.05$ ) and correlated with LOX.

**Conclusions:** This novel mutation in collagen gene, the first to be reported, may be a causative factor in familial KC. The association of genetic (nature) and gene expression (nurture) may contribute to drive KC pathogenesis, which can be harnessed for disease management.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Lotus Room

### Negative Impact of Dextran in Organ Culture Media for Prestripped Tissue Preservation on Descemet Membrane Endothelial Keratoplasty Outcome

First Author: Berthold **SEITZ**

Co-Author(s): Alaadin **ABDIN**, Loay **DAAS**, Achim **LANGENBUCHER**, Max **PATTMÖLLER**, Shady **SUFFO**

**Purpose:** To assess the morphological and functional outcomes of DMEK, performed with pre-stripped tissue in organ culture medium containing dextran, compared to tissue preserved in dextran-free medium.

**Methods:** In this retrospective study, we reviewed the clinical records of 103 patients who underwent DMEK. The endothelium-Descemet membrane (EDM) was preserved in organ culture medium for a maximum of 48 hours for all patients. For group 1, 49 EDM were stripped and preserved in medium 1 (dextran-free organ culture medium), while 54 EDM were stripped and preserved in medium 2 (organ culture medium supplemented with 6% dextran T-500) for group 2.

**Results:** Group 1 showed a statistically significant better best-corrected visual acuity compared to group 2 at each time point ( $P < 0.05$ ). The percentage of grafts achieving 0.5 or better after 6 months in group 1 was 96%, and in group 2 it was 66% ( $P < 0.001$ ). CCT was significantly lower in group 1 compared to group 2 at 2 weeks and 6 months after surgery ( $P < 0.05$ ). ECD was comparable between donor grafts before surgery, was significantly greater in groups 1 after 2 and 6 weeks ( $P < 0.05$ ), but not after 6 months. Necessity for repeat keratoplasty was significantly lower in group 1 ( $P < 0.05$ ).

**Conclusions:** Pre-stripped tissue for DMEK preserved in dextran-free medium led to better visual recovery, thinner postoperative corneas, a higher endothelial cell density, and a lower rate of repeat keratoplasty, indicating that dextran has an unfavorable impact on the preservation of pre-stripped DMEK tissue.

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: Meeting Room 3

### Outcomes of Descemet Membrane Endothelial Keratoplasty in Patients with Pseudophakic Bullous Keratopathy

First Author: Anahita **KATE**

Co-Author(s): Pratik **GOGRI**, Akanksha **KOUL**, Mubashir **PARKAR**, Pravin **VADDAVALLI**

**Purpose:** DMEK is one of the preferred procedures in cases with endothelial dysfunction and has been reported to have excellent outcomes in Fuch's endothelial dystrophy. However, there are lacunae in the outcomes of patients with PBK due to non-Fuchs eye. We reported the outcomes of 54 cases of PBK where DMEK was done.

**Methods:** A retrospective review of all cases with PBK who underwent DMEK between July 2016 and July 2018 was done. Best-corrected visual acuity (BCVA) and endothelial cell density (ECD) were recorded preoperatively, 1 month postoperatively, and at the last follow-up after DMEK along with the detachment rates and need of subsequent surgery.

**Results:** A total of 60 eyes of 59 patients were included, of which 3 (5%) eyes had pre-existing glaucoma and 4 (6.6%) eyes had undergone prior endothelial keratoplasty. The mean age was  $66.86 \pm 10.31$  years. The mean preoperative BCVA was  $-1.5 \pm 0.41$  logMAR. The mean follow-up period was  $17.39 \pm 12.27$  months. The BCVA at 3 months was  $-0.51 \pm 0.54$  logMAR and at the final visit it was  $-0.47 \pm 0.54$  logMAR. The difference between the BCVA preoperatively and at the last visit postoperatively was found to be statistically significant ( $P = 0.00001$ ). The mean ECD on specular microscopy was  $1409.18 \pm 388.79$  at 3 months, which dropped to  $1389.26 \pm 500.45$  cells/mm<sup>2</sup> at the last visit, and this decrease was not found to be significant ( $P = 0.44$ ). Amongst the 60 eyes, 9 (15%) had a detached lenticule, of which 7 (77.7%) underwent rebubbling and 2 (22.22%) underwent subsequent DSAEK and penetrating keratoplasty.

**Conclusions:** DMEK in PBK is a viable surgical procedure with good outcomes.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Lotus Room

### Pellucid Marginal Degeneration and Keratoconus: A Structural, Molecular, and Biomechanical Study

First Author: Gairik **KUNDU**

Co-Author(s): Prerna **AHUJA**, Arkasubhra **GHOSH**, Pooja **KHAMAR**, Rohit **SHETTY**

**Purpose:** To elucidate the structural, biomechanical,

and molecular properties of pellucid marginal degeneration (PMD) versus keratoconus (KC) and to see if PMD is a variant of KC.

**Methods:** PMD and KC are both corneal ectasias causing visual compromise, but with inherent differences. We studied 20 eyes of 10 PMD patients and 50 eyes of 25 KC patients by imaging, air-puff applanation, tear cytokines, confocal analysis, and gene expression analysis. Differential Corvis ST measurements were taken superiorly, centrally, and inferiorly. The epithelium was collected separately from the ectatic area and the surrounding non-ectatic area and was analyzed later for gene expression analysis. The tears were collected on Schirmer's strips, put in Eppendorf tubes, and stored in our biorepository at  $-80^{\circ}\text{C}$ . For analysis, the tears underwent flow cytometry and cytometric bead array.

**Results:** Confocal microscopy revealed a fibrotic component in the inferior ectatic area in PMD which was distinct from KC. Gene expression from the ectatic tissue and matched periphery showed LOX and collagen levels significantly higher in the ectatic area in PMD compared to the cone in KC. This was supported by the differences in biomechanics measured on Corvis ST.

**Conclusions:** This study shows that PMD and KC are probably different entities and not variants of the same disease as sometimes believed. These results may have a huge impact on treatment planning and surgical outcomes of these diseases.

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: Meeting Room 3

### Prevalence of Meibomian Gland Dysfunction, Dry Eye, and Posterior Blepharitis in a Population-Based Study (Hirado-Takushima Study) in Takushima Island in Japan

First Author: Reiko **ARITA**

Co-Author(s): Motoko **KAWASHIMA**, Shizuka **KOH**, Takanori **MIZOGUCHI**, Naoyuki **MORISHIGE**, Takashi **SUZUKI**

**Purpose:** To investigate the prevalence and the coincidence rate of meibomian gland dysfunction (MGD), dry eye (DE), and posterior blepharitis (PB) in a population-based study (Hirado-Takushima Study) in Takushima Island in Japan.

**Methods:** A total of 356 residents of Takushima Island with an age range of 6 to 92 years were included. Participants filled in questionnaires regarding ocular symptoms. Lid margin abnormalities (vascularity, plugging, irregularity, displacement of mucocutaneous junction), meiboscore, meibum grade, tear meniscus height, corneal and conjunctival fluorescein staining score, tear film breakup time with fluorescein,

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and Schirmer test value were evaluated. MGD was diagnosed (classified?) with the definition as (1) the presence of more than (at least?) one chronic ocular symptom; (2) more than (at least?) 1 lid margin abnormalities, and (3) obstruction of meibomian glands with orifice plugging and reduced meibum expression in response to moderate digital pressure in at least 1 eye. DE was diagnosed (classified?) based on the diagnostic criteria as (1) the presence of more than (at least?) 1 ocular symptom and (2) an FTBUT of <5 s. PB was diagnosed with the findings of a vascularity of lid margin.

**Results:** The prevalence of MGD, DE, and PB was 32.9%, 33.4%, and 27.8%, respectively. The coincidence rate of MGD and DE, DE and PB, and MGD and PB was 12.9%, 11.2%, and 16.6%, respectively. The coincidence rate of all 3 diseases was 5.9%.

**Conclusions:** MGD, DE, and PB were common in Japan. About 10% of 2 of 3 diseases coexisted.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Meeting Room 3**

### Quantification of Endothelial Cell Loss with a Pull-Through Inserter for Descemet Membrane Endothelial Keratoplasty

*First Author: Tien-En TAN*

*Co-Author(s): Marcus ANG, Kavya DEVARAJAN, Donald TAN*

**Purpose:** To quantify endothelial cell loss (ECL) associated with a “pull-through” inserter for Descemet’s membrane endothelial keratoplasty (DMEK).

**Methods:** In this ex-vivo experimental study, 9 human corneoscleral buttons were stained with Calcein AM. 8-mm DMEK grafts were prepared by a lamellar dissection technique and loaded into the DMEK EndoGlide device using an “endothelium-in” Tri-Fold approach. Grafts were pulled through and unfolded onto imaging dishes with viscoelastic. Grafts were imaged with an inverted fluorescent microscope over 16 fields, with automated digital stitching to produce a single composite image of each graft. Image resolution was standardized at 1000 x 1000 pixels, and images were analyzed by trainable segmentation software to quantify ECL as a percentage of each graft. ECL patterns were also assessed qualitatively.

**Results:** The mean age of donors was 58.8 (range, 49–69) years. Mean tissue death-to-preservation time was 10.2 (range, 6–16) hours, and mean tissue storage time was 7.8 (range, 6–11) days. Mean pre-procedure endothelial cell density by specular microscopy was 2685.7 (range, 2079–3378) cells/mm<sup>2</sup>. All 9 DMEK grafts could be successfully loaded into the EndoGlide device and pulled through. In 1 graft, a small tear was created

during graft preparation. Nevertheless, this graft could still be successfully loaded and pulled through, without extending the tear. Mean ECL was 15.20 (SD, 5.36) %. Qualitatively, all grafts showed mild areas of ECL at one edge from the forceps during loading and pull-through.

**Conclusions:** The “pull-through”, “endothelium-in” approach to DMEK using the DMEK EndoGlide is viable, with acceptable ECL rates.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Lotus Room**

### Routine Donor Tomography in the Eye Bank as Sterile Screening Method for Improved Graft Selection in Corneal Transplantation

*First Author: Berthold SEITZ*

*Co-Author(s): Fatema ASI, Timo EPPIG, Loic HAMON, Achim LANGENBUCHER, Stephanie MÄURER*

**Purpose:** To evaluate the efficiency of using anterior segment optical coherence tomography (AS-OCT) as a non-invasive and sterile screening method to detect corneal grafts with curvature and/or thickness abnormalities.

**Methods:** A total of 133 routine organ-cultured corneal buttons mounted in sterile tissue cultivation flasks were imaged using AS-OCT CASIA2 at least 24 hours after addition of 6% dextran T-500 (Medium 2). 3D volume data of the donor corneoscleral button within a 7.0 mm central zone were grabbed through the posterior surface of the cornea while the OCT system was aligned to capture the central part of the cornea. After pre-processing the data, an edge detection of the front and back surface of the donor cornea was performed using MATLAB. A sphero-cylindrical surface model was then fitted to the detected surfaces in order to determine the front and back radii of curvature and the central thickness.

**Results:** The mean steep/flat anterior radius of curvature was  $7.5 \pm 0.2$  (6.8–7.9) /  $7.7 \pm 0.2$  (7.3–8.8) mm, the respective values for the posterior surface were  $6.6 \pm 0.2$  (5.9–7.1) /  $6.7 \pm 0.2$  (6.2–7.5) mm and the mean central corneal thickness was  $585.6 \pm 43.9$  (454.9–678.9)  $\mu\text{m}$ . Abnormalities (beyond  $\pm 2$  SDs) were found in 8 corneas (6.0%) for the front surface, 12 corneas (9.0%) for the back surface, and 3 corneas (2.3%) for the thickness.

**Conclusions:** The AS-OCT provides an objective, sterile, and semi-automated screening method to identify corneal morphological and refractive alterations (eg, keratoconus, status post PRK/LASIK) in order to optimize corneal donor selection in the Eye Bank.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Lotus Room

### Safety and Efficacy of Frequency Doubled Nd:Yag Laser Photocoagulation of Corneal Vascularisation

First Author: Keerti **WALI**

Co-Author(s): Karan **BHATIA**, K V Satyamurthy **KODUR**, Shilpa **MALED**, Aniket **SHASTRI**, Ronak **SOLANKI**

**Purpose:** To evaluate safety and efficacy of frequency doubled Nd:YAG laser photocoagulation of corneal vascularization (NLPC), efficacy confirmed by anterior segment fluorescein angiography (AS-FA).

**Methods:** Thirty quiet eyes of 28 cases with superficial/mid stromal/deep stromal corneal vascularization were subjected to laser photocoagulation, maximum twice. Resolution of vessels corneal clarity and survival of subsequent corneal grafts was monitored up to 3 months. Anterior segment fluorescein angiography was done pre- and post-laser to study the nature of vessels and also effect of laser.

**Results:** Twenty eyes (66.66%) had complete resolution of vascularization with improved corneal clarity in 25% cases. Superficial (92.86%) and mid stromal vessels (75%) had a significant resolution, compared to deeper vessels (12.5%). Thirteen cases (43.33%) had ignorable flukes, like minimal corneal burn (13.33%), iris holes (10%), anterior chamber bubbles (16.67%), and self-resolving intrastromal bleed (6.67%). Of 12 eyes with subsequent keratoplasty, 1 (8.33%) had graft host junctional ectasia at lasered location. The vessels of corneal vascularization are immature vessels which leak the fluorescein. There was definitive evidence of vessel blockage as evidenced by AS-FA.

**Conclusions:** NLPC is an effective non-contact method to deal with superficial and midstromal corneal vascularization, with no risk of perforation, infectious keratitis, LSCD, and induced astigmatism, especially in cases where a large vessel arborises within the stroma.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Lotus Room

### Study on Factors Affecting Serological Testing of Cadaveric Donor Cornea in a Tertiary Hospital in Western India

First Author: Atul **KAMATH**

**Purpose:** The purpose of this study was to know the factors affecting serological testing of cadaveric donor cornea in a tertiary care center in western India.

**Methods:** An observational cross sectional study was done for the period of December 2014 to December 2016. Variables studied included donor demographics

(age, gender), cause and time of death of donor, macroscopic appearance of blood sample, and details of discarded tissues. Serological examination of blood was performed for human immunodeficiency virus, hepatitis B virus, hepatitis C virus, venereal disease research laboratory, and serology reports reactive or nonreactive were analyzed.

**Results:** During this study period, 200 corneal tissues were retrieved from 100 donors (male:female = 33:17). Most common age group of donors belonged to 70–79 year age group. The most common cause of death was cardiorespiratory arrest (63%). Macroscopically, sera were normal in 95% of cases. Among 100 donors, 90% were nonreactive, 2% donors were found to be reactive to hepatitis B surface antigen (HBsAg), and 1% was reactive to HCV. 7% donors' sera were not fit for serological testing. Among all donors, 90% of donors were accepted and 10% were rejected on the basis of serological testing. Cause of death and macroscopic aspect of sera influenced the serological results in a highly significant manner.

**Conclusions:** Macroscopic aspects of sera, along with cause of death of the donor corneas, play a vital role in corneal utility. Special care has to be taken by the enucleator as there is a significant risk of transmission.

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: Meeting Room 3

### The Expression of Prostaglandin E2 Receptor 3 in the Eyelid Epidermis of Patients with Stevens-Johnson Syndrome/Toxic Epidermal Necrolysis

First Author: Hiroki **MIENO**

Co-Author(s): Shigeru **KINOSHITA**, Chie **SOTOZONO**, Mayumi **UETA**, Akihide **WATANABE**, Keiko **YAMADA**

**Purpose:** We previously performed a genome-wide association study of Stevens-Johnson syndrome/toxic epidermal necrolysis (SJS/TEN) patients and reported the association between SJS/TEN and the prostaglandin E receptor 3 (PTGER3) gene. We also reported PGE2 receptor 3 (EP3), encoded by the PTGER3 gene, was markedly downregulated in the conjunctival epithelium of SJS/TEN patients and that PGE2 suppressed cytokine production via EP3 in human conjunctival epithelial cells. Here we investigated the EP3 expression of the eyelid epidermis in SJS/TEN patients with severe ocular complications and whether PGE2 could suppress cytokine production via EP3 in human epidermal keratinocytes.

**Methods:** For the immunohistochemical study, we obtained eyelid samples from SJS/TEN patients (n = 5) and patients without SJS/TEN (n = 5) undergoing surgery to treat trichiasis and investigated the expression of EP3 protein in the epidermis of those samples. Immunostaining was performed via the 3,

3'-diaminobenzidine immunological staining method. To investigate the EP3 function, we performed ELISA and quantitative reverse transcription polymerase chain reaction using human epidermal keratinocytes, adult.

**Results:** The immunohistochemical study revealed that EP3 expression in the eyelid epidermis of the SJS/TEN patients was identical to that in the control. PGE2 and a selective EP3 agonist suppressed the cytokine production such as chemokine ligand 5 and chemokine motif ligand 10.

**Conclusions:** Our findings revealed that in chronic-phase SJS/TEN, EP3 expression in the eyelid epidermis was not downregulated, unlike in conjunctival epithelium, and that PGE2 can suppress cytokine production via EP3. Thus, EP3 expression in the epidermis might contribute the silence of the skin inflammation in chronic-phase SJS/TEN.

## Glaucoma

Mar 07, 2019 (Thu)

14:30 - 16:00

Venue: C Ground Meeting Room 2

### 4- and 5-Year Results of the MicroShunt in Patients with Primary Open-Angle Glaucoma

*First Author:* Juan F **BATLLE**

*Co-Author(s):* Rachel **ALBURQUERQUE**, Raymund **ANGELES**, Adalgisa **CORONA PERALTA**, Omar **SADRUDDIN**

**Purpose:** The MicroShunt is made from a highly biocompatible and bioinert material called poly(styrene-block-isobutylene-block-styrene) or SIBS. Previous reports from a 3-year single-center study showed that implantation of the MicroShunt reduced intraocular pressure (IOP) with few adverse events (AEs) in patients with primary open-angle glaucoma (POAG). Herein, we reported the 4- and 5-year results for this study.

**Methods:** The MicroShunt was implanted using an ab externo approach with application of Mitomycin C for 3 minutes with or without cataract surgery. The outcomes recorded were IOP, number of glaucoma medications, and all device- and/or procedure-related AEs. Success was defined as IOP (with/without medication) <21 mm Hg and ≥20% reduction from baseline without surgical intervention.

**Results:** In total, 23 patients with a baseline IOP ± standard deviation (SD) of  $23.8 \pm 5.3$  mm Hg were implanted with the MicroShunt. At years 4 and 5, mean IOPs were  $13.3 \pm 3.2$  mm Hg and  $11.4 \pm 4.9$  mm Hg; success rates were 78.3% and 73.9%, respectively. Glaucoma medications ± SD were reduced from  $2.2 \pm$

$1.0$  to  $0.0 \pm 0.0$  at year 4 and to  $0.8 \pm 1.1$  at year 5. In total, 57.1% of patients were medication free at year 5. The most common device- and/or procedure-related AEs were transient and resolved within 90 days.

**Conclusions:** These results support the previously reported outcomes observed over a 3-year follow-up period.

Mar 07, 2019 (Thu)

14:30 - 16:00

Venue: C Ground Meeting Room 2

### 5-Year Outcomes of a Prospective Study of 2 Trabecular Microbypass Stents vs Prostaglandin in Newly Diagnosed Open-Angle Glaucoma

*First Author:* Florian **KRETZ**

**Purpose:** To evaluate long-term safety and effectiveness of 2 microbypass stents (iStent) as a standalone procedure compared to initial medical therapy in subjects with newly diagnosed OAG.

**Methods:** This 5-year prospective, randomized, unmasked study enrolled subjects with OAG naïve to medical and surgical treatment with intraocular pressure (IOP) of 21–40 mm Hg and a vertical C/D ratio ≤0.9. Outcomes included IOP reduction and use of additional medications. Safety measures included AEs, BCVA, VF, and optic nerve assessments.

**Results:** A total of 101 subjects were randomized to implantation of 2 iStent devices (n = 54) or travoprost QD (n = 47) with 90 subjects completing 5-year follow-ups. Mean pretreatment IOP was  $25.5 \pm 2.5$  mm Hg (iStent group) and  $25.1 \pm 4.6$  mm Hg (travoprost group). Mean IOP through 5 years ranged between 13.5 and 16.5 mm Hg in both groups with 12/35 eyes in the iStent group requiring add-on medication compared to 18/32 eyes in the travoprost group. IOP ≤18 mm Hg without add-on medication was reported in 77% of iStent eyes versus 53% of travoprost eyes at 5 years. An excellent safety profile was observed in both groups. The most common adverse event was progression of pre-existing cataract (both groups, ~30%).

**Conclusions:** In this study, both groups showed long-term substantial IOP reduction with favorable safety over a 5-year period. More subjects in the 2 iStent treatment group achieved IOP ≤18 mm Hg without additional medical therapy and remained medication-free as compared to initial travoprost therapy. The data from this prospective study, comparing 2 iStent devices to travoprost, supports the efficacy of iStent as an initial therapy for patients newly diagnosed with OAG.

Mar 07, 2019 (Thu)

14:30 - 16:00

Venue: C Ground Meeting Room 2

### Analysis on the Trend of the Development of Acute Primary Angle Closure

First Author: Sang-Woo **PARK**

Co-Author(s): Mi-Sun **SUNG**

**Purpose:** To analyze the trend of the development of acute primary angle closure (APAC) during the last 10 years.

**Methods:** A total of 250 APAC eyes from 250 patients were included. APAC eyes were classified into group 1 (2008–2013; n = 84 eyes) and group 2 (2014–2018; n = 166 eyes) depending on the time of the occurrence of APAC. In all included eyes, the demographic, clinical, and biometric parameters were investigated and compared among APAC eyes, or between APAC eyes with their fellow eyes or normal control eyes.

**Results:** In comparison between group 1 and 2, there was a change in sex difference ( $P = 0.046$ ), mean intraocular pressure at presentation ( $P < 0.001$ ), and the interval between attack and initial treatment ( $P = 0.013$ ). In comparison with biometric parameters, APAC eyes showed shallower anterior chamber depth (ACD) and greater LV (lens vault) compared with their fellow eyes (all  $P < 0.05$ ). Especially, group 2 showed shallower ACD ( $P = 0.033$ ) and greater LV ( $P = 0.029$ ) compared with group 1, but there were no significant differences in lens thickness and axial length. In comparison of treatment modality, we found lens extraction was performed more in group 2 compared with group 1 ( $P = 0.015$ ).

**Conclusions:** When comparing recent APAC eyes with past APAC eyes, we found shallower ACD and greater LV in recently developed APAC eyes. These findings may suggest that lens factor is more prominent in the development of recent APAC.

Mar 07, 2019 (Thu)

14:30 - 16:00

Venue: C Ground Meeting Room 2

### Clinical Results of Ultrasound Cycloplasty Using High-Intensity Focused Ultrasound to Treat Refractory Glaucoma

First Author: Jian **GE**

Co-Author(s): Junyi **CHEN**, Da-Bo **WANG**

**Purpose:** To evaluate intraocular pressure reduction (IOP) and safety after performing ultrasound cycloplasty (UCP) technique in refractory glaucoma patients uncontrolled by hypotensive medications.

**Methods:** Our prospective study was conducted in 3 eye hospitals on 98 patients (mean age,  $55.9 \pm 15.5$  years) with intraocular pressure (IOP)  $>24$  mm Hg

under hypotensive medication. Three ultrasound treatment strategies were used depending of the ciliary body circumference sonicated by ultrasound [ $165^\circ$  (48 eyes);  $210^\circ$  (30 eyes);  $270^\circ$  (20 eyes)]. Ultrasound parameters were the same in both groups. Complete ophthalmic examinations were performed before the UCP procedure, and at day-1, day-7, month-1, and month-3. The primary efficacy and safety outcomes were IOP reduction (from baseline  $>20\%$ ) and major adverse events, respectively.

**Results:** No major intra- and postoperative complications occurred, no serious adverse event was registered. Mean intraocular pressure reduced from  $39.6 \pm 9.9$  mm Hg before treatment to  $29.8 \pm 12.4$  mm Hg in the last follow-up, from  $44.5 \pm 10.5$  mm Hg before treatment to  $27.8 \pm 12.6$  mm Hg in the last follow-up, and from  $55.1 \pm 7.8$  mm Hg before treatment to  $23.1 \pm 10.1$  mm Hg in the last follow-up ( $P < 0.05$ ), respectively in group 1, group 2, and group 3. Qualified success rate was 63.4%, 66.7%, and 91.7% in the last follow-up, respectively in group 1, group 2, and group 3.

**Conclusions:** The increase in CB circumference treated by ultrasound appears to improve the IOP reduction in refractory glaucoma, with no additional effect on safety. Data need to be confirmed by further prospective studies.

Mar 07, 2019 (Thu)

14:30 - 16:00

Venue: C Ground Meeting Room 2

### Comparison of Omidenepag Isopropyl 0.002% with Latanoprost 0.005% in Primary Open-Angle Glaucoma and Ocular Hypertension: The Phase III AYAME Study

First Author: Makoto **AIHARA**

Co-Author(s): Akihiro **IWATA**, Hisashi **KAWATA**, Fenghe **LU**, Noriko **ODANI-KAWABATA**, Naveed **SHAMS**

**Purpose:** Omidenepag isopropyl (OMDI) is a selective EP2 receptor agonist with a non-prostaglandin structure. The objective of this Phase III, randomized, investigator-masked, active-controlled, parallel-group, multicenter study (NCT02623738) was to compare the efficacy and safety of OMDI 0.002% with latanoprost 0.005%, both once daily, for 4 weeks in subjects with primary open-angle glaucoma (POAG) or ocular hypertension (OHT).

**Methods:** The study was conducted in Japan. After a washout period, a baseline intraocular pressure (IOP) of 22–34 mm Hg at 3 timepoints (09:00, 13:00, and 17:00) was required for study entry. Eligible subjects were randomized to OMDI or latanoprost in 1:1 ratio for 4 weeks. IOP was measured at 9:00, 13:00, and 17:00. The primary endpoint was the change from baseline in mean diurnal IOP at week 4. The noninferiority margin was 1.5 mm Hg. Adverse events were recorded.

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**Results:** At week 4, the mean diurnal IOP reduction was  $-5.96 \pm 2.45$  mm Hg and  $-6.45 \pm 0.32$  mm Hg for OMDI ( $n = 94$ ) and latanoprost ( $n = 95$ ), respectively. OMDI IOP-lowering was non-inferior to that of latanoprost. The most frequently reported ocular adverse events (AEs, OMDI versus latanoprost) were conjunctival hyperemia (24.5% versus 10.4%), corneal thickening (11.7% versus 1.0%), and punctate keratitis (0.0% versus 7.3%). No serious AEs were observed in either group.

**Conclusions:** OMDI 0.002% once daily was non-inferior to latanoprost 0.005% in reducing IOP in subjects with POAG or OHT and had an acceptable safety profile. The study was sponsored by Santen.

**Mar 07, 2019 (Thu)**

**14:30 - 16:00**

**Venue: C Ground Meeting Room 2**

### **Continuous 24-Hour Intraocular Pressure Profile in Progressive and Nonprogressive Primary Open-Angle Glaucoma Patients**

*First Author: Wei Loon NG*

*Co-Author(s): Ghee Soon ANG, Jemaima CHE HAMZAH*

**Purpose:** We compared the continuous 24-hour intraocular pressure (IOP) related profiles in patients with progressive and non-progressive primary open angle glaucoma.

**Methods:** This was a cross-sectional study. We included 31 patients who were categorized into progressors (16 patients) and non-progressors (15 patients). The determination of progression was based on the enhanced Glaucoma Staging System 2 (eGSS 2). The 24-hour IOP-related profiles of ocular dimensional changes were measured with SENSIMED triggerfish contact lens sensor (CLS). The demographic data of patients, amplitude, and peak time of CLS output were analyzed and compared between groups.

**Results:** The mean IOP before study in progressors and non-progressors were  $14.69 \pm 2.12$  mm Hg and  $14.67 \pm 2.66$  mm Hg respectively, hence it was not statistically significant ( $P = 0.398$ ). However, the amplitude of the CLS output was significantly larger in progressors ( $45.62 \pm 11.41$  mVeq) compared to non-progressors ( $33.94 \pm 8.76$  mVeq) ( $P = 0.00$ ). Both groups showed a nocturnal acrophase (12am–5am) in the majority of cases.

**Conclusions:** The mean IOP before study in progressors and non-progressors were  $14.69 \pm 2.12$  mm Hg and  $14.67 \pm 2.66$  mm Hg respectively, hence it was not statistically significant ( $P = 0.398$ ). However, the amplitude of the CLS output was significantly larger in progressors ( $45.62 \pm 11.41$  mVeq) compared to non-progressors ( $33.94 \pm 8.76$  mVeq) ( $P = 0.00$ ). Both groups showed a nocturnal acrophase (12am–5am) in the majority of cases.

**Mar 07, 2019 (Thu)**

**14:30 - 16:00**

**Venue: C Ground Meeting Room 2**

### **Induced Ocular Hypertension in Rats: Anterior Chamber Injection of 0.5% Carbomer Suspension**

*First Author: Jingkang ZHAO*

*Co-Author(s): Yuan HE*

**Purpose:** To describe a simple method for artificially inducing a rat model of a consistent, low-loss, and reproducible elevation in IOP without secondary effects. IOP was induced by injection of 0.5% carbomer 940 suspension into the anterior chamber to occlude aqueous outflow in rats.

**Methods:** The mean and peak intraocular pressure (IOP) of the injected eyes were elevated significantly higher than those of the control eyes for 12 weeks. In most rats, the IOP is different in the day and night. The average daytime IOP was  $11.23 \pm 0.97$  mm Hg and  $11.56 \pm 1.20$  mm Hg at night. In the experimental group, mean IOP was  $14.25 \pm 1.38$  mm Hg during the day and  $16.20 \pm 3.89$  mm at night. Most of the IOP in the experimental group dropped to normal within 6 weeks, and a few could be maintained to 12 weeks. Subsequently, we analyzed the density of RGCs, as well as the retina thickness. Eyeball cross-sections showed significant retinal difference between carbomer-injected eyes and control eyes. Compared with the control eyes, there was a significant decrease in the retinal ganglion cells near the optic nerve and the equator in the experimental eyes. In carbomer-injected eyes with chronic IOP elevation, the obstruction of anterior chamber angle and corneal edema were observed.

**Results:** Anterior chamber injection of 0.5% carbomer suspension was an effective and reproducible method to produce chronic IOP elevation and glaucomatous neuropathy in rats.

**Conclusions:** Anterior chamber injection of 0.5% carbomer suspension was an effective and reproducible method to produce chronic IOP elevation and glaucomatous neuropathy in rats.

**Mar 07, 2019 (Thu)**

**14:30 - 16:00**

**Venue: C Ground Meeting Room 2**

### **Interim Results of a Prospective Feasibility Study to Evaluate Safety and Efficacy of Ultrasound Cycloplasty Using High-Intensity Focused Ultrasound in Refractory Open Angle Glaucoma Patients**

*First Author: Reena CHOUDHRY*

*Co-Author(s): Chandrima PAUL, Sirisha SENTHIL*

**Purpose:** To evaluate safety and efficacy of ultrasound

cycloplasty (UCP) technique using high intensity focused ultrasound (HIFU) in refractory open angle glaucoma patients when glaucoma medications have failed to control intraocular pressure (IOP).

**Methods:** Prospective study (CTRI 2017/09/009740) was conducted in 3 eye hospitals on 21 eyes of 21 patients with intraocular pressure (IOP) >21 mm Hg. Two ultrasound treatment strategies were used, depending of the ciliary body circumference sonicated by ultrasound [group 1 = 210° (11 eyes); group 2 = 260° (10 eyes)]. Ultrasound parameters were the same in both groups (21 MHz, piezoelectric transducers of the therapy probe activated for 6 seconds each). Complete ophthalmic examinations were performed before the UCP procedure, and at day-1, day-7, month-1, month-2, month-3, and month-6. The primary efficacy and safety outcomes were IOP reduction (from baseline >20%) and major adverse events respectively.

**Results:** No major intra- and postoperative complications occurred. Ocular exam did not reveal lesions of ocular structures other than ciliary body. No serious adverse event was registered. Mean IOP reduced from  $29.1 \pm 6.8$  mm Hg before treatment to  $21.9 \pm 5.9$  in last follow-up, and from  $28.9 \pm 4.1$  mm Hg to  $19.6 \pm 9.9$  in last follow-up ( $P < 0.05$ ), respectively in group 1 and in group 2.

**Conclusions:** The increase in CB circumference treated by ultrasound appears to improve the IOP reduction in open angle glaucoma, with no additional effect on safety. Data need to be confirmed by further prospective studies.

**Mar 07, 2019 (Thu)**

**14:30 - 16:00**

**Venue: C Ground Meeting Room 2**

### **MIGS with Second-Generation Trabecular Microbypass Stents Combined with Topical Prostaglandin in Eyes with OAG on 2 Preoperative Medications: 42-Month Outcomes**

*First Author: Robert ANG*

**Purpose:** To evaluate long-term effectiveness and safety of second-generation trabecular micro-bypass stents (iStent inject) implanted as a standalone procedure combined with prostaglandin in open-angle glaucoma (OAG) patients on 2 preoperative topical glaucoma medications.

**Methods:** This prospective study enrolled subjects with OAG on 2 medications with baseline IOP of 18–30 mm Hg (medicated) and 22–38 mm Hg (following washout). Two iStent inject stents were implanted as a standalone procedure, and travoprost was started on postoperative day 1. Assessments performed over the course of the study included intraocular pressure (IOP), medication usage, and standard safety assessments.

Annual medication washouts were performed. Postoperative safety and efficacy evaluation through 5 years is ongoing.

**Results:** All 53 enrolled subjects completed follow-up of 42 months. Mean medicated IOP at M42 is 12.4 mm Hg compared to 19.7 preoperative on 2 meds (37% reduction) and 24.9 preoperative post-washout (50% reduction). At M36, 91% of eyes achieved IOP of  $\leq 18$  mm Hg and 88% achieved  $\geq 20\%$  reduction in mean IOP on travoprost compared to preoperative mean IOP on 2 meds. All eyes underwent uncomplicated implantation of iStent inject. Best-corrected VA, C/D ratio, and VF mean deviation remained stable throughout the study. Other than 2 reports of progression of pre-existing cataract, no other AEs have been reported.

**Conclusions:** In this cohort of eyes with OAG not controlled on 2 medications, treatment with iStent inject stents performed as a standalone procedure combined with postoperative travoprost resulted in safe and long-lasting clinically meaningful IOP and medication reduction through 42 months.

**Mar 07, 2019 (Thu)**

**14:30 - 16:00**

**Venue: C Ground Meeting Room 2**

### **Microvascular Changes in Peripapillary and Optic Nerve Head Tissues After Trabeculectomy in Primary Open-Angle Glaucoma**

*First Author: Ji-Ah KIM*

*Co-Author(s): Gyu-Nam KIM, Tae Woo KIM, Eun Ji LEE*

**Purpose:** To determine microvasculature changes in the deep optic nerve head (ONH) and peripapillary tissues after trabeculectomy, and to correlate these with changes in the lamina cribrosa (LC) curvature.

**Methods:** A total of 56 eyes with primary open-angle glaucoma that underwent trabeculectomy were included. The optic nerve and peripapillary microvasculature was evaluated in en-face images obtained using optical coherence tomography (OCT) angiography (OCTA) before and 3 months after trabeculectomy. The OCTA-derived vessel density (VD) was calculated in each layer segmented into the prelaminar tissue (PLT), LC, peripapillary retina (PR), and peripapillary choroid (PPC). Swept-source OCT volume scanning of ONH was performed on the same day as OCTA to examine the change in LC curvature quantified as the lamina cribrosa curve index (LCCI).

**Results:** At 3 months postoperatively, the intraocular pressure (IOP) and LCCI had significantly decreased (both  $P < 0.001$ ). OCTA images revealed a significant increase in VD in the LC ( $P = 0.006$ ), but not in the PLT, PR, or PPC. A total of 26 eyes showed both significant LCCI decrease and VD increase based on 95% Bland-Altman limits of agreement. The VD increase in the

LC was significantly associated with larger percentage reductions in IOP ( $P = 0.040$ ) and LCCI ( $P < 0.001$ ) in the univariate analysis. Multivariate analysis revealed that only the LCCI reduction was a significant factor affecting the VD increase in the LC.

**Conclusions:** A significant increase in VD was observed at the level of the LC after trabeculectomy. The VD increase was more strongly associated with the reduction in the LC curvature than with the reduction of IOP.

Mar 07, 2019 (Thu)

14:30 - 16:00

Venue: C Ground Meeting Room 2

### Primary Congenital Glaucoma: Baseline Features and Short-Term Surgical Outcome

First Author: Rakshya **PANTA SITOUA**

Co-Author(s): Jamuna **GURUNG**

**Purpose:** This study was undertaken to study the demographic and clinical characteristics, risk factors, and 1-year outcome of combined trabeculotomy and trabeculectomy of children ( $\leq 3$  years old) with primary congenital glaucoma presenting.

**Methods:** Retrospective review of records of all the children ( $\leq 3$  years) with primary congenital glaucoma who presented to the glaucoma clinic between 2013 and 2017 was done. Children with intraocular pressure (IOP)  $>21$  mm Hg associated with enlarged corneal diameter ( $>11$  mm in newborn;  $>12$  mm in a child less than 1 year; or  $>13$  in a child of any age), corneal haze, Haab striae, buphthalmos, and increased axial length were defined to have congenital glaucoma. All diagnosed children underwent combined trabeculotomy, with trabeculectomy of 1 eye in the same sitting and the second eye in bilateral cases after 2 weeks.

**Results:** A total of 80 eyes of 48 children were diagnosed with primary congenital glaucoma in this period; 32 (66.7%) had bilateral involvement. There were 33 (67%) boys and 15 (33%) girls. Mean age of initial presentation was 11.7 months. Mean horizontal corneal diameter, IOP, and the axial length were  $12.4 \pm 1$  mm,  $42 \pm 8.72$  mm Hg (range, 18–55) and  $23.98 \pm 1.7$  mm, respectively. Consanguinity was observed in 13 (27%) children. IOP control of  $\leq 21$  mm Hg was achieved in 65%, with surgery alone that increased to 78% with medication at 1 year.

**Conclusions:** This study provided baseline data on the present scenario of primary congenital glaucoma in the region, with consanguinity being identified as an important risk factor.

Mar 07, 2019 (Thu)

14:30 - 16:00

Venue: C Ground Meeting Room 2

### Prospective Evaluation of a Schlemm Canal Microstent for Treatment of Primary Angle Closure Glaucoma in Combination with Phacoemulsification

First Author: Robert **ANG**

**Purpose:** To assess preliminary safety and effectiveness of the Hydrus Microstent (Ivantis) implanted in Schlemm's canal during cataract surgery for treatment of primary angle closure glaucoma (PACG).

**Methods:** A total of 21 eyes from 21 subjects with cataracts and PACG with intraocular pressure (IOP)  $>21$  mm Hg on at least 1 glaucoma medication or at least 24 mm Hg on no medications were treated with phacoemulsification and Hydrus Microstent. Goniosynechiolysis (1–2 clock hours) was performed in the nasal hemisphere if needed to expose the trabecular meshwork (TM) prior to microstent insertion. Follow-up was conducted for 1 year postoperative.

**Results:** Study patients were 100% Asian, 75% female, and mean age was  $66.8 \pm 7.2$  years. Gonioscopy showed 82% of the angle was closed prior to surgery. Mean preoperative IOP  $25.5 \pm 6.2$  with  $1.4 \pm 1.3$  medications. Device implant was successful in 20/21 subjects, and 65% required goniosynechiolysis to expose the TM prior to microstent insertion. At 6 months, mean IOP was  $14.4 \pm 3.4$  mm Hg and there were 0 medications in use ( $P < 0.001$  vs baseline for IOP and medications). The device inlet remained visible and patent despite narrow or closed angle. There were no serious adverse events or complications.

**Conclusions:** The Hydrus Microstent was associated with clinically and statistically significant reductions in IOP and medication when implanted during cataract surgery in PACG. Through 6 months of follow-up, the inlet remained open to the anterior chamber. There were no significant safety findings.

Mar 07, 2019 (Thu)

14:30 - 16:00

Venue: C Ground Meeting Room 2

### Surgical Outcomes of Trabecular Microbypass Stent and Gonioscopy-Assisted Transluminal Trabeculotomy Through Retrospective Analysis

First Author: Danielle **WENTZELL**

Co-Author(s): Anish **ARORA**, Helen **CHUNG**, Malcolm **GOOI**, Samir **NAZARALI**, Dani **WANG**

**Purpose:** To compare gonioscopy-assisted transluminal trabeculotomy (GATT) and trabecular micro-bypass

stent (iStent, Glaukos) for surgical outcomes.

**Methods:** A total of 146 patients with open-angle and closed-angle glaucoma that had previous GATT or trabecular micro-bypass stent procedures were retrospectively reviewed, in adherence to the Declaration of Helsinki and Health Research Ethics Board approval. Preoperative, 1-day, 1-week, 1-month, 3-month, and 6-month surgical outcomes were investigated. The percentage of patients that reached intraocular pressure (IOP)  $\leq 21$  mm Hg or IOP decrease of  $\geq 20\%$ , without pressure-lowering medications at 6 months was the primary outcome measure. IOP and number of glaucoma medications at 1, 3, and 6 months were assessed as secondary outcomes.

**Results:** A total of 57 patients received GATT and 89 received trabecular micro-bypass stent. The mean IOP in patients who underwent GATT was  $22.8 \pm 9.3$  mm Hg and decreased to  $13.2 \pm 4.9$  mm Hg at 6 months. In patients who underwent trabecular micro-bypass stent, the mean IOP was  $19.3 \pm 5.5$  mm Hg and decreased to  $13.2 \pm 0.9$  mm Hg. Number of glaucoma medications in GATT patients decreased from  $2.1 \pm 1.5$  to  $1.4 \pm 1.2$  at 6 months and decreased from  $1.1 \pm 1.2$  to  $0.9 \pm 1.1$  in trabecular micro-bypass stent patients. Between GATT and trabecular micro-bypass stent patients there were no significant differences in IOP outcomes at 6 months. The success rate of GATT was 74% compared to 52% in trabecular micro-bypass stent patients.

**Conclusions:** The mean IOP at 6 months for both GATT and trabecular micro-bypass stent procedures resulted in significant decreases. Completing a GATT procedure with a suture is an inexpensive alternative compared to trabecular micro-bypass stents or other MIGS devices.

**Mar 07, 2019 (Thu)**

**14:30 - 16:00**

**Venue: C Ground Meeting Room 2**

### **The SPECTRUM Registry: 12- and 24-Month Results from a Global Real-World Study of 2400 Glaucoma Eyes Treated with Microinvasive Glaucoma Surgery Using the Hydrus Microstent**

*First Author: Rahat HUSAIN*

**Purpose:** The purpose of the SPECTRUM registry was to collect and evaluate real world safety and effectiveness outcomes for all forms of glaucoma treated with the Hydrus Microstent, either in combination with cataract surgery or as a standalone surgery.

**Methods:** The SPECTRUM registry has been conducted in 51 clinics located in 17 countries. Over 60 surgeons were participating in the registry. Data collected includes baseline demographic and ocular status, intraocular pressure (IOP), medication count, visual field mean deviation, and history of prior glaucoma or ocular surgeries. A follow-up visit was conducted

between 1 and 3 months and repeated annually. IOP, medication, and adverse event outcomes were collected. A total of 2495 eyes were registered between 2013 and 2017. Follow-up is complete in 62% at 12 months, and 32% at 24 months.

**Results:** The predominant diagnosis is primary open angle glaucoma (71%). Average MD is  $-7.2$  dB. 73% of procedures were performed in combination with cataract surgery; 27% were performed standalone (SA). In the combination group, IOP was reduced by 19.6% and 20.6% ( $P < 0.05$ ), and medications were reduced 59.2% and 51.2% ( $P < 0.05$ ) at 12 and 24 months. In the SA group, IOP was reduced by 22.2% and 23.8% ( $P < 0.05$ ), and medications were reduced 40.9% and 34.3% ( $P < 0.05$ ) at 12 and 24 months.

**Conclusions:** This large-scale online multicenter global registry shows that the Hydrus MIGS device can be broadly used in different classes of glaucoma, in combination with cataract surgery or as a standalone procedure. IOP and medication use is significantly reduced at 12 and 24 months in both types of procedure.

**Mar 07, 2019 (Thu)**

**14:30 - 16:00**

**Venue: C Ground Meeting Room 2**

### **Trabecular Peeling Technique for Ab-Interno Trabeculectomy**

*First Author: Ankush MAHAJAN*

*Co-Author(s): Vijay Kumar MAHAJAN*

**Purpose:** To evaluate the efficacy of a novel technique of performing ab-interno trabeculectomy either alone or when combined with phacoemulsification in the management of glaucoma.

**Methods:** This was a retrospective non-randomized study of 38 patients. The trabecular meshwork was incised for 2 clock hours at its anterior border using a 30G needle. The trabecular tissue flap was firmly grasped with 25G ILM peeling forceps and pulled out, creating a free flap of trabecular meshwork 3–4 clock hours long. This free flap was then repeatedly held and pulled in a tangential direction using either ILM peeling forceps or capsulorhexis forceps to complete 120 to 360 degrees trabeculectomy.

**Results:** A total of 33 underwent combined phaco with trabeculectomy, and 5 underwent only trabeculectomy. Complete 360-degree ab-interno trabeculectomy was accomplished in 8 cases, and in the rest 120 degrees of trabecular meshwork was peeled off. The preop intraocular pressure (IOP) was  $22.79 \pm 5.95$  mm Hg. The postop IOP at 1 week, 1 month, 6 months, and 1 year was  $15.66 \pm 4.6$  ( $n = 38$ ),  $15.62 \pm 3.43$  ( $n = 34$ ),  $16.15 \pm 3.07$  ( $n = 27$ ),  $16.11 \pm 2.74$  ( $n = 37$ ) ( $P = 0.0001$ ), respectively. The anti-glaucoma medication use decreased from  $2.0 \pm 0.83$  preoperatively to  $0.2 \pm 0.6$  at 1 year. Hyphema occurred in 94.74% of cases but

resolved spontaneously in all.

**Conclusions:** This new technique of trabecular peeling is an effective method of creating 120–360 degrees of ab-interno trabeculectomy, causing clinically significant decreases in IOP in both open as well as narrow angle glaucoma patients.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Ballroom**

### **A Novel Method for the Localization and Management of Large and Deep Traumatic Cyclodialysis Cleft by Using Endocamera for Direct Suturing**

*First Author: Tham Truong Khanh* **VAN**

*Co-Author(s): Trung Kiên* **TRẦN**

**Purpose:** To describe a new surgical technique to effectively close large and deep (even 360 degrees) cyclodialysis clefts.

**Methods:** Our method was based on 2 techniques: 1st technique was iridodialysis repaired, and the 2nd technique was using endocamera for cyclocoagulation for glaucoma refractory. We created one or some small paracentesis (depending on the extension of cleft). One for placing long needle with 10-0 polypropylene thread, the other for 23G endocamera probe which can localize precisely the site and the extension of the cleft. After localizing the cleft, under the guide of 23G endocamera, we can put the needle in its exact position (just behind iris). At the end of surgery, we applied watertight for closing the paracentesis and cryoapplication on the cleft.

**Results:** This technique was used to repair large cyclodialysis clefts in 2 eyes. Both eyes had resolution of hypotony and improvement of visual acuity with cleft closure.

**Conclusions:** This technique is effective in repairing extensive and deep cyclodialysis clefts. It can localize exactly the cleft's position and extension so we can precisely navigate the position of suture. It also is a minimally invasive technique with a quick recovery, and it can avoid some complications such as bleeding by piercing the needle through the ciliary body. The disadvantages of this technique including complicated equipment with well-trained surgeons with endocamera and can apply only when concomitant lens damage/pseudophakic/aphakic eye.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Ballroom**

### **A Prospective, Randomized Pivotal Study of Second-Generation Trabecular Microbypass Stents Implanted in Conjunction with Cataract Surgery**

*First Author: David* **LUBECK**

**Purpose:** US IDE pivotal trial to evaluate the effectiveness and safety of the second-generation trabecular micro-bypass stents (iStent inject) implanted in conjunction with cataract surgery, compared to cataract surgery alone in subjects with mild to moderate open-angle glaucoma (OAG).

**Methods:** Two-year prospective, randomized, concurrently controlled, parallel groups, multicenter trial that enrolled subjects  $\geq 45$  years diagnosed with mild-to-moderate OAG on 1–3 medications with a cataract eligible for surgery. Baseline post-washout mean diurnal intraocular pressure (IOP) of 21–36 mm Hg was required in the study eye. Qualified subjects were randomized to implantation with 2 iStent inject devices in conjunction with cataract surgery (treatment group) or cataract surgery alone (control group). Annual medication washouts were performed. Key study assessments included: IOP, best corrected visual acuity, pachymetry, visual field, specular microscopy, biomicroscopy, gonioscopy, funduscopy, and adverse events.

**Results:** A total of 505 subjects were randomized. Subject accountability at 24 months was 96%. At M24, 75.8% of treatment eyes vs 61.9% of control eyes achieved  $\geq 20\%$  reduction from baseline in unmedicated IOP (difference = 13.9%;  $P = 0.003$ ). Mean reduction in unmedicated IOP from baseline was greater in treatment eyes ( $7.0 \pm 4.0$  mm Hg) than control eyes ( $5.4 \pm 3.7$  mm Hg;  $P < 0.001$ ). Overall, the safety profile of the treatment group was favorable and similar to that of the control group throughout the 2-year follow-up.

**Conclusions:** Clinically and statistically greater reductions in IOP without medication were achieved after iStent inject implantation in combination with cataract surgery vs cataract surgery alone, with excellent safety observed through 2 years.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Ballroom**

### **Can Toric IOL be Given to Patients Undergoing Phacotrabeculectomy? Visual and Refractive Outcomes**

*First Author: Jai* **KELKAR**

*Co-Author(s): Pankaj* **BENDALE**

**Purpose:** The purpose of this study was to compare

visual outcomes following single-site versus twin-site phacotrabeculectomy and refractive outcomes following single-site versus twin-site phacotrabeculectomy. Thus, this study aimed to look at refractive outcomes of both procedures while weighing pros and cons of each other.

**Methods:** Results of twin site phacotrabeculectomy (superior trabeculectomy and temporal phacoemulsification with PC-IOL implantation) in 54 eyes of 46 patients were prospectively reviewed with a minimum follow-up of 3 months. The twin site procedures were compared with a randomly chosen group of 51 eyes of 41 patients undergoing single-site phacotrabeculectomy (superior trabeculectomy and phacoemulsification with PC-IOL implantation through the same incision), performed by the same surgeon, to decrease variables.

**Results:** (1) The average intraocular pressure (IOP) (preop, 1 day, 1 month, and 3 month postop follow-ups) did not differ significantly between 2 study groups ( $P > 0.05$  for all). (2) The average difference between K1 and K2 readings (preop, 1 day, 1 month, and 3 month postop follow-ups) did not differ significantly between 2 study groups ( $P > 0.05$  for all).

**Conclusions:** (1) Phacotrabeculectomy surgery should be considered in patients with low target IOP, complex medical regimens, and advanced glaucoma. The surgical approach should be chosen that best suits the surgeon's skills and preferences. (2) The efficacy of twin-site phacotrabeculectomy as well as single-site in visual and refractive outcomes and IOP control were comparable at 3 months postoperative follow-up. (3) Meticulous suturing of trabeculectomy does not induce significant astigmatism, so toric IOL can be offered for the patients undergoing combined cataract and glaucoma surgery. (4) Both surgeries are equally suited for possibility of toric IOL option.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Boardroom 2**

### Comparison of Central Corneal Thickness Measurements Using Optical and Ultrasound Pachymetry in Glaucoma Patients and Elderly and Young Controls

*First Author: Karin **PILLUNAT***

*Co-Author(s): Lutz **PILLUNAT**, Eberhard **SPOERL**, Soeren **WAIBEL***

**Purpose:** To compare central corneal thickness (CCT) using optical and ultrasound pachymetry in patients with open-angle glaucoma and young as well as elderly, healthy controls. Further, to investigate whether the devices could be used interchangeably.

**Methods:** A total of 69 eyes of 41 glaucoma patients, 51 eyes of 32 elderly controls, and 50 eyes of 25

young controls were consecutively included in this cross-sectional observational study. Optical CCT measurements were obtained using the non-contact Specular Microscope CEM-530 (NCSM). Ultrasound pachymetry (USP) was measured using the Pachy Meter SP 3000. Linear mixed models and Bland–Altman plots were used for statistical analysis.

**Results:** In young, healthy subjects ( $27.2 \pm 4.8$  years), the mean CCT taken with NCSM and USP was  $562.1 \pm 33.6 \mu\text{m}$  and  $565.8 \pm 35.8 \mu\text{m}$ , respectively. This was significantly different ( $\text{USP} > \text{NCSM}$ ,  $P = 0.019$ ). In elderly, healthy subjects ( $70.6 \pm 10.7$  years), CCT measured with NCSM ( $562.5 \pm 27.8 \mu\text{m}$ ) compared to USP ( $564.9 \pm 27.1 \mu\text{m}$ ) was not statistically significantly different ( $P = 0.121$ ). In glaucoma patients ( $65.0 \pm 11.1$  years), USP measured thinner CCT values compared to NCSM, without significant differences between the devices (NCSM  $525.3 \pm 32.3 \mu\text{m}$ ; USP  $522.9 \pm 33.15 \mu\text{m}$ ;  $P = 0.067$ ).

**Conclusions:** Ultrasound pachymetry measures CCT higher than optical pachymetry in young, healthy subjects. This difference is no longer observed in elderly subjects and is even reversed in glaucoma patients. A higher ultrasound velocity of the cornea in elderly and glaucoma patients could explain this. The devices could be used interchangeably in older and glaucoma patients, but not in young individuals.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Boardroom 2**

### Comparison of New Head Mount Perimeter, Virtual Reality-Based C3 Visual Field Analyzer with Standard Humphrey Field Analyzer in Patients with and without Glaucoma

*First Author: Pavan **KUMAR***

*Co-Author(s): Sandal **KOTALWALA**, Rengaraj **VENKATESH***

**Purpose:** To evaluate the validity of the CFA device (developed by us) as a glaucoma screening and diagnostic device in comparison to standard HFA.

**Methods:** Two groups of patients, one comprised of patients diagnosed with glaucoma in prior, based on a demonstrable visual field defect on HFA and a glaucomatous appearing optic nerve as determined by a glaucoma specialist, and another group with normal results in the ocular examination and visual field tests on HFA. The C3 Field Analyzer, which is comprised of a virtual reality headset, a smartphone with a 6-inch display, and software which implements a fast-threshold algorithm for the central  $24^\circ$  of visual field with 54 points, was used to test the patients. The results were compared with those obtained using the Humphrey perimeter for the 2 groups of same patients. A survey was also conducted to analyze the comfort of performing HFA and CFA through a 5-point question.

**Results:** The study included 100 patients in each group. The average accuracy of the test was 90.02%, while that of the sensitivity and specificity of the CFA to detect visual field defects was 84.30% and 90.74% respectively. 94% of the patients found that the CFA test was easier to perform than the HFA, 95.60% of patients found CFA more comfortable than HFA, and 100% of patients opted for the CFA over the HFA for visual field testing during future follow-ups.

**Conclusions:** Visual field perimetry test using virtual reality based C3 Field Analyzer has competent accuracy, with better patient comfort in comparison to the Humphrey Field perimeter.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Ballroom**

### **Differentiating Age-Related Optic Nerve Head Change from Early Glaucoma in Elderly Patients**

*First Author: Ahnul HA*

*Co-Author(s): Jin Wook JEOUNG, Young Kook KIM, Ki Ho PARK*

**Purpose:** To answer the question: In the elderly, can 'age-related optic-nerve-head (ONH) change' and 'early glaucoma' be distinguished?

**Methods:** A total of 72 eyes of 72 elderly patients (65+ years) with large vertical cup-to-disc ratio (VCDR  $\geq 0.8$ ) without any other glaucomatous findings were included. 'Conversion to primary open-angle glaucoma (POAG)' was assessed as either red-free retinal nerve fiber layer photography or standard automated perimetry, and participants were classified into two groups: non-converter (no conversion to POAG) and converter (conversion to POAG) groups. The ability of baseline factors to predict the conversion was identified. A presence or absence of 'temporal raphe sign' on the baseline macular ganglion cell-inner plexiform layer (mGCIPL) thickness map was also evaluated.

**Results:** During the 5-year follow-up, 19 eyes (26.4%) converted to POAG. A temporal raphe sign was observed much more frequently in the converter group (18 of 19) than in the non-converter group (0 of 53). In multivariate Cox models, baseline factors that significantly predict POAG development included: positive temporal raphe sign [hazard ratio (HR) = 4.3; 99% CI, 1.2–17.9]; greater fluctuation of follow-up intraocular pressure (HR = 1.1; 99% CI, 1.4–3.0). The AUC of the temporal raphe sign was excellent (0.967; sensitivity 94.94%, specificity 98.46%) and greater than that of any other OCT parameters.

**Conclusions:** In assessing the likelihood of the elderly with large VCDR to develop POAG, identification of the temporal raphe sign on mGCIPL thickness map

was very effective. Those without this sign could be suspected as 'age-related ONH change' rather than glaucoma.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Ballroom**

### **Double-Masked, Randomized, Dose-Response of Phase 2 Study of PHP-201 in Patients with Normal Tension Glaucoma**

*First Author: Ki Ho PARK*

*Co-Author(s): Jaheon KANG; \* Php-201 Study Group: Ki Ho PARK, Chan Yun KIM, Jaheon KANG, Joon Mo KIM, Sang Woo PARK, Dai Woo KIM, Chong Eun LEE, Jiwoong LEE, Kyoung Nam KIM, Hwang Ki KIM, Mincheol SEONG, Hae-Young Lopilly PARK, Seungsoo RHO, Sangchul YOON, Jong Yeon LEE, Chan Yun KIM, Joon Mo KIM, Sang-Woo PARK*

**Purpose:** PHP-201 is a small molecule inhibitor of Rho kinase with localized drug action characteristics. This study was conducted to evaluate the reduction of intraocular pressure (IOP) and safety of PHP-201 for 4 weeks in patients with normal tension glaucoma (NTG).

**Methods:** A total of 119 patients with NTG were randomized in 3 groups and treated with PHP-201 in concentrations of 0.25%, 0.5%, and a placebo 3 times daily for 4 weeks. The dose-response of IOP lowering and the incidence of adverse events by PHP-201 and placebo were investigated.

**Results:** The mean baseline IOP was between 15.4 and 15.8 mm Hg. The mean IOP reductions from the baseline of the last visit in the placebo, 0.25%, and 0.5% group were -0.65 mm Hg, -1.1 mm Hg and -1.5 mm Hg, respectively. The dose-dependent IOP lowering effect of PHP-201 was statistically significant ( $P < 0.05$ ). Also, conjunctival hyperemia was founded in 1 (2.63%) of 38 patients for the placebo group, 7 (17.5%) of 40 patients for 0.25% group, and 10 (24.4%) of 41 patients for 0.5% group.

**Conclusions:** PHP-201 0.25% and 0.5% were all effective in lowering the IOP and well-tolerated with favorable adverse events including low incidence rate of conjunctival hyperemia. The result suggests that PHP-201 can be a new treatment option for patients with NTG.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Ballroom

### Efficacy and Safety of Intravitreal Aflibercept Injection in Japanese Patients with Neovascular Glaucoma: The VEGA Study

First Author: Kenji **MATSUSHITA**

Co-Author(s): Tomomi **HIGASHIDE**, Masaru **INATANI**, Yuji **IWAMOTO**, Masato **KOBAYASHI**, Sergio **LEAL**

**Purpose:** The aim of the VEGA study was to assess efficacy and safety of intravitreal aflibercept (IVT-AFL) injection in Japanese patients with neovascular glaucoma (NVG).

**Methods:** VEGA was a randomized, 13-week, double-masked, sham-controlled, Phase 3 study. After a run-in phase of receiving topical intraocular pressure (IOP)-lowering drugs, patients were randomized to IVT-AFL or sham at baseline if IOP >25 mm Hg. The primary endpoint was change in IOP from baseline to week 1 (pre-injection). Change in neovascularization of iris (NVI) grade from baseline to week 1 was the secondary endpoint. Change in neovascularization of angle (NVA) and proportion of patients achieving IOP ≤21 mm Hg at week 1 were exploratory endpoints.

**Results:** Full analysis (FAS: IVT-AFL, n = 27; sham, n = 27) and per-protocol (PPS: IVT-AFL, n = 26; sham, n = 26) sets were analyzed. Least squares mean IOP change (baseline to Week 1) favored IVT-AFL versus sham (FAS: -9.9 vs -5.0 mm Hg; P = 0.06; PPS: -10.2 vs -4.7 mm Hg; P = 0.04, respectively). At week 1, proportions of patients with IOP ≤21 mm Hg and improved NVI/NVA grade in study eye were greater for IVT-AFL than sham (FAS: IOP ≤21 mm Hg, 44.4% vs 7.4%; NVI grade, 70.4% vs 11.5%; NVA grade, 59.3% vs 11.5%, respectively). Most common ocular treatment emergent adverse events were punctate keratitis (9.3%) and eye pain (7.4%).

**Conclusions:** In Japanese patients with NVG, IVT-AFL, within 1 week, showed numerically greater IOP reductions of clinically meaningful magnitude versus sham. Safety profile of IVT-AFL was similar to that observed in other indications.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Ballroom

### Efficacy and Safety of Crosslinking on Leaking Cystic Bleb: A Prospective Study

First Author: Yu **CAI**

Co-Author(s): Bonnie Nga Kwan **CHOY**

**Purpose:** To evaluate the long-term efficacy and safety of collagen crosslinking (CXL) in patients with late onset cystic bleb leak.

**Methods:** Patients underwent CXL with riboflavin application to the bleb surface, followed by ultraviolet irradiation for 30 minutes. Patients were evaluated at baseline and at 1 week to 6 months post treatment, and then every 6 months afterwards.

**Results:** Eleven eyes of eleven consecutive patients were recruited. Mean follow-up was 17.7 ± 11.5 months. Ten out of 11 (91%) patients' bleb leak subsided after a single session of CXL, ranging from 1 to 4 weeks after treatment (median 2 weeks). One patient required repeated CXL for recurrent leak from the limbal edge, after which the leak subsided. Time to leak cessation following CXL was significantly correlated with the number of prior filtration surgeries (R = 0.61, P = 0.048), and the total number of interventions (R = 0.71, P = 0.014). Bleb wall at 3 months was significantly thicker than at baseline (0.70 ± 0.67 vs 0.81 ± 0.62 mm, P = 0.008). Visual acuity and intraocular pressure remained stable throughout the follow-up. None of the patients had any complications.

**Conclusions:** A single session of CXL achieves resolution of late onset cystic bleb leak for at least 6 months, without the need of subsequent surgical interventions. In some cases with multiple prior glaucoma interventions, bleb leak took longer to resolve. CXL is a simple, non-invasive treatment in cystic bleb leak. It aims to restore the integrity of conjunctiva, which is particularly important in patients with scarred and fragile conjunctiva.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Ballroom

### Hemi-GATT as a Novel 180-Degree Approach to Gonioscopy-Assisted Transluminal Trabeculotomy

First Author: Patrick **GOOI**

Co-Author(s): Helen **CHUNG**, Samir **NAZARALI**, Steven **SAFRAN**, Matt **SCHLENKER**, Danielle **WENTZELL**

**Purpose:** To obtain and report on surgical outcomes of hemi-gonioscopy assisted transluminal trabeculotomy (hemi-GATT) as a novel 180-degree approach to the traditional circumferential GATT.

**Methods:** A hemispheric procedure targeting 180-degrees of Schlemm's canal instead of the initially described 360-degree trabeculotomy was performed with adherence to the Declaration of Helsinki and Health Research Ethics Board approval. The number of patients attaining intraocular pressure (IOP) below 21 mm Hg or a reduction of ≥20% by 6 months postoperative, and not requiring further surgery were the primary outcome measure. Secondary outcome measures included evaluations of IOP lowering and amount of pressure-lowering medications prescribed at 1, 3, and 6 months.

**Results:** A total of 132 patients, including 57 GATT procedures and 77 hemi-GATT procedures were assessed. Concurrent cataract extractions were done in 60 patients and 6 had concurrent intraocular lens exchanges. Mean IOP in patients treated with GATT was  $22.8 \pm 9.3$  mm Hg, and decreased to  $13.0 \pm 4.4$  mm Hg,  $13.0 \pm 9.3$  mm Hg, and  $13.2 \pm 4.9$  mm Hg at 1, 3, and 6 months respectively. Pressure lowering medications were reduced from  $2.1 \pm 1.5$  to  $1.4 \pm 1.2$  at 6 months. For patients treated with hemi-GATT, IOP was  $31 \pm 10.3$  mm Hg and decreased to  $15.7 \pm 6.8$  mm Hg,  $14.9 \pm 4.6$  mm Hg, and  $14.4 \pm 4.4$  mm Hg at 1, 3, and 6 months respectively. At 6 months, the pressure lowering medications were reduced from  $3.6 \pm 1.2$  to  $1.7 \pm 1.4$ . Success rate for GATT was 74% compared to the 70% for hemi-GATT.

**Conclusions:** There was no significant difference in IOP lowering and decrease in glaucoma medications at 6 months between GATT and hemi-GATT patients. This novel approach preserves 180-degrees of Schlemm's canal for potential future angle surgeries.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Ballroom**

### **Incidence of Normal Tension Glaucoma Among Chinese Patients with Treatment-Naive Obstructive Sleep Apnea Syndrome**

*First Author: Kendrick SHIH*

*Co-Author(s): Nga Kwan, Bonnie CHOY, Ronnie HUANG, Christopher HUI, Mary Sau-Man IP, Jennifer SHUM*

**Purpose:** To investigate the 1-year incidence and potential risk factors for normal tension glaucoma (NTG) in Chinese patients with newly diagnosed obstructive sleep apnea syndrome (OSAS).

**Methods:** This was a prospective cohort study conducted between July 1, 2015 and June 30, 2017. A total of 220 consecutive subjects, who were referred to the respiratory clinic at Queen Mary Hospital for suspected OSAS, were recruited. Subjects with a pre-existing diagnosis of glaucoma or history of OSAS treatment were excluded from analysis. Subjects underwent polysomnography (PSG), using AHI  $>5$  as the diagnostic OSAS. The subjects further underwent glaucoma workup at Grantham Hospital, including slit lamp examination, gonioscopy, intraocular pressure measurement, and at least 2 Humphrey Visual Field 24-2 and Ocular Coherence Tomography (OCT) nerve fiber layer assessments 4 months apart from each other. Anderson's criteria were used for normal tension glaucoma diagnosis.

**Results:** A total of 196 Chinese subjects consented for the study. On follow-up, 7 subjects were further excluded as they did not complete at least 2 ophthalmic assessments. 64.5% of subjects were male, with a mean age of  $54.2 \pm 9.89$ . The overall one-year incidence

of normal tension glaucoma in this cohort was 6.34%. Subjects with more severe OSAS had higher incidence of NTG. There were no significant correlations between AHI score and glaucoma parameters.

**Conclusions:** Patients with OSAS are at increased risk of NTG. Increased OSAS severity, as measured by AHI, is a marker for higher risk of NTG. It is worthwhile to investigate the cost-effectiveness of glaucoma screening in this cohort.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Boardroom 2**

### **Influence of Retinal Vascular Topography on the Diagnostic Performance of Retinal Nerve Fiber Layer Thickness Measurements Determined by SD-OCT**

*First Author: Mingzhi ZHANG*

*Co-Author(s): Qiu KUNLIANG*

**Purpose:** To evaluate the influence of the retinal vascular topography on the diagnostic performance of retinal nerve fiber layer (RNFL) measurements determined by SD-OCT.

**Methods:** A total of 116 healthy myopic eyes and 65 glaucoma myopic eyes were included. Peripapillary RNFL was imaged with Topcon 3D OCT-2000. We determined the major supratemporal and infratemporal retinal artery angles and recorded the diagnostic classification of RNFL thickness from the deviation map, and the location of the color-coded area relative to the major temporal retinal vessels. We calculated the sensitivity and specificity with a positive test defined as (1) presence of a color-coded region that qualified as abnormal and (2) presence of a color-coded region that qualified as abnormal and was located at least partially on the temporal side of the major temporal vessels.

**Results:** At a fixed specificity, the sensitivity of superior and inferior regional RNFL parameters was significantly different for varying artery angles (all with  $P \leq 0.029$ ). Artery angle did not influence the AUCs of the global RNFL measurements ( $P > 0.05$ ). By taking the location into account, the specificity increased from 58.6 to 93.9% while corresponding sensitivities were 94.6 and 92.8%.

**Conclusions:** Artery angle affects the diagnostic accuracy of regional RNFL measurements but not the global RNFL measurements. The location of the color-coded area in the RNFL deviation map relative to the major temporal retinal vessels offers a valuable clue for differentiating between glaucoma and false-positive labeling in myopic eyes.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Ballroom

### Long-Term Intraocular Pressure Fluctuation as a Risk Factor for Visual Field Progression: Results from the Singapore 5-Fluorouracil Study

First Author: Bryan **ANG**

Co-Author(s): Tin **AUNG**, Hla Myint **HTOON**, Rahat **HUSAIN**, Arjunan **KUMARAN**, Sophia **SEEN**

**Purpose:** To study the effect of long-term intraocular pressure (IOP) fluctuation on visual field (VF) progression 8 years post-trabeculectomy.

**Methods:** Retrospective analysis of post-trabeculectomy data from the Singapore 5-Fluorouracil (5-FU) Study. VFs were analyzed using Progressor software (Medisoftware, Ltd, Leeds, United Kingdom). Outcome measures were mean VF slope per year, number of progressing points, and mean slope for progressing points per year. Multivariate linear regression analyses were performed, adjusting for age, gender, ethnicity, glaucoma type, use of intraoperative 5-FU, diabetes mellitus, hypertension, pre-trabeculectomy VF mean deviation, and post-trabeculectomy mean IOP, and IOP fluctuation.

**Results:** A total of 127 (52.3%) of the 243 original study subjects completed 8 years follow-up with  $\geq 5$  reliable visual fields and  $\geq 8$  6-monthly IOP measurements. The mean age was  $61.8 \pm 9.6$  years. Majority were male (64.6%) and Chinese (80.3%). 68 (51.2%) eyes had open-angle glaucoma and 59 (46.5%) had angle-closure glaucoma. 66 (52.0%) eyes received intraoperative 5-FU while 61 (48.0%) eyes received placebo. Postoperatively, the mean IOP was  $14.2 \pm 2.8$  mm Hg and mean IOP fluctuation was  $2.53 \pm 1.20$  mm Hg. Higher IOP fluctuation was associated with greater slope for field ( $B = -0.068$ ;  $P = 0.016$ ), number of progressing points ( $B = 0.309$ ;  $P = 0.017$ ), as well as VF progression defined by  $\geq 1$  progressing point ( $B = 0.473$ ;  $P = 0.023$ ) and  $\geq 3$  adjacent progressing points in the same hemifield ( $B = 0.426$ ;  $P = 0.039$ ). Age was associated with greater number of progressing points ( $B = 0.051$ ;  $P = 0.007$ ). There was no significant effect of 5-FU compared to placebo for all outcome measures.

**Conclusions:** In post-trabeculectomy Asian eyes with well-controlled IOP, higher long-term IOP fluctuation is associated with greater VF progression.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Ballroom

### Outcomes of 2 Second-Generation Trabecular Microbypass Stents in Subjects With Open-Angle Glaucoma on 1 Preoperative Ocular Hypotensive Medication

First Author: Shamira **PERERA**

Co-Author(s): L.Jay **KATZ**

**Purpose:** The purpose of this study was to prospectively evaluate the medium to long-term safety and intraocular pressure (IOP) lowering ability of 2 second-generation trabecular microbypass stents (iStent inject, Glaukos Corporation, Laguna Hills, CA) implanted as a standalone procedure in patients with OAG who were not controlled on one ocular hypotensive medication.

**Methods:** A prospective, uncontrolled, nonrandomized, interventional case series study enrolled 57 subjects with both mild or moderate OAG who were not controlled by a single ocular hypotensive medication. Preoperative IOP was 18 - 30 mm Hg (medicated) and 22 - 28 mm Hg (post-washout). Outcome measures were IOP, ocular hypotensive usage, and adverse events. All subjects underwent uncomplicated implantation of 2 iStent inject trabecular stents as a standalone procedure. Postoperatively, ocular hypotensive medications were added in a cumulative manner if the IOP was uncontrolled.

**Results:** All 57 subjects completed 42 months of follow-up. Preoperative medicated mean IOP was  $19.5 \pm 1.5$  mm Hg and post-washout IOP was  $24.4 \pm 1.3$  mm Hg. Postoperative mean IOP was  $\leq 14.6$  mm Hg at all study visits through 42 months. At 36 months postoperative, 95% of subjects achieved both mean IOP  $\leq 18$  mm Hg and IOP reduction of  $\geq 20\%$  on no medication compared to preop unmedicated IOP. Only 2 adverse events noted. One subject underwent trabeculectomy for uncontrolled IOP and the other experienced progression of pre-existing cataract.

**Conclusions:** Medium to long-term outcomes from this study demonstrate safe and sustained reduction of IOP to  $\leq 15$  mm Hg with almost total elimination of medication in eyes with OAG following implantation of 2 iStent inject stents.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Ballroom

### Phacocanaloplasty in Patients with Pseudoexfoliation Glaucoma: 6-Year Results

First Author: Jamil **HASANOV**

**Purpose:** To assess the safety and efficacy of phacocanaloplasty in patients with PXG.

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**Methods:** Sixty-nine eyes of 68 patients underwent canaloplasty guided by Glaucolight microcatheter. All patients were followed for 72 months. Visual acuity, changes of intraocular pressure (IOP), use of glaucoma medications, incidence of complications, and postsurgical interventions were examined.

**Results:** Mean preoperative IOP decreased from  $29.4 \pm 9.7$  mm Hg (15.6-61.6) with a mean of  $1.9 \pm 0.8$  (0-3) glaucoma medications to  $15.8 \pm 2.4$  mm Hg (12-23) with a mean of  $0.33 \pm 0.67$  (0-3) respectively in 72 months. Mean preoperative VA increased from  $0.2 \pm 0.23$  (0.01-0.8) to  $0.53 \pm 0.29$  (0.03-1.2) by the final examination. The most frequent postoperative complications included mild hyphema (42 eyes, 72.4%), descemet membrane perforation (4 eyes, 7%), IOP spikes (2 eyes, 3.4%), and inflammation (9 eyes, 15.5%).

**Conclusions:** Phacocanaloplasty in eyes with PXG reestablishes the natural outflow system and led to a significant IOP reduction with minimal risk of complications.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Ballroom**

### Postkeratoplasty Glaucoma in Perforated Fungal Keratitis

*First Author: Amrita MUKHERJEE*

*Co-Author(s): Charudutt KALAMKAR*

**Purpose:** To report our experience of management of post penetrating keratoplasty glaucoma where therapeutic keratoplasty was done for perforated fungal keratitis.

**Methods:** This was a retrospective study of 76 eyes (76 patients) that had undergone therapeutic penetrating keratoplasty (TPK) for perforated fungal keratitis from January 2015 until December 2016 in a tertiary eye care center in central India. Minimum follow-up period was 1 year. Indication of starting topical anti-glaucoma medication (AGM) was intraocular pressure (IOP) of 21 mm Hg or more. Uncontrolled IOP on 3 medications was considered as an indication for trabeculectomy. Ahmed Glaucoma Valve implant (AGV) was done in failed trabeculectomy cases.

**Results:** Out of 76 eyes, 51 (67%) developed glaucoma during the follow-up period. Medical management was successful in 11 eyes (21.6%). 40 eyes underwent trabeculectomy out of which 12 eyes (23.5%) required AGV implantation. A total of 42% of eyes with AGV developed graft failure while 18% of eyes, which had undergone only trabeculectomy, had graft failure. One eye had graft rejection after AGV implantation. None of the eyes required cyclodestructive procedures for IOP control.

**Conclusions:** Post keratoplasty glaucoma in perforated

fungal keratitis is a major cause of vision loss due to graft failure. Higher incidence of PTKG in these patients entails regular IOP monitoring in all such cases. Failure of medical management is high, with more cases requiring surgical intervention.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Ballroom**

### Selective Mitochondrial Autophagy in Retinal Ganglion Cells Following Short-Term Intracranial Pressure Reduction: Beijing iCOP Study

*First Author: Xiao Xia LI*

**Purpose:** To determine whether short-term reduction of intracranial pressure (ICP) triggers selective mitochondrial autophagy and ultrastructural changes in Sprague Dawley (SD) rats.

**Methods:** The experiment included 54 male SD rats which underwent continuous cerebrospinal fluid drainage for 6 hours ( $n = 18$ ). For control, 18 normal rats were anaesthetized for 6 hours. The autophagosomes and mitochondrial structural changes were assessed by transmission electron microscopy (TEM). Mitophagy related proteins PINK1, Parkin, LC3B-II/I, and lysosome-associated membrane protein 1 (LAMP1) were measured by western blot. LAMP1 protein distribution was assessed by immunocytochemistry.

**Results:** TEM analysis showed the mean length and area of mitochondria decreased, and the width increased in the experimental rats. Elevation of PINK1, Parkin, and LAMP1 over time were observed in the low-ICP retinas. LC3B-II/I was significantly increased only at 0 day after ICP reduction.

**Conclusions:** ICP may participate in the glaucoma or glaucoma-like optic neuropathy by influencing the mitochondrial morphology and function. Thus, ICP may provide a therapeutic strategy for protecting both RGCs and their axons in optic neurodegeneration.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Ballroom**

### Using Subconjunctival Anesthesia as an Alternate Anesthetic Technique for MicroPulse Cyclophotocoagulation

*First Author: Malcolm GOOI*

*Co-Author(s): Helen CHUNG, Chris HANSON, Dani WANG, Kevin WARRIAN, Danielle WENTZELL*

**Purpose:** To propose subconjunctival anesthesia as an effective and less invasive alternative to retrobulbar anesthesia for patients undergoing MicroPulse

transscleral cyclophotocoagulation (MPCPC).

**Methods:** Patients that received subconjunctival anesthesia preceding MPCPC between September 2015 and September 2017 were included in a retrospective chart review, quantifying successful pain control, and treatment area and duration. Demographics, glaucoma diagnosis, mean deviation, prior and current glaucoma treatments, logMAR best corrected visual acuity (BCVA), and intraocular pressure (IOP) were all recorded and analyzed in observance of the Declaration of Helsinki and Health Research Ethics Board approval.

**Results:** A total of 145 eyes (92 patients) were included in the review, with 138 (95.2%) having undergone successful subconjunctival anesthesia for MPCPC preparation without complications. Seven patients failed the treatment, with 4 reporting pain control inadequate, 1 experiencing mild pain, 1 having a vasovagal reaction, and 1 with comorbid behavioral disorder. The MicroPulse laser settings were set to 2000 mW, with treatment durations ranging from 50 - 500 seconds. Treatment areas included inferior (51%) or superior (12%) 180-degrees, or the full 360-degrees (37%). No correlation was found in baseline features or treatment parameters in success or failure of pain control via logistical regression.

**Conclusions:** For patients undergoing MPCPC, subconjunctival anesthesia is a well-tolerated and safe pain control measure for the majority of patients, regardless of treatment length or area. We propose that this anesthesia technique is a safer substitute for MPCPC than retrobulbar anesthesia.

## Intraocular Inflammation, Uveitis & Scleritis

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Boardroom 4

### Antagonist of GH-Releasing Hormone Receptor Alleviates Experimental Autoimmune Intraocular Inflammation

*First Author: Jian LI*

*Co-Author(s): Wai Kit CHU, Liu Tao GUO, Jingna HE, Calvin PANG, Mandy WONG*

**Purpose:** Disorders in immunity and occurrence of intraocular inflammation cause many blinding diseases. Steroids, which possess several adverse effects, remains the current footstone for treatment of autoimmune uveitis. Thus, alternative effective treatments are desirable. The growth hormone-releasing hormone (GHRH) pathway exerts regulatory effects on several inflammatory diseases including infectious uveitis. The present work investigated the anti-inflammatory

effects and mechanism of GHRH-receptor (GHRHR) peptides on an experimental autoimmune uveoretinitis (EAU) model.

**Methods:** EAU was induced in mice. Controls were mock induced with PBS. GHRHR agonist MR-409, GHRHR antagonist MIA-602, dexamethasone, or PBS treatment was administered. Long-term effects of GHRHR peptides on EAU were monitored in real-time by non-invasive technologies such as optical coherence tomography, fundus fluorescein angiography, and electroretinography (ERG). Histological abnormalities and pro-inflammatory gene expression were assessed after sacrificing the animals. The underlying mechanism was investigated by assessing T cell responses in ex vivo antigen-specific recall assays.

**Results:** GHRHR antagonist MIA-602, but not agonist MR-409, alleviated ocular inflammation in EAU by reducing autoreactive T cell responses, remitting the manifestations of ocular inflammation observed by both in vivo and in vitro monitoring ( $P < 0.05$ ). Quantitative assessments of retinal-choroidal thickness, vessel diameter, ERG amplitudes, and expression of pro-inflammatory genes also showed alleviations of EAU by GHRHR antagonist MIA-602 but not agonist MR-409 ( $P < 0.05$ ). Remission of the EAU as a result of GHRHR antagonist MIA-602 treatment was comparable to that in dexamethasone-treated EAU mice ( $P > 0.05$ ).

**Conclusions:** Our findings show that GHRHR antagonist is a potent anti-inflammatory agent against the inflammation of autoimmune uveitis.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Boardroom 4

### Improvement in Vitreous Haze in Active Noninfectious Uveitis of the Posterior Segment with Intravitreal Sirolimus

*First Author: Harvey UY*

*Co-Author(s): Abu ABRAHAM*

**Purpose:** To assess the effects of intravitreal (IVT) sirolimus on vitreous haze (VH) in subjects with active non-infectious uveitis of the posterior segment (NIU-PS) in the Sirolimus study assessing double-masked uveitis treatment (SAKURA) program.

**Methods:** The SAKURA program consisted of two Phase III, randomized, multinational, double-masked studies. Eligibility criteria included active NIU-PS and baseline VH  $\geq 1.5+$  (modified Standardization of Uveitis Nomenclature scale) in the study eye. Subjects received every-other-month IVT sirolimus 44  $\mu\text{g}$  or 440  $\mu\text{g}$  ( $n = 208$  each). Assessments included VH response at Month 5; least-squares (LS) mean change in VH from baseline at Week 2 and monthly up to Month 5, and adverse events (AEs) through Month 6.

**Results:** VH=0 at Month 5 was met by 21.2% vs 13.5%

in the 440 µg and 44 µg groups ( $P = 0.038$ );  $VH=0/0.5+$  at Month 5 was met by 50.0% vs 40.4% in the 440 µg and 44 µg groups ( $P = 0.049$ ). LS mean change in VH from baseline was greater with 440 µg vs 44 µg:  $-0.74$  vs  $-0.52$  ( $P < 0.001$ ) at Week 2;  $-1.18$  vs  $-0.96$  ( $P = 0.006$ ) at Month 5. The incidence of serious AEs in the study eye was similar in both groups: 16.1% and 14.0% in the 440 µg and 44 µg groups, respectively.

**Conclusions:** The SAKURA Program suggests administration of 440 µg IVT sirolimus can lead to greater early and sustained improvement in ocular inflammation when compared to 44 µg in subjects with active NIU-PS.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Boardroom 4**

### Performance of an Ocular Fluorometer Equipped with a Lock-In Amplifier for Measurement of Aqueous Flare: Data from Uveitis and Post-Cataract Patients

*First Author: Sudhir **RACHAPALLE REDDI***

*Co-Author(s): Jyotirmay **BISWAS**, Padmanabhan **PREMA**, Mehal **RATHORE**, S P **SRINIVAS***

**Purpose:** To evaluate a custom-made ocular fluorometer for detection of the intensity of light scatter (ILS) from the anterior chamber (A/C) as an objective measure of aqueous flare.

**Methods:** The fluorometer, equipped with a lock-in amplifier and having an axial resolution of 250 µm, was employed in the scatter mode to measure ILS (expressed in mV) from A/C. Healthy eyes, who show Grade 0 of aqueous flare as per the Standardization of Uveitis Nomenclature (SUN), were employed as control subjects. Uveitis patients and those showing SUN scores of Grades 1+ or 2+ following phacoemulsification were enrolled. The person performing the ILS was blinded of SUN scores.

**Results:** The inter- and intra-observer variabilities in ILS were insignificant. Mean ILS was  $0.0825 \pm 0.0234$  ( $n = 82$ ),  $0.1596 \pm 0.0555$  ( $n = 75$ ),  $0.2270 \pm 0.0723$  ( $n = 34$ ),  $0.3615 \pm 0.1634$  ( $n = 13$ ) mV for SUN scores of 0, 1+, 2+, and 3+, respectively. SUN scores correlated positively with ILS measurements ( $R^2 = 0.77$ ). In post-cataract patients, ILS was significantly higher on Day 1 ( $0.21 \pm 0.07$ ;  $n = 64$ ) relative to healthy eyes ( $0.08 \pm 0.02$ ;  $n = 82$ ). By Day 4, ILS ( $0.19 \pm 0.07$ ;  $n = 40$ ) decreased significantly.

**Conclusions:** ILS, which correlates linearly with SUN scores, can be reliably measured using the spot fluorometer. Thus, the instrument can be used in uveitis management and drug development.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Boardroom 4**

### Retinal Complications in Uveitis Patients in Taiwan: A Population-Based Study

*First Author: De-Kuang **HWANG***

**Purpose:** To evaluate the incidence and risk factors for developing retinal complications in uveitis patients in Taiwan.

**Methods:** The National Health Insurance Research Database was used in this study. A million registered beneficiaries were randomly selected from the database. All uveitis patients who were newly diagnosed between 2002 and 2011 were identified. Retinal complications in this study was identified based on ICD-9 codes, which included macular hole, macular pucker, and retinal detachment. Patients who underwent vitrectomy were further identified. Clinical and demographic factors including age, gender, and anatomical types of uveitis were analyzed to explore the risk factors for incidence of these retinal complications.

**Results:** There were 10,936 newly onset uveitis patients identified from the database. Among them, 261 (2.4%) developed retinal complications after uveitis. Only 23% ( $n = 60$ ) of them received vitrectomy for treatment. Older age, posterior and pan-uveitis were significant risk factors for developing these complications.

**Conclusions:** Although retinal complications rarely happened in the first few years after uveitis occurred, a quarter of them may need surgical treatment. Clinicians should follow up retina and macular carefully in elder patients and those whose uveitis mainly involves the posterior segment of the eye.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Boardroom 4**

### Triggering Factors Associated with Attack of Recurrent Acute Anterior Uveitis

*First Author: Anchisa **PIMSRI***

*Co-Author(s): Sutasinee **BOONSOPON**, Pitipol **CHOOPONG**, Nattaporn **TESAVIBUL***

**Purpose:** To identify triggering factors of recurrent acute anterior uveitis within 1 month prior to recurrent attack.

**Methods:** A case-control study was conducted in 70 participants, from August 2017 to July 2018, compared 35 outpatients with recurrent acute anterior uveitis and 35 age- and sex-matched controls with quiescence acute anterior uveitis using telephone interview questionnaires and Srithanya Stress Test (ST-5).

**Results:** In 1 month prior to the attack of recurrent

acute anterior uveitis, 35 patients with recurrent acute anterior uveitis significantly reported higher stress scores (ST-5) and had a 2.414 (95% CI 1.45%, 4.019%,  $P < 0.001$ ) times greater odds of recurrent acute anterior uveitis compared with non-recurrent group. Sleeping time was found to be a protective factor to prevent recurrence of acute anterior uveitis (OR 0.568, 95% CI 0.320%, 1.009%). A total of 31 (91%) patients in recurrent group and 19 (73.1%) in control group are HLA-B27 positive. Other suspected triggering factors such as exercise time, smoking, alcohol drinking, prodromal symptoms, back pain, birth of child, or life events were not associated with recurrence of acute anterior uveitis in this study.

**Conclusions:** Stress interestingly was shown to be a triggering factor that led to future episodic attacks of recurrent acute anterior uveitis. Sleeping time tends to be a preventive factor of the recurrence of the disease. Explanation to patients regarding their physical and emotional health is mandatory to prevent their next episodes of recurrence and future complications.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Boardroom 4

### Uveitis is a Predictive Factor for Acute Myocardial Infarction Among Patients with Behcet Disease: A Nationwide Cohort Study

First Author: Yu-Yen **CHEN**

**Purpose:** To investigate the association between uveitis and an increased risk of subsequent acute myocardial infarction (AMI) among patients with Behcet's disease (BD).

**Methods:** Using the Taiwan National Health Insurance Database from 2001 to 2013, patients with BD were enrolled in our study. They were divided into BD with uveitis (uveitis group) and BD without uveitis (non-uveitis group). Kaplan-Meier curves were generated to compare the cumulative hazard of subsequent AMI between the uveitis group and non-uveitis group. A Cox regression analysis was performed to investigate the hazard ratio (HR) for AMI in the uveitis group compared to the non-uveitis group.

**Results:** Among the 6136 patients with BD, 5237 had uveitis and 899 did not. During the study period of 13 years, survival analysis with Kaplan-Meier curves revealed a significantly higher cumulative hazard for AMI in the uveitis group than the non-uveitis group ( $P < 0.0001$ ). After adjustment of age and gender in a Cox regression, those with uveitis still had a significantly higher risk for subsequent AMI (HR=2.71; 95% confidence interval: 1.44-5.09).

**Conclusions:** Among patients with BD, uveitis could possibly predict a higher risk for subsequent AMI.

## Neuro-Ophthalmology

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: Auditorium

### Characteristics and Risk Factors of Bilateral Nonarteritic Anterior Ischemic Optic Neuropathy

First Author: Shaoying **TAN**

Co-Author(s): Lei **WANG**, Shihui **WEI**

**Purpose:** To compare the clinical characteristics and risk factors of unilateral and bilateral onset in non-arteritic anterior ischemic optic neuropathy (NAION) patients.

**Methods:** Differences in clinical characteristics, including disease history, laboratory tests, carotid artery ultrasound, brain magnetic resonance imaging (MRI), polysomnography (PSG), and ambulatory blood pressure monitoring (ABPM) between groups were analyzed using Chi-square test or  $t$ -test.

**Results:** A total of 201 NAION patients were recruited, 67 patients were bilateral onset (6 of them happened bilaterally simultaneously or with an interval less than 1 week between the 2 eyes) and the other 134 patients were unilateral onset. There was no difference found between the two groups in age ( $54.69 \pm 10.43$  vs  $54.47 \pm 9.90$  years old,  $P = 0.988$ ) and gender (Male: Female: 1.34:1 vs 2.05:1,  $P = 0.22$ ). Compared to the unilateral group, the bilateral group showed a higher percentage of hypertension (52.2% vs 37.3%,  $P = 0.04$ ), lower percentage of nocturnal hypotension (19.2% vs 37.2%,  $P = 0.026$ ), more frequent use of hypotensors (65.7% vs 40.3%,  $P = 0.03$ ), more frequent coexisting with obstructive sleep apnea syndrome (OSAHS) (35.4% vs 21.2%,  $P = 0.036$ ), and more frequent of obesity (17.9% vs 9.7%,  $P = 0.031$ ). There were no significant differences in smoking and drinking status, diabetes, dyslipidemia, carotid atherosclerosis, cerebral infarction, homocysteine serum cystine, crowded disc, or precipitating factor.

**Conclusions:** Hypertension, hypotensive medications, obesity, and coexistence with OSAHS may be risk factors for the development of bilateral NAION.

Mar 09, 2019 (Sat)  
09:00 - 10:30  
Venue: Auditorium

### Clinical Characteristics and Outcomes of Myelin Oligodendrocyte Glycoprotein Antibody-Seropositive Optic Neuritis at Different Ages: A Cohort Study in China

First Author: Honglu **SONG**  
Co-Author(s): Shihui **WEI**

**Purpose:** To investigate clinical characteristics and prognosis of myelin oligodendrocyte glycoprotein antibody-seropositive optic neuritis (MOG-ON) at different ages in China.

**Methods:** Patients displaying onset of MOG-ON were recruited from the neuro-ophthalmology Department in the Chinese People's Liberation Army General Hospital from January 2016 to May 2018. They were assigned into 3 groups based on different ages: pediatric, young, and middle-aged MOG-ON.

**Results:** A total of 110 patients were assessed, including 58 pediatric (52.7%), 34 young (30.9%), and 18 seronegative-ON (16.4%). The pediatric were significantly younger at onset compared to the other groups. Of the pediatric group, 93.9% had good recovery of visual acuity ( $\geq 0.5$ ) compared to 66.7% of middle-aged group ( $P < 0.001$ ). The annualized relapse rate is lower in pediatric than young and middle-aged groups ( $0.34 \pm 0.52$  vs  $0.87 \pm 1.11$ ,  $0.55 \pm 1.21$ ,  $P < 0.024$ ). Six children ended up being diagnosed with acute disseminated encephalomyelitis, while only 1 patient in the pediatric group developed neuromyelitis optica during follow-up. The average peripapillary RNFL were  $70.27 \pm 12.78 \mu\text{m}$ ,  $71.70 \pm 16.53 \mu\text{m}$  and  $78.57 \pm 12.56 \mu\text{m}$  for the pediatric, young, and middle-aged MOG-ON respectively, which showed no statistical difference between the 3 subgroups ( $P = 0.837$ ). Orbital MRI revealed a larger proportion of pediatric patients had intracranial optic nerve involvement than the other 2 groups (45.4% vs 21.2% vs 36.7%,  $P = 0.014$ ).

**Conclusions:** Pediatric ON was the most common MOG-ON subtype in China. Pediatric had different clinical features, including earlier age of onset, equal female/male ratio, better recovery of visual acuity, and lower annualized relapse rate. Age of onset may be a potential biomarker for determining visual prognosis with MOG-ON.

Mar 09, 2019 (Sat)  
09:00 - 10:30  
Venue: Auditorium

### Comparison of Autoimmune Antibody Positive Autoimmune Optic Neuropathy Between AQP4-Ab Positive and Negative Patients

First Author: Teng **DA**  
Co-Author(s): Shihui **WEI**, Quangang **XU**, Mo **YANG**

**Purpose:** To investigate and compare the characteristics of autoimmune antibody positive autoimmune optic neuropathy (ON) between AQP4-antibody (AQP4-Ab) positive and negative patients.

**Methods:** A total of 330 ON patients with autoimmune antibody positive were recruited and divided into 2 groups. Group 1: ON patients combined with AQP4-Ab positive, and group 2: those combined with AQP4-Ab negative. The clinical, laboratory tests, Magnetic Resonance Imaging (MRI) features, and therapeutic effects were assessed between the two groups by student T-test and X2 test.

**Results:** The age of group 1 was  $39.3 \pm 13.9$  years, which showed no difference with group 2 ( $45.6 \pm 14.3$  years) ( $P = 0.10$ ). The worst visual acuity after first attack in group 1 was  $5.69 \pm 1.76$  (Visual Outcome Scale, VOS), which performed more serious than group 2 ( $4.06 \pm 2.10$ ) ( $P = 0.003$ ). The visual function after systemic corticosteroids treatment of group 1 ( $4.23 \pm 1.75$ ) was significantly worse than group 2 ( $2.42 \pm 1.93$ ) ( $P < 0.001$ ). The sensitivity of corticosteroids treatment (2 or more numbers dropped in VOS) of group 1 (46.2%) was lower than group 2 (58.3%).

**Conclusions:** Autoimmune antibody positive autoimmune ON combined with AQP4-Ab positive may perform a worse visual acuity and prognosis compared to that with AQP4-Ab negative patients.

Mar 09, 2019 (Sat)  
09:00 - 10:30  
Venue: Auditorium

### Diagnostic Value of Antibodies to Myelin Oligodendrocyte Glycoprotein in Chronic Relapsing Inflammatory Optic Neuropathy

First Author: Hongjuan **LIU**  
Co-Author(s): Junqing **WANG**, Shihui **WEI**, Huanfen **ZHOU**

**Purpose:** To evaluate the status of Myelin Oligodendrocyte Glycoprotein Antibodies (MOG-Abs) in CRION and investigate its different clinical characteristics and prognosis.

**Methods:** Patients diagnosed with CRION were recruited by the neuro-ophthalmology department of our hospital from December 2015 to April 2017. Based

on antibody status, they were assigned to either the MOG-CRION or seronegative-CRION groups.

**Results:** A total of 33 patients (38 eyes) were assessed and divided into the following groups: 22 (66.7%) MOG-CRION and 11 (33.3%) seronegative-CRION. The ratio of female to male was 1:1, and 81.8% of total CRION patients were adults ( $\geq 18$  years). A total of 29 eyes (76.3%) showed severe visual loss ( $< 20/200$ ) during the first optic neuritis (ON) episode, and 37 eyes (72.5%) demonstrated good visual recovery ( $> 20/40$ ) during the final follow up. The mean onset age of MOG-CRION patients was  $28 \pm 16$  years (range 6 - 62), which was significantly younger than that of seronegative-CRION ( $45 \pm 12$  years, range 22 - 59) ( $P = 0.029$ ). The intraorbital and canalicular segments were highly involved in the orbital MRI of CRION patients. During the final follow up, MOG-CRION patients had more bilateral involvement ( $P = 0.008$ ) and higher annualized relapse rates (ARR) compared to the seronegative-CRION patients ( $P = 0.019$ ).

**Conclusions:** CRION was predominantly found in adults with unilateral ON and exhibited a higher rate of seropositive MOG-Abs. MOG-CRION, which may be a disparate subtype of MOG-Ab-induced demyelinating disease that needs further investigation, was found in younger patients at onset, with more bilateral involvement and more relapse tendency.

**Mar 09, 2019 (Sat)**  
**09:00 - 10:30**  
**Venue: Auditorium**

### Different Characteristics of Aquaporin-4 or Myelin Oligodendrocyte Glycoprotein Antibody-Seropositive Male Optic Neuritis in China

*First Author: Shihui WEI*  
*Co-Author(s): Huanfen ZHOU, Honglu SONG*

**Purpose:** To describe different clinical characteristics and prognosis of optic neuritis (ON) in male patients with seropositive aquaporin-4 antibody (AQP4-Ab) or myelin oligodendrocyte glycoprotein antibody (MOG-Ab) in China.

**Methods:** Males with onset of optic neuritis (ON) were recruited from the neuro-ophthalmology department of the Chinese People's Liberation Army, General Hospital from January 2016 to April 2018. They were assigned to 2 groups based on antibodies status: MOG-Ab-seropositive ON (MOG-ON) and aquaporin-4 Ab-seropositive ON (AQP4-ON).

**Results:** A total of 76 patients were assessed, including 44 MOG-ON (57.9%) and 32 AQP4-ON (42.1%). The MOG-ON patients were significantly younger at onset compared to the AQP4-ON group ( $P < 0.001$ ). The frequencies of optic disc swelling, presence of abnormal autoimmune antibodies, and elevated levels

of IgG were significantly higher in AQP4-ON group than MOG-ON ( $P = 0.040$ ,  $P = 0.016$ , and  $P = 0.10$ ). Of the MOG-ON eyes, 85.3% had good recovery of visual acuity ( $\geq 0.5$ ), compared to 35.1% of AQP4-ON eyes ( $P < 0.001$ ). The ratio of this steroid-dependent condition is higher in MOG-ON patients than AQP4-ON group ( $P < 0.001$ ). MOG-ON patients had thicker peripapillary retinal nerve fiber layers in the superior, inferior, and temporal quadrants than in AQP4-ON patients ( $P = 0.019$ ,  $P = 0.020$ , and  $P = 0.009$ , respectively). Orbital MRI revealed a larger proportion of AQP4-ON patients had chiasmal involvement than MOG-ON patients ( $P < 0.001$ ).

**Conclusions:** Male patients with MOG-ON had different clinical features, including earlier age of onset, higher optic disc swelling ratio, better recovery of visual acuity, and less chiasmal involvement, than AQP4-ON patients. Serum antibody may be a potential biomarker for determining visual prognosis with male ON.

**Mar 09, 2019 (Sat)**  
**09:00 - 10:30**  
**Venue: Auditorium**

### Effectiveness of Plasma Exchange in Acute Neuromyelitis Optica-Related Optic Neuritis

*First Author: Shaoying TAN*  
*Co-Author(s): Teng DA, Shihui WEI, Quangang XU, Mo YANG, Jie ZHAO*

**Purpose:** To evaluate the short-term and long-term therapeutic effect of plasma exchange (PE) in Chinese patients with acute neuromyelitis optica-related optic neuritis (NMO-ON) who did not respond to high dose intravenous corticosteroid.

**Methods:** Thirty-three affected eyes from 26 NMO-ON patients with first attack of acute vision loss worse than 20/60 but without neurological disability were recruited in this study. Double-filtration plasmapheresis was used on all study subjects. Visual functional improvements were evaluated based on Visual Outcome Scale (VOS) scores documented at onset, 1 day before PE therapy, 1 day after each cycle of PE therapy, and 1-week, 1-month, 3-month, 6-month, and 12-month follow-up visits.

**Results:** An improving tendency of VOS scores was found in the affected eyes during the treated period. The visual function was significantly better than both at onset and 1 day before PE therapy since the 1st cycle of PE therapy ( $P < 0.001$ ), and stable tendency of VOS scores during the 12-month follow-up period ( $P = 0.429$ ). An average of  $1.9 \pm 1.6$  VOS scales in visual improvement was persistently maintained during the 12-month follow-up period. PE treatment was more effective in the eyes with disease course less than 30 days (19 of 21 eyes, 90.5%), compared with those exceeded 30 days (6 of 12 eyes, 50.0%) ( $P = 0.015$ ).

**Conclusions:** PE could potentially be an effective

therapy to improve visual function in refractory NMO-ON patients, especially in an acute phase of within 30 days.

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: Auditorium

### Prevalence and Prognostic Value of Myelin Oligodendrocyte Glycoprotein Antibody in Adult Optic Neuritis

First Author: Shihui **WEI**

**Purpose:** To investigate the prevalence, relationship with steroid dependency, and prognostic value of MOG-Ab in adult optic neuritis.

**Methods:** Clinical data analysis was undertaken in ON adults admitted between December 2014 and January 2016. Patients were classified into 3 groups: AQP4-ON, MOG-ON, and seronegative-ON.

**Results:** A total of 158 ON adults (190 eyes) were assessed, including 31 MOG-ON (19.6%), 67 AQP4-ON (42.4%), and 60 seronegative-ON (38.0%). The female-to-male ratio was significantly lower in MOG-ON (1.8:1) than that in AQP4-ON (8.6:1) groups ( $P = 0.005$ ). The median age, percentage of bilateral ON, and visual loss at the nadir at onset was similar among the 3 groups. Thirty-eight eyes (76%) in the MOG-ON group showed good visual recovery ( $>20/40$ ) in the final visit, which is far better than that in the AQP4-ON and seronegative-ON groups ( $P = 0.000$  and  $P = 0.006$ , respectively). Fifteen adults with ON (9.5%) showed dependency on steroids, which was particularly prominent in the MOG-ON group (11/31, 35.5%) and rarely presented in the AQP4-ON (2, 3.0%) and seronegative-ON (2, 3.3%) groups. Results suggested less loss of pRNFL in MOG-ON patients ( $P = 0.000$  and  $P = 0.022$ ) and a larger proportion of canalicular and intracranial segments involved in MOG-ON adults ( $P = 0.007$  and  $P = 0.000$ ).

**Conclusions:** MOG-ON had the smallest proportion of acute demyelinating ON in Chinese adults. One third of adults with MOG-ON predominantly showed a substantial dependency on steroids and relapse on steroid reduction or cessation, which rarely presented in AQP4-ON and seronegative-ON adults.

## Ocular Imaging

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Boardroom 3

### Application of OCTA in Optic Neuritis

First Author: Mo **YANG**

Co-Author(s): Wei **WANG**, Shihui **WEI**, Quangang **XU**

**Purpose:** The objective of this research was to observe the vascular in different layers of the retina in optic neuritis (ON) via optical coherence tomography angiography (OCTA) and explore the difference of the blood flow in different types of ON.

**Methods:** Twenty-one ON eyes from 21 patients were enrolled in the study. They underwent flow index measurements of their macular and optic nerve head via OCTA, the difference of the ON eyes and normal control eyes were analyzed, and the correlation of the pRNFLs, visual field index, and flow index were analyzed. They were also divided into 2 groups according to serum AQP4-Ab assay, the difference of the retinal perfusion of optic disc and macular between the 2 groups were analyzed.

**Results:** Most of the macular and optic nerve head flow index in the eyes affected with ON were significantly lower than in the healthy control eyes ( $P < 0.05$ ), except NFA\_S and NFA\_D; PSD was positive correlated to deep flow area (FA\_D), deep parafoveal vessel density (PVD\_D), deep parafoveal vessel index (PVI\_D) ( $P < 0.05$ ), but was not a demonstrated significant correlation with superficial blood flow indexes. AQP4-Ab positive ON seemed to have less retinal perfusion than AQP4-Ab negative ON, however, and there was no significant difference between the 2 groups.

**Conclusions:** Compared to health control group, reduction of retinal perfusion was found not only around optic nerve head, but also around macular in ON eyes. AQP4-Ab negative ON demonstrated more retinal blood flow reduction but remained less retinal structure than AQP4-Ab positive ON eyes.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Boardroom 3

### Associations Between Retinal Vascular Topography and Disc Parameters in Myopic Eyes

First Author: Qiu **KUNLIANG**

Co-Author(s): Xuehui **LU**, Geng **WANG**, Mingzhi **ZHANG**

**Purpose:** To investigate the associations between the retinal vascular topography and various disc parameters in healthy myopic eyes.

**Methods:** A total of 138 healthy myopic eyes from 138 subjects were included. Disc imaging was performed with both spectral-domain optical coherence tomography (SD OCT) and HRT 2 in each subject. The middle point of the intersections of the most temporal major retinal blood vessels (including superior artery, superior vein, inferior artery, and inferior vein) and the 3.4 mm circle were determined. Subsequently, the retinal vessel angle was calculated. Various disc parameters, including disc area, rim area, cup disc area ratio, vertical cup disc ratio, and cup volume were collected from the OCT and HRT analysis printout. OCT derived disc measurements were adjusted for ocular magnification by using Bennett's formula. Correlation and multiple regression analysis were performed to evaluate the associations between the retinal vessel angle and disc parameters.

**Results:** The mean refraction and retinal vessel angle was  $-4.98 \pm 2.32$  diopters (D) and  $133.9 \pm 15.8^\circ$ , respectively. The retinal vessel angle was significantly associated with axial length ( $r = -0.39$ ,  $P < 0.001$ ). After adjustment of other covariant, retinal vessel angle was significantly and independently associated with disc area ( $\beta_{\text{OCT}} = 0.43$ ,  $\beta_{\text{HRT}} = 0.45$ , all  $P < 0.001$ ), cup disc area ratio ( $\beta_{\text{OCT}} = 0.003$ ,  $\beta_{\text{HRT}} = 0.002$ , all  $P < 0.001$ ), vertical cup disc ratio ( $\beta_{\text{OCT}} = 0.003$ ,  $\beta_{\text{HRT}} = 0.004$ , all  $P < 0.001$ ), and cup volume ( $\beta_{\text{OCT}} = 0.002$ ,  $\beta_{\text{HRT}} = 0.002$ , all  $P < 0.001$ ).

**Conclusions:** Retinal vessel topography was independently associated with various disc parameters. Smaller retinal vessel angles were associated with smaller disc size in healthy myopic eyes. Further studies are warranted to evaluate the clinical importance of the current findings.

**Mar 09, 2019 (Sat)**  
**09:00 - 10:30**  
**Venue: Auditorium**

### Central Corneal Thickness in Highly Myopic Eyes: Interdevice Agreement of Ultrasonic Pachymetry, Pentacam, and Orbscan II Before and After Photorefractive Keratectomy

*First Author: Kourosh SHEIBANI*  
*Co-Author(s): Nader NASSIRI*

**Purpose:** To determine inter-device agreement for central corneal thickness (CCT) measurement among ultrasound pachymetry, rotating Scheimpflug imaging (Pentacam, Oculus, Wetzlar, Germany), and scanning slit corneal topography (Orbscan II, Bausch & Lomb, Rochester, NY, USA) in highly myopic eyes before and after photorefractive keratectomy (PRK).

**Methods:** This prospective comparative study included 61 eyes of 32 patients with high myopia who underwent PRK. Six-month postoperative CCT values were compared to preoperative values in 27 patients (51 eyes) who completed the follow-up period. To

determine the level of agreement, Pentacam and Orbscan II readings were compared to ultrasonic pachymetry measurements as the gold standard method.

**Results:** Mean CCT measurements with ultrasound, Pentacam, and Orbscan II before PRK were 557  $\mu\text{m}$ , 556  $\mu\text{m}$ , and 564  $\mu\text{m}$ , respectively; and 451  $\mu\text{m}$ , 447  $\mu\text{m}$ , and 438  $\mu\text{m}$  6 months after surgery in the same order. Preoperatively, the 95% limits of agreement (LoA) with ultrasound measurements were -20  $\mu\text{m}$  to 17  $\mu\text{m}$  for Pentacam, and -21  $\mu\text{m}$  to 33  $\mu\text{m}$  for Orbscan II. Six months postoperatively, the 95% LoA were -30  $\mu\text{m}$  to 23  $\mu\text{m}$  for Pentacam, and -69  $\mu\text{m}$  to 43  $\mu\text{m}$  for Orbscan II.

**Conclusions:** Preoperatively, CCT measurements were higher with Orbscan II as compared to ultrasound. Postoperatively, both Pentacam and Orbscan II measurements were lower than those obtained with ultrasound, but Pentacam had better agreement. The use of ultrasound, as the gold standard method, or Pentacam both appear to be preferable over Orbscan II among patients with high myopia.

**Mar 09, 2019 (Sat)**  
**11:00 - 12:30**  
**Venue: Boardroom 3**

### Characteristics of Subretinal Neovascular Membrane on Optical Coherence Tomography Angiography in Macular Telangiectasia Type 2

*First Author: Komal AGARWAL*  
*Co-Author(s): Jay CHHABLANI, Rajeev REDDY*

**Purpose:** To describe the characteristics of subretinal neovascular membrane on optical coherence tomography angiography (OCTA) in macular telangiectasia type 2 (MacTel Type2).

**Methods:** It was a retrospective case review of 18 patients with 36 eyes. A total of 26 eyes with subretinal neovascular membrane (SRNVM) were analyzed on OCTA. Changes in the superficial and deep plexus, outer retina, and choriocapillaries were noted. Shape and location of the SRNVM was noted.

**Results:** Eighteen patients with 36 eyes were identified. Two eyes were excluded due to segmentation error on OCTA. A total of 26 of these 36 eyes showed presence of SRNVM – active or scarred. Eighteen of these 26 patients were treated with anti-VEGF. On OCTA, right angled vein with epicenter in the superficial plexus could be identified in all eyes. SRNVM was most commonly noted to be on the temporal side (12 out of 26 eyes). Superficial plexus showed distortion of plexus and pull towards the epicenter in 20 eyes. Crowding of vessels was seen in 23 eyes. Deep plexus showed crowding of plexus as the most common feature. Other features were telangiectasia and proliferation of vessels

in 24 eyes each. Choriocapillaries involvement with SRNVM was noted only in 3 eyes.

**Conclusions:** This analysis noted that all eyes with SRNVM had an epicenter with right angled vein. Analysis of deep plexus and the outer retina points towards the proliferation of these vessels as the SRNVM. Choriocapillaris involvement was seen only in advanced cases and hence could not be the origin of SRNVM. However, more data is required to comment on origin.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Boardroom 3**

### **Clinical Observation of Intrinsic Feeder Vessels and Secondary Choroidal Neovascularization in Choroidal Osteoma Using OCT Angiography**

*First Author: Min **WANG***

**Purpose:** To observe and evaluate the blood flow and morphologic features of tumor intrinsic feeder vessels and secondary choroidal neovascularization (CNV) in choroidal osteoma using optical coherence tomography angiography (OCTA).

**Methods:** Fifty-one eyes of 46 patients who were diagnosed with choroidal osteoma underwent full imaging examinations, including color fundus photography, fluorescein angiography, indocyanine green angiography, spectral-domain OCT, and OCTA. Patients displaying active CNV and severe sub-retinal fluid (SRF) without obvious CNV received anti-vascular endothelial growth factor (VEGF) therapy, while the other patients without any complications underwent regular follow-ups.

**Results:** OCTA showed rich feeder vessels of tumors with varied patterns in all eyes, and displayed 2 phenotypes of CNV (isolated and interlacing) in 20 eyes. Anti-VEGF treatment resulted in the resolution of CNV in all of the isolated phenotypes, while anti-VEGF treatment led to the regression of CNV in 4 eyes, progression of CNV in 1 eye, and relapse of CNV in 6 eyes of the interlacing phenotype. Moreover, 7 eyes experienced alterations in vessel density and the vascular structure of the tumor's feeder vessels. For cases receiving anti-VEGF therapy due to SRF without CNV and others without complications, the feeder vessels remained almost unchanged at follow-ups.

**Conclusions:** OCTA is a useful and noninvasive tool for detecting a tumor's intrinsic feeder vessels and differentiating them from secondary CNV in choroidal osteoma. Tumor's intrinsic feeder vessels structure could experience alteration and remodeling after anti-VEGF treatment.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Auditorium**

### **Early Postnatal Development in Normal and Injured Eyes Using Magnetic Resonance Imaging**

*First Author: Kevin **CHAN***

*Co-Author(s): Hassan **HAMADE**, Malack **HAMADE**, Swarupa **KANCHERLA***

**Purpose:** To determine the growth characteristics of the rat eyes during normal postnatal development (ND), and the effects of neonatal unilateral hypoxic-ischemic encephalopathy (HIE), monocular deprivation (MD), and monocular enucleation (ME) on postnatal eye growth using 7-Tesla MRI.

**Methods:** T2-weighted anatomical MRI was performed to both eyes of 7 ND rats at postnatal days (P) 1, 5, 10, 15, 21, 28 and 60. In addition, 7 HIE rats underwent ligation of the left common carotid artery followed by hypoxia for 2 hours at P7 and were compared to ND rats at P60. MD was performed to 6 rats after eyelid opening at about P15, whereas ME was performed to 5 rats at P1. MD and ME rats were compared to another group of 8 ND rats at P45.

**Results:** Qualitatively, the lens, vitreous, retina, and hyaloid vessels but not anterior or posterior chamber (AC/PC) were apparently visible in T2-weighted MRI at P1. Quantitatively, normal rat eyes followed a quadratic growth curve of  $Y=0.26+0.15X+1.58 \times 10^{-3}X^2$  for AC/PC,  $Y=3.97+0.54X-2.71 \times 10^{-3}X^2$  for lens, and  $Y=6.53+0.86X-4.21 \times 10^{-3}X^2$  for vitreous respectively, where Y is the volume in  $\text{mm}^3$ , and X is postnatal day. Unilateral neonatal HIE significantly decreased the volumes of AC/PC, lens, and vitreous of the same hemisphere, as well as the lens volume of the opposite hemisphere. MD significantly decreased the AC/PC, lens, and vitreous volumes compared to ND, whereas the remaining eye after ME showed reduced vitreous volume compared to ND.

**Conclusions:** High-field MRI allows non-invasive and quantitative characterizations of postnatal ocular growth during ND, HIE, MD, and ME before and after eyelid opening.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Auditorium**

### **Effect of Cornea Curvature on Retinal Thickness Measured Using Spectral Domain Optical Coherence Tomography**

*First Author: Li **KELVIN***

*Co-Author(s): Louis **LIM**, Colin **TAN**, Pamela **TING***

**Purpose:** Spectral domain optical coherence

tomography (SD-OCT) is used in ophthalmic practice to assess retinal thickness. On SD-OCT devices, a default cornea curvature is assumed. The effect of using individualized cornea curvature on retinal thickness measurements is unknown. This study aimed to evaluate the effect of cornea keratometry on retinal thickness measurements obtained from SD-OCT.

**Methods:** In a prospective study, 64 healthy volunteers were recruited and underwent auto-keratometry, auto-refraction, and SD-OCT scans using the Spectralis OCT (Heidelberg Engineering, Heidelberg, Germany). Retinal thickness was evaluated with the default cornea curvature of 7.7 mm, and after, the actual keratometry was input. Comparisons between original and adjusted thicknesses were made using paired *t*-tests.

**Results:** The mean retinal thickness was 263.0  $\mu\text{m}$  using the default cornea curvature, and 262.4  $\mu\text{m}$  using the actual keratometry (difference of 0.55  $\mu\text{m}$ ,  $P = 0.006$ ). The differences in retinal thicknesses were significant in the outer retina subfields ( $P < 0.02$ ) but not in the inner retina subfields. The difference in retinal thickness was greater for emmetropes followed by low myopes and high myopes (0.87  $\mu\text{m}$ , 0.58  $\mu\text{m}$ , and 0.44  $\mu\text{m}$  respectively). Eyes with keratometry  $< 42$  diopters (D) had a decrease in central retinal thickness (mean = 2.8  $\mu\text{m}$ ), whereas eyes with keratometry  $> 44$  D had an increase in central retinal thickness (mean = 0.93  $\mu\text{m}$ ).

**Conclusions:** Cornea curvature has a significant effect on the measured retinal thickness output on the Spectralis OCT. Using corneal keratometry measurements increases the accuracy of retinal thickness measurements.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Boardroom 3**

### Evaluation of Peripapillary Vessel Flow Change After Vitrectomy Using OCT-A

*First Author: Jong Beom PARK*

*Co-Author(s): Eung-Suk KIM, Kiyoun KIM, Sungrae NOH, Jong In YU, Seung Young YU*

**Purpose:** To investigate the OCT angiographic changes of micro-vascular flow and non-perfusion area around the optic disc following vitrectomy with ILM peeling.

**Methods:** Retrospective review of the patients who had underwent vitrectomy for epiretinal membrane or lamellar macular hole was performed. OCT-A was performed at preoperative 1 day, and postoperative 1 week and 3 months. Capillary density was calculated from the four quadrants of 500  $\mu\text{m}$  diameter circle around the optic nerve head using Image J software. Non-perfusion area was measured at the area of temporal sides of optic disc.

**Results:** Twenty eyes of 20 patients (5 male, 15 female)

were included in the study. Average age was  $67.7 \pm 5.9$  years. The mean of axial length was  $23.84 \pm 1.84$  mm, and 4 eyes were diagnosed as glaucoma before the surgery. There was no statistically significant difference in between preoperative and postoperative intraocular pressure ( $14.63 \pm 2.22$  mm Hg and  $13.53 \pm 3.49$  mm Hg, respectively,  $P = 0.169$ ). There was a significant decrease in the inferior sector of peripapillary capillary density in superficial capillary plexus 1 week after the surgery ( $P = 0.039$ ). There was no significant difference in capillary density between preoperative and postoperative 3 months after surgery in all 4 quadrants.

**Conclusions:** OCT-A revealed a temporary decrease of capillary density in the inferior quadrants of optic disc after vitrectomy with ILM peeling. Inferior quadrant capillary density may decrease after ILM peeling. Therefore, care must be taken when performing a vitrectomy, especially on patients with glaucoma.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Auditorium**

### In Vivo Confocal Microscopic Analysis of Corneal Subbasal Nerve in a Thai Population

*First Author: Sittiphong THONGSUWAN*

*Co-Author(s): Chareenun CHIRAPAPAISAN*

**Purpose:** To determine normative values of subbasal nerve parameters and to observe nerve tortuosity in healthy Thai population using corneal laser in vivo confocal microscopy (IVCM).

**Methods:** This descriptive observational study recruited healthy subjects aged between 20 - 60 years from Siriraj Health-Screening Center. Ones who had abnormal ocular symptoms, previous ocular surgery, history of any diseases that might be related to systemic and/or corneal neuropathy, and corneal sensitivity  $< 6$  cm by Cochet-Bonnet esthesiometer were excluded. Corneal IVCM (HRT 3 Rostock Corneal Module) was performed at the central cornea of all subjects to analyze subbasal nerve plexus. Corneal nerve parameters including number and density of nerves (main nerve trunks, branches and total nerves) were analyzed using NeuronJ program. Corneal nerve tortuosity was also graded. The correlation among subbasal nerve density, tortuosity and age was analyzed accordingly.

**Results:** There were 80 subjects enrolled; 20 subjects for each age group (20-30, 31-40, 41-50, and 51-60 years). Mean number of main nerve trunks and density of overall subjects were  $4.47 \pm 0.13/\text{frame}$  and  $11.22 \pm 0.30 \text{ mm/mm}^2$ . Average nerve branches were  $15.38 \pm 0.38/\text{frame}$  and  $9.15 \pm 0.30 \text{ mm/mm}^2$ . The total nerve density was  $20.37 \pm 0.39 \text{ mm/mm}^2$ . There was no significant difference of subbasal nerve parameters among all age groups. It is noteworthy that more than 50% of subjects aged over 40 years revealed high

graded-nerve tortuosity.

**Conclusions:** Corneal subbasal nerve number and density were not significantly different among healthy Thai population aged 20-60 years. However, there was a trend towards high tortuosity of corneal nerve in people aged over 40 years.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Auditorium**

### Multimodal Imaging-Based Phenotyping of a Newly Established Cohort of High Myopia Patients

*First Author: Quan HOANG*

*Co-Author(s): Gemmy Chui Ming CHEUNG, Shu Yen LEE, Gavin, Siew Wei TAN, Chee-Wai WONG, Ian YEO*

**Purpose:** To investigate how frequently highly myopic (HM) patients present with high axial anisometropia and other related features.

**Methods:** HM patients [ $< -6.00$  diopters (D) and/or  $>25$  mm axial length (AL) in at least 1 eye] clinically diagnosed with staphyloma, recruited from a HM clinic between January - December 2017, were evaluated retrospectively. The following was performed for all patients: dilated retinal exam, IOLMaster axial length (AL) measurement, fundus photography/autofluorescence, and widefield swept source optical coherence tomography.

**Results:** A total of 335 HM patients (69% female,  $62 \pm 14$  years old, range 19 - 92) were evaluated. Excluding unilateral eyes  $<25$  mm, AL was  $29.4 \pm 2.2$  mm (25 - 36.7 mm). Using the Meta-analysis of Pathologic Myopia (Meta-PM) classification to assess the degree of myopic macular degeneration (MMD) revealed 20% with tessellated fundus MMD Category (MMDCat) 1, 34% with MMDCat2 (diffuse atrophy), 32% with MMDCat3 (patchy atrophy), and 15% with MMDCat4 (macular atrophy). Eighteen percent of patients had foveoschisis, 14% had myopic choroidal neovascularization, 10% had dome-shaped macula, 7% had vitreomacular adhesion, and 4% had macular/lamellar hole. 15% of patients had high axial anisometropia, in which at least 1 eye had high axial myopia, and there was a difference of at least 2.5 mm in axial length between the 2 eyes in a given patient (range 3 - 11.2 mm).

**Conclusions:** We have established an important clinical cohort with a wide range of pathology that will serve as the basis for longitudinal studies that search for potential imaging biomarkers for development and progression of myopic maculopathy.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Auditorium**

### Next Generation Bowman Topography and Its Application in Refractive Surgery

*First Author: Deeksha LOCHAB*

**Purpose:** To describe a novel method of computing topography and aberrations of the corneal surface and Epithelial-Bowman's interface using anterior segment optical coherence tomography (AS-OCT), and to compare this with Bowman's layer topography measured after epithelium removal.

**Methods:** A total of 25 normal and 30 keratoconus (KC) eyes were analyzed using undistorted AS-OCT (12 scans) and Pentacam HR. Curvatures for OCT were calculated from the detected anterior corneal surface (ACS) and Epithelium Bowman's Interface (EBI) edges on the scans. Similarly, curvatures of the same ACS were obtained from Pentacam (OCULUS Optikgerate GmbH, Germany). Wave-front aberration was also analyzed by ray tracing on OCT (ACS and EBI) and Pentacam data (ACS only). Manual epithelium removal of 30 KC eyes was done during cross linking by a single surgeon, and topography was repeated intraoperatively (intraoperatively) to manually measure Bowman's topography. Paired *t*-test and ANOVA was used for statistical comparisons.

**Results:** Higher and lower order aberrations were greatest for the EBI, followed by the anterior corneal surface in KC eyes ( $P < 0.05$ ). Kmax of the interface was steeper than the anterior corneal surface by 1 diopter ( $P < 0.05$ ). The mean K1, K2, and Kmax (D) of Bowman's topography measured intraoperatively and derived from preop OCT images were similar ( $48.8 \pm 1.58$ ,  $48.1 \pm 1.59$ ;  $55.3 \pm 2.05$ ,  $54.7 \pm 2.27$ ; and  $56.4 \pm 2.04$ ,  $55.8 \pm 2.34$ , respectively).

**Conclusions:** This study presents a novel, non-invasive method for "virtual de-epithelization" using OCT, where no physical removal of epithelium is required. This method is accurate and comparable to manual de-epithelization method. This tool can be useful for preoperative planning of trans-epithelial procedures and customized corneal crosslinking in keratoconus.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Boardroom 3**

### OCTA Findings in Retinal Vein Occlusion Treated with Anti-VEGF

*First Author: Eung-Suk KIM*

*Co-Author(s): Kiyoun KIM, Sungrae NOH, Jong In YOU, Seung Young YU*

**Purpose:** To evaluate changes of capillary non-perfusion of the patients according to the intravitreal

injections of anti-VEGF for ME secondary to branch retinal vein occlusion (BRVO) with wide-field optical coherence tomography angiography (OCTA).

**Methods:** Retrospectively reviewed medical records of patients with BRVO. Patients who had undergone wide-field (12 mm x 12 mm) swept-source OCT angiography (SS-OCTA). Full ophthalmic exam including best corrected visual acuity (BCVA) and central macular thickness (CMT). Follow-up  $\geq 3$  months, administration of anti-VEGF, number of anti-VEGF injections using image with SS-OCTA.

**Results:** On the correlation analysis with non-perfusion area in OCTA, hypertension, baseline BCVA, and CMT showed positive correlation with non-perfusion area at final visit. These correlations were consistently significant in both superficial and deep capillary plexus. Considering change in non-perfusion area over time, we investigated the correlation of differences value between final and baseline non-perfusion area with each parameter. Difference of non-perfusion area in superficial choroidal plexus was significantly correlated with baseline and final BCVA, baseline CMT, and number of anti-VEGF injections. On the results of multiple linear regression analysis, difference of non-perfusion area in deep choroidal plexus was significantly correlated only with the number of anti-VEGF injections.

**Conclusions:** Systemic hypertension, visual acuity, and central macular thickness at baseline were associated with the area of non-perfusion at final visit. Increase of non-perfusion area was associated with the number of anti-VEGF injections.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Boardroom 3

### Optical Coherence Tomography Angiography Analysis of Changes in the Retina and the Choroid After Hemodialysis

First Author: Hee Yoon **CHO**

Co-Author(s): Eun Hee **HONG**, Yong Un **SHIN**, Joo Hak **YI**

**Purpose:** The purpose of this study was to evaluate the effect of hemodialysis on perfused vessel density, choroidal thickness (CT), and retinal thickness in end-stage renal disease (ESRD) using swept source optical coherence tomography angiography (SS-OCTA).

**Methods:** We studied 29 eyes of 29 ESRD patients by ophthalmologic examination and SS-OCTA before and after hemodialysis. The color-coded perfusion density maps were generated, and perfused vessel density was calculated. Changes in systemic and other ocular parameters such as retinal and choroidal thickness were measured and analyzed.

**Results:** Total perfused vessel density decreased

significantly after hemodialysis in the choriocapillaris; it was not significantly different in the superficial capillary plexus (SCP) and the deep capillary plexus (DCP). Total CT decreased significantly, but total retinal thickness was not significantly different. There was no significant correlation between choriocapillaris perfused vessel density and CT. The reduction in choriocapillaris perfused vessel density correlated with the decrease in systolic and mean arterial blood pressures. The decrease in CT correlated with the ultrafiltration volume. There were no significant systemic and ocular factors affecting change in retinal thickness and perfused vessel density of SCP and DCP.

**Conclusions:** This is the first study to assess the effect of hemodialysis on blood flow changes using SS-OCTA; changes may be more prominent in the choroidal compared to the retinal layer.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Boardroom 3

### PCV Lesion on OCTA Following Treatment

First Author: Eung-Suk **KIM**

Co-Author(s): Kiyoun **KIM**, Sungrae **NOH**, Jong In **YOU**, Seung Young **YU**

**Purpose:** To evaluate the change of the lesion on optical coherence tomography angiography (OCT-A) following treatment in patients with PCV, and to compare the OCT-A and ICGA findings at baseline of characteristics of lesion in treatment-naïve patients with PCV.

**Methods:** A total of 29 treatment-naïve PCV patients were retrospectively recruited and followed-up for 6 months. Patients who received only anti-VEGF injections were included in mono therapy group, and those who received both PDT and anti-VEGF injection at same day were classified as combination therapy group. For 3 months, all subjects (both groups) received more than 2 anti-VEGF injections.

**Results:** Using spectral-domain OCT angiography (SD-OCTA) and swept-source OCT angiography (SS-OCTA), we determined "detection on OCTA" only if all polyps were seen as hyperflow signal matched with ICGA. Detection rate of polyp was only 73% with SD-OCTA compared with ICGA, however SS-OCTA showed comparable detection rate with ICGA as 92%. SD-OCTA and SS-OCTA showed higher detection rate as on BVN, 79% and 87% compared with ICGA. Six months after treatment, combination group showed higher rate of complete and partial polyp dissolution than mono group. On the other hand, mono treatment showed significantly greater reduction in BVN compared to combination treatment.

**Conclusions:** Combination therapy was noted for higher rate of regression of polyp, and mono therapy was better in the regression of BVN. Through

customized segmentation, SS-OCTA can effectively identify polyps as hyperflow signal, and could evaluate activity of polyps following treatment.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Boardroom 3**

### **Quantitative Microvascular Changes in Surgically Repaired Rhegmatogenous Retinal Detachment by OCT Angiography**

*First Author: Sanghyu **NAM***

*Co-Author(s): Eung-Suk **KIM**, Kiyoun **KIM**, Sungrae **NOH**, Jong In **YOU**, Seung Young **YU***

**Purpose:** The purpose of this study was to analyze the changes of the foveal avascular zone (FAZ) area and vascular density after rhegmatogenous retinal detachment surgery for 1 year, retrospectively.

**Methods:** Seventeen eyes with adhered retina after rhegmatogenous retinal detachment surgery (vitrectomy or scleral buckling) were included. The changes of FAZ area and vascular density were examined using optical coherence tomography angiography (OCTA) images of 3x3 mm<sup>2</sup>, 6x6 mm<sup>2</sup>, and 15x9 mm<sup>2</sup> for 1 year. The opposite eye was set as the control group for comparison.

**Results:** Eleven eyes had undergone scleral buckling surgery and 6 eyes underwent vitrectomy. All 17 eyes were in a macular detached state before surgery. At 3, 6, and 12 months postoperatively, difference of FAZ area compared to the control group was increased to  $0.11 \pm 0.063$  mm<sup>3</sup>,  $0.1 \pm 0.076$  mm<sup>3</sup>, and  $0.09 \pm 0.104$  mm<sup>3</sup>. The amount of change decreased in proportion to the recovery period and was significantly different from the control group ( $P < 0.05$ ) at each point. Vascular density difference was also decreased to  $3.16 \pm 4.24$ ,  $2.17 \pm 5.49$ , and  $1.20 \pm 5.00$  compared to the control group. The changes of vascular density were recovered with time and significantly different from the control group ( $P < 0.05$ ).

**Conclusions:** The changes of FAZ area decreased gradually after rhegmatogenous retinal detachment surgery in 12 months and were significantly different compared to the control group. Vascular density also decreased after surgery but recovered with time. Therefore, with the analysis of FAZ area and vascular density changes, these could be used as prognostic factors of the recovery.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Boardroom 3**

### **Real-World Application of Artificial Intelligence Using Deep Learning to Screen for Diabetic Retinopathy in a Low-Income Country**

*First Author: Valentina **BELLEMO***

*Co-Author(s): Geeta **MENON**, Sobha **SIVAPRASAD**, Daniel **TING**, Tien-Yin **WONG***

**Purpose:** Zambia is ranked 144th for gross domestic product (GDP) per capita in 2017. It is a low-income developing country challenged by poor accessibility to health care services. The application of artificial intelligence (AI) using deep learning (DL) has been described in many developed countries for eg, US, UK and Singapore. This study evaluate the real-world clinical effectiveness of a DL system in screening for referable diabetic retinopathy (DR) and vision-threatening DR (VTDR) using different convolutional neural networks (CNN) – VGGNet, ResNet and Ensemble.

**Methods:** A total of 6071 images from 2608 Zambia patients with diabetes had been recruited from this. All patients had 2-field retinal photography (optic-disc and macula-centered) images taken. Referable DR was defined as moderate non-proliferative DR or worse, including diabetic macular edema and ungradable image, and VTDR as severe non-proliferative DR or worse. With reference to the retinal specialists' grading, we calculated the area under curve (AUC), sensitivity and specificity for referable DR, and the detection rate of VTDR.

**Results:** The AUCs of the DL system for referable DR were 0.957, 0.945, 0.960 for VGGNet, ResNet and Ensemble, with corresponding sensitivities of 95.4%, 93.5%, 95.2% and specificities of 80.9%, 81.3%, 85.8%. For VTDR, detection rates were 96.5%, 93.7%, 96.5%.

**Conclusions:** Our study shows the promising application of such sophisticated cutting-edge AI technology for the Zambia population. Future research is of great value in expanding the adoption of AI in helping to reduce the incidence of preventable blindness for the global population with diabetes among the low-income countries.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Boardroom 3

## Regional Growth of Geographic Atrophy and Visual Acuity: A Longitudinal Analysis

First Author: Jong In **YOU**

Co-Author(s): Eung-Suk **KIM**, Kiyoun **KIM**, Sungrae **NOH**, Seung Young **YU**

**Purpose:** To investigate the correlation between visual acuity and regional growth of geographic atrophic area.

**Methods:** We retrospectively analyzed 26 eyes of 18 patients who were diagnosed with geographic atrophy and had at least a 1 year follow-up period. Areas 1 to 6 mm from foveal center were defined as Area 1 to Area 6, and ring shape areas from between 1 mm and 2 mm to between 5 mm and 6 mm were defined as Zone 2 to Zone 6, respectively. We analyzed the relationship between visual acuity change in the progression of atrophic area.

**Results:** Mean age was 76.9 years. Mean follow-up period was 2.81 years. During follow-up period, atrophic area was increased from 8.09 mm<sup>2</sup> to 16.34 mm<sup>2</sup>, and visual acuity decreased from 0.46 to 0.38. Atrophic area showed more rapid increase in distance from center. Regression analysis showed that area of 3 mm diameter (B = 0.762), 2 mm area (B = 0.742), 4 mm area (B = 0.723), and 5 mm area (B = 0.689), 6 mm area (B = 0.668), and 1 mm area (B = 0.544) were related to change of visual acuity. Also, area increase in Zone 2 (B = 0.737) was significantly associated with decreased visual acuity.

**Conclusions:** Progression pattern of atrophic area showed the area with the largest correlation with the change of visual acuity was from 1 mm to 2 mm in diameter from the foveal center. It may be used as a factor to determine the visual prognosis of the patient by analyzing the progressive pattern of atrophic area.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Boardroom 3

## Underdiagnosed Optic Disc Pit Maculopathy: Spectral Domain Optical Coherence Tomography Features for Accurate Diagnosis

First Author: Adrian **FUNG**

Co-Author(s): Catharina **BUSCH**, Alessandro **INVERNIZZI**, Matias **IGLICKI**, Anat **LOEWENSTEIN**, Dinah **ZUR**

**Purpose:** To report a cohort with optic disc pit maculopathy (ODPM) presenting with neurosensory macular detachment that were initially misdiagnosed and mistreated. To describe structural features on spectral domain optical coherence tomography (SD-OCT) in misdiagnosed and all other consecutive cases

of ODPM.

**Methods:** Multicenter, international, retrospective cohort study. 59 participants were included. Main outcome measures included: 1) Proportion of patients with ODPM initially misdiagnosed and mistreated; 2) Morphological features on SD-OCT including other causes of subretinal and/or intraretinal fluid, inner/outer retinoschisis, communication with the optic disc pit, and retinal pigment epithelial (RPE) alterations; 3) Visual and anatomical outcomes 6 months after proper treatment.

**Results:** Fifteen patients (25.4%) with ODPM were correctly diagnosed initially. These patients were significantly younger than misdiagnosed cases (age 33.8 ± 15.2 versus 58.7 ± 15.8 years, P < 0.0001). 40/44 misdiagnosed eyes (90.9%) were treated for their presumed diagnosis before referral. Eyes with initial misdiagnosis had significantly more outer retinoschisis at baseline (88.4% versus 40.0%, P = 0.0002) and more RPE alterations (90.0% versus 27.3%, P < 0.0001) 6 months after proper treatment.

**Conclusions:** Optic disc pit maculopathy is an underdiagnosed entity and can mimic other causes of subretinal fluid. Awareness and identification of pertinent SD-OCT features can help avoid inappropriate and delayed treatment.

## Ocular Oncology & Pathology

Mar 06, 2019 (Wed)

09:00 - 10:30

Venue: Boardroom 3

## A 10-Year Retrospective Analysis of Clinical Profile and Survival Rates in Retinoblastoma from North Eastern India

First Author: Pushkar **DHIR**

Co-Author(s): Manabjyoti **BARMAN**, Kasturi **BHATTACHARJEE**, Dipankar **DAS**, Diva **MISRA**, Hemlata **DEKA**

**Purpose:** To report on the clinical profile and long-term survival rates from Rb from an ocular oncology unit in India.

**Methods:** Retrospective study. The data of children with Rb hailing from the northeastern states over a 10-year period between 2004 and 2013 were analyzed for type and pattern of Rb, results with different treatment therapies, and survival rates.

**Results:** Amongst 189 patients in the study, 100 (53%) were boys and median age at presentation was 14 months (interquartile range= 5 - 27 months). Leukocoria was the most common symptom, unilateral

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Rb was seen in 136 patients (72%), and group E disease was the most common form (n = 146, 77%). Seventy-one eyes (38%) underwent enucleation as primary treatment and 76 (40%) had systemic chemotherapy. At last follow-up, 72% of children were surviving and the cumulative survival estimate at 1 year was 67%, which dropped to 48% at 2 years and 44% at 3 and 5 years. Cox proportional hazard analysis showed that risk of mortality was 90% higher with group E disease receiving chemotherapy compared to enucleation (HR = 1.90, 95% CI = 1.03 – 3.51, P = 0.04) even after adjusting for bilaterality.

**Conclusions:** Children with Rb in northeast India present with end-stage disease most often have a low 5-year survival rate compared to the western world. Children in resource poor settings with group E disease should not be offered chemotherapy as the primary treatment.

Mar 06, 2019 (Wed)

09:00 - 10:30

Venue: Boardroom 3

### ATM as a DNA Damage Response Protein in Uveal Melanoma: Association with Clinicopathological Factors and Prognostic Outcome

First Author: Jayanti **JHA**

Co-Author(s): Seema **KASHYAP**, Neelam **PUSHKER**, Seema **SEN**, Mithalesh **SINGH**

**Purpose:** Uveal melanoma (UM) is the most common intraocular malignancy commonly arising from choroid. There is no current study available on UM with respect to ATM (Ataxia Telangiectasia Mutated) protein that induces DNA damage response. Loss of nuclear ATM (nATM) in pancreatic, colorectal, gastric cancer was found to be a prognostic biomarker for cancer progression. Therefore, the aim of the study is to detect the expression/localization of ATM protein in uveal melanoma patients.

**Methods:** Expression of nATM was investigated on 69 formalin fixed paraffin embedded choroidal melanoma samples by immunohistochemistry and validated by western blotting. Results were then correlated with clinical and histopathological parameters. To determine the prognostic significance, Kaplan–Meier analysis and multivariate analysis by Cox’s Proportional Hazards Model was performed.

**Results:** There was a male preponderance in our study. Histopathological high-risk factors were identified in 30/69 (43.5%) cases. Loss of nATM was found in 65.2% of the cases. This was statistically significant with epithelioid cell type, high pigmentation, LTD >10 mm, HRFs >1, tumor height, and advanced tumor staging (P < 0.05). On multivariate analysis, advanced tumor staging was found out to be an independent prognostic factor.

**Conclusions:** Our data suggests that loss of nATM protein might serve as a potential prognostic marker in the pathogenesis of uveal melanoma and leads to increased risk of metastasis. These findings demonstrate an important role of ATM protein and may have a therapeutic potential in uveal melanoma. However, further studies are required in a larger cohort of patients with longer follow-up, and translational validation needs to be performed.

Mar 06, 2019 (Wed)

09:00 - 10:30

Venue: Boardroom 3

### Characteristics and Treatment Outcomes of Patients with Primary Ocular Adnexal Lymphoma: A Multicenter Study in Tertiary Hospitals

First Author: Sirima **TANGCHITTAM**

Co-Author(s): Sakarin **AUSAYAKHUN**, Lalita

**NORASETTHADA**, Vannakorn **PRUKSAKORN**, Kasem **SERESIRIKACHORN**, Kitsada **WUDHIKARN**

**Purpose:** To assess the characteristics and treatment outcomes of patients with primary ocular adnexal lymphoma (POAL) in tertiary hospitals.

**Methods:** A retrospective, multicenter study of patients who were pathologically diagnosed with POAL between January 2004 and December 2016 was reviewed and analyzed.

**Results:** Out of 148 POAL patients, 127 (85.8%) were classified as indolent lymphoma, while the rest had aggressive lymphoma (n = 21, 14.2%). The predominant subtype was extranodal marginal zone lymphoma (MZL) of mucosa-associated lymphoid tissue (MALT) (n = 122, 82.4%). The patients’ median age was 59 years old, ranging from 4 – 86, with 51.4% of them being female. Palpable mass was the most common symptom presented in 73.2% of patients with indolent lymphoma, and 47.6% in aggressive lymphoma. In aggressive lymphoma, the manifestation of cellulitis was as high as 23.8%. Orbit (44.6%) and lacrimal gland (35.8%) were the 2 typical sites of origin respectively. The Ann-Arbor Stage was 60.4% stage I in indolent lymphoma and 52.9% stage IV in aggressive lymphoma. Treatment modalities involved field radiation (33.1%), chemotherapy (25.0%), combined chemoradiotherapy (8.8%), and surgical resection (8.1%). By multivariable analysis, radiotherapy-based treatment was found to be correlated with improved Progression Free Survival (PFS) (HR 0.385; 95% CI 0.194 - 0.764, P = 0.006), albeit with lower Overall Survival (OS) in patients with aggressive lymphoma (HR 12.808; 95% CI 3.869 - 42.394, P = 0.000).

**Conclusions:** Radiotherapy contributed to better PFS in POAL patients. However, the aggressive subtype was associated with poor OS.

Mar 06, 2019 (Wed)  
09:00 - 10:30  
Venue: Boardroom 3

### Characteristics, Treatments, and Outcomes of Retinoblastoma in Thailand: 10-Year Analysis of 92 Eyes of 61 Consecutive Patients from a Tertiary Referral Center

First Author: Atasit **ROJANASAKUL**  
Co-Author(s): Rangsim **AROONROCH**, Taweevat **ATTASETH**, Parin **HUNTRAKOOL**, Duangnate **ROJANAPORN**, Tharikarn **SUJIRAKUL**

**Purpose:** To report demographic data, clinical classification, and treatment outcomes of patients with retinoblastoma in Thailand.

**Methods:** Retrospective study of 61 consecutive retinoblastoma patients treated at a tertiary referral center in Bangkok, Thailand, from January 2007 to December 2017.

**Results:** Of 61 patients, 29 patients (47.5%) were male. The median age at diagnosis was 8 months (range, 1 to 48 months). Thirty-one patients (50.8%) had bilateral retinoblastoma. Two patients (3.3%) had familial retinoblastoma. Of 92 eyes, extraocular retinoblastoma was found in 7 eyes (7.6%). Of 85 eyes with intraocular retinoblastoma, the eyes were classified as International Classification of Retinoblastoma (ICRB) group A (n = 2, 2.2%), group B (n = 16, 17.4%), group C (n = 4, 4.3%), group D (n = 25, 27.2%), and group E (n = 38, 41.3%). Our treatment modalities included systemic chemotherapy, intra-arterial chemotherapy (IAC), Ruthenium brachytherapy, external beam radiotherapy, cryotherapy, transpupillary thermotherapy, subtenon chemotherapy, and intravitreal chemotherapy. At the median follow-up period of 26.8 months (range, 0.4 to 120 months), the overall globe salvage rate of intraocular retinoblastoma was 53%, which was 100% in ICRB group A, B and C, 60% in group D, and 21% in group E. The overall survival rate was 93%. Four patients passed away due to brain metastasis, febrile neutropenia, chemotherapy toxicity, and secondary acute myeloid leukemia.

**Conclusions:** Treatment of retinoblastoma is challenging. With recent advanced treatment modalities available at our center, globe salvage is more promising. However, enucleation is still required to save the patient's life in advanced retinoblastoma.

Mar 06, 2019 (Wed)  
09:00 - 10:30  
Venue: Boardroom 3

### Characteristics, Treatments, and Outcomes of Uveal Melanoma in Thailand: Analysis of 46 Consecutive Patients from a Tertiary Referral Center

First Author: Parin **HUNTRAKOOL**  
Co-Author(s): Rangsim **AROONROCH**, Lindara **PO**, Duangnate **ROJANAPORN**, Atasit **ROJANASAKUL**, Tharikarn **SUJIRAKUL**

**Purpose:** To report the characteristics, treatments, and outcomes of uveal melanoma patients in the tertiary care center in Bangkok, Thailand and to compare with previous reports.

**Methods:** Retrospective review of 46 consecutive patients with uveal melanoma from a single tertiary referral center in Bangkok, Thailand, from January 2010 to September 2017.

**Results:** Of 46 patients with uveal melanoma, 27 (58.7%) were females. The mean age at diagnosis was 47 years (range; 15 – 80 years). The median visual acuity at initial diagnosis was 20/150 (range; 20/20 to no light perception). Tumor locations were choroid (95.6%), ciliary body (2.2%), and iris (2.2%). The mean tumor basal diameter and thickness were 12.4 mm (range; 3.0 – 25.0 mm) and 10.5 mm (range; 2.4 – 20.0 mm), respectively. According to the 8th American Joint Cancer Committee classification, the tumors were classified as T1, T2, T3, and T4 in 13.0%, 17.4%, 54.3%, and 15%, respectively. The histological classification was spindle B cell (6.25%), epithelioid cell (6.25%), and mixed cell type (87.5%). Treatments were enucleation (60.9%), Ru-106 brachytherapy (23.9%), endoresection (13.0%), and PLSU (2.2%). The mean follow-up time was 21 months (range; 1 – 83 months). The overall globe salvage rate was 39.1%. Systemic spreading was detected in 6.5%. The most common metastatic site was the liver (66.7%). The 5-year survival probability by Kaplan–Meier method was 83.9%.

**Conclusions:** In the Thai population, our incidence and mean age at diagnosis of uveal melanoma patients were comparable to other Asian countries, but lower than the Caucasian population. Our survival rate was comparable to previous reports from other Asian and Western countries.

Mar 06, 2019 (Wed)  
09:00 - 10:30  
Venue: Boardroom 3

### Clinical Profile of Retinoblastoma in a Tertiary Public Hospital of Bangladesh

First Author: Md.Ashiqur **AKANDA**

**Purpose:** To report and analyze the characteristics and

clinical presentations of Retinoblastoma in a series of pediatric patients from a tertiary public hospital of Bangladesh.

**Methods:** In this retrospective study, profiles of pediatric patients with retinoblastoma archived in a tertiary public hospital of Bangladesh from January 2017 to December 2017 (80 patients with 114 eyes) were reviewed. Demographics, as well as the laterality, clinical manifestations, findings of CT scan orbits, and brain and the types of treatment were the major endpoints.

**Results:** There were 46 cases (57.7%) with unilateral and 34 cases (42.5%) with bilateral involvement. The male to female ratio was 1.4 to 1 with a mean admitting age of  $24.0 \pm 11.3$  (range: 5 - 62) months. The mean diagnosis delay was  $(7.4 \pm 9.6)$  months (range: 10 days to 13 months). The most common presenting sign was leukocoria (72.5%) followed by proptosis (7.5%), strabismus (7.5%), hyphema (5%), orbital cellulitis (5%), and glaucoma (2.5%). Enucleation was performed in 95.7% of the cases with unilateral involvement, and at least 1 eye of the patients with bilateral disease.

**Conclusions:** This is the first study evaluating a series of Bangladeshi children with retinoblastoma. Leukocoria is the most common presentation of retinoblastoma in our study in a tertiary public hospital in Bangladesh. The critical issues in the management of childhood blindness are early diagnosis, timely intervention, and follow-up for long time.

Mar 06, 2019 (Wed)

09:00 - 10:30

Venue: Boardroom 3

### Conjunctival Melanoma in Asian Indian Patients: A Study of 40 Cases

First Author: Varshitha **VASANTHAPURAM**

Co-Author(s): Swathi **KALIKI**, Dilip **MISHRA**

**Purpose:** To describe the clinical features, histopathology, treatment, and outcomes of conjunctival melanoma at a tertiary center in South India.

**Methods:** Retrospective study of 40 patients.

**Results:** The mean age at presentation of conjunctival melanoma was 44 years (median, 45 years; range, 9 years to 78 years). There were 19 males and 21 females. Nineteen patients (48%) had past history of a pigmented or pre-existing lesion, nevus ( $n = 14$ , 35%), primary acquired melanosis (PAM) ( $n = 5$ , 13%). The mean basal diameter of the lesion was 12 mm (median, 10 mm; range, 4 to 30 mm). Majority of the patients had pigmented lesion (80%). As primary treatment, 26 (65%) patients underwent excision biopsy, 11 (28%) underwent exenteration, and 3 were lost to follow-up. On histopathology, out of 33 patients whose HPE was available, 7 (21%) had an associated nevus, 10 (30%)

had PAM, and 1 (3%) patient had both PAM and nevus. Four (12.12%) patients had tumor recurrence, 4 (10%) developed lymph node metastasis, and 4 (10%) had systemic metastasis during a mean follow-up period of 24 months (median, 8.5 months; range, <1 to 134 months ie, 11.16 years).

**Conclusions:** Conjunctival melanoma is rare in Asian Indians and has a high rate of tumor recurrence and regional lymph node metastasis.

Mar 06, 2019 (Wed)

09:00 - 10:30

Venue: Boardroom 3

### Endocrine, Mucin-Producing Sweat Gland Carcinoma: Clinicopathological and Immunohistochemical Features

First Author: Kaustubh **MULAY**

Co-Author(s): Santosh **HONAVAR**

**Purpose:** Endocrine mucin-producing sweat gland carcinoma (EMPSGC) is a rare and recently recognized tumor of sweat gland origin. We conducted this study to elucidate various clinicopathological features of EMPSGC and to further define the use of immunohistochemical staining in the early diagnosis of these tumors.

**Methods:** This was a retrospective case series of patients diagnosed with EMPSGC. Clinical, histopathological, and immunohistochemical features were analyzed.

**Results:** The study included 10 patients of EMPSGC diagnosed between 2013 and 2018. Average age at presentation was 68.7 years (range, 55 - 82 years). Male to female ratio was 1:2. Most presented as a gradually progressive, painless swelling. Histologically, tumors were multinodular with solid and/or cystic nodules. Focal cribriform and/or papillary patterns were also present. While an invasive component was present in all patients, an identifiable in-situ component was seen in 8 patients. The tumor cells in all patients were diffusely positive for ER, PR, pan-CK, EMA, GCDFP15, and CK7. Focal or diffuse but strong positivity was observed for CGA and/or NSE in all tumors. Average follow-up duration was 15 months (range, 6 - 36 months). Recurrence was observed in 1 patient.

**Conclusions:** We described clinicopathological and immunohistochemical features in 10 patients with endocrine, mucin-producing, sweat gland carcinoma of the eyelid, a rare and low-grade sweat gland neoplasm. The nodular pattern, relatively bland cytology, and characteristic immunostaining will help differentiate this tumor from other adnexal tumors. Given its close association with invasive mucinous carcinoma and potential for local recurrence, complete surgical excision with a close follow-up is essential in managing

such patients.

Mar 06, 2019 (Wed)

09:00 - 10:30

Venue: Boardroom 3

### Is Neoadjuvant Chemotherapy with Deferred Enucleation Safe in Patients with Advanced Retinoblastoma Unsafe or Unwilling for Primary Enucleation?

First Author: Ankit **TOMAR**

Co-Author(s): Santosh **HONAVAR**, Kaustubh **MULAY**, Vijay Anand **REDDY**

**Purpose:** Efficacy and safety of NAC with intent to enucleate in advanced Rb.

**Methods:** Retrospective, interventional case series of 125 eyes of 125 patients, 30 group E, 79 group E with clinical risk factors, and 16 orbital Rb, unsafe or unwilling for primary enucleation, who underwent 6 cycles of NAC. Eye salvage and systemic metastasis were the outcome measures.

**Results:** Mean age was  $23.6 \pm 18.3$  months. Eye salvage was possible in 28 (22%) with focal therapy along with NAC. Of 97 (78%) eyes enucleated following NAC, 10 (10.3%) showed histopathological risk factors and received further adjuvant chemotherapy. At  $23.46 \pm 13.41$  months follow-up, 2 (3%) patients with enucleated eyes and none with salvaged eyes developed systemic metastasis.

**Conclusions:** NAC with intended deferred enucleation appears safe and may be offered to patients with advanced retinoblastoma, unsafe or unwilling (with risk of treatment abandonment) for immediate primary enucleation. About a fifth of such eyes may be salvaged.

Mar 06, 2019 (Wed)

09:00 - 10:30

Venue: Boardroom 3

### Management of Giant Ocular Surface Squamous Neoplasia: Our Experience

First Author: Rajendra **MAURYA**

Co-Author(s): Nilutparna **DEORI**, Syeed **KADIR**, Diva **MISRA**, Virendra P **SINGH**

**Purpose:** To describe the clinico-pathological characteristics and treatment outcome of giant OSSN ( $\geq 15$  mm size or involving  $\geq 6$  limbal clock hours) and to determine the predictive factors and rate of recurrence.

**Methods:** Twenty-eight patients histopathologically proven giant OSSN were studied. Slit lamp biomicroscopy, anterior segment optical coherence tomography, and biopsy/imprint cytology taken.

Treatment was topical mitomycin-C (0.02%)/5FU (1%)/topical IFN $\alpha 2\beta$  injection (10 M IU/mL) and perilesional IFN $\alpha 2\beta$ . In 3 patients, single subconjunctival injection of bevacizumab was used. Treatment outcome, safety, and tolerability were assessed.

**Results:** A total of 28 eyes with unilateral involvement were studied. The mean age of patients was  $65 \pm 12$  years. Mean duration of the symptoms was 8.25 months. Right eye (67.86%) was commonly involved. Temporal quadrant (71.42%) was most commonly involved. Cornea was involved in 60% of cases. The mean area of lesion before treatment was  $20 \pm 4.6$  mm<sup>2</sup>, 5 (17.85%) patients had greater than 12 clock hours of limbus involvement, 39.29%. Mean reduction in tumor area after 6 weeks of treatment was  $45 \pm 31\%$  (range from 20 - 100%). Complete resolution of tumor occurred in 6 (21.43%) cases, all treated with topical plus intralesional IFN $\alpha 2\beta$ . Recurrence was observed in 5 (17.85%) cases, and for them surgery with topical mitomycin was done. Failure of treatment was found in 14.29% cases. Exenteration was done in 2 eyes. Most common ocular side effects were hyperemia and irritation, and mild keratitis in 17.85% of cases.

**Conclusions:** Topical IFN $\alpha 2\beta$  appears to be an effective modality for giant OSSN. It reduces recurrence rates and is considered as a primary therapy.

Mar 06, 2019 (Wed)

09:00 - 10:30

Venue: Boardroom 3

### Mutational Screening of Germline RB1 Gene in Vietnamese Patients with Retinoblastoma

First Author: Chau **PHAM**

Co-Author(s): Quynh **LE**, Ha **NGUYEN THI HAI**

**Purpose:** Retinoblastoma (Rb) is an eye cancer that is usually due to mutations in the RB1 gene. This study aimed to identify germline RB1 mutations in a cohort of Rb patients.

**Methods:** Genomic DNA was extracted from peripheral blood of 34 Rb patients and their available parents. A total of 27 exons, flanking sequences, and the promoter region of RB1 gene were screened for mutations by direct PCR sequencing. The MLPA was applied for patients with negative sequencing results. In mutation-positive patients, their available parental DNA were analyzed to determine parental origin of mutation.

**Results:** Germline RB1 mutations were identified in 25 (73.53%) of 34 patients (4 unilateral, and 21 bilateral cases). Of these mutations, 19 were detected including 7 nonsense, 6 frameshift, 4 splice-site (one was identified in 2 siblings), and 1 missense by Sanger sequencing. Three novel frameshift mutations were discovered in 2 bilateral and 1 unilateral patients. MLPA analysis was allowed to detect mutations of RB1 in 6 bilateral cases, of whom 5 had a whole gene deletion (3

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familial cases) and one had a partial gene deletion (from exon 4 to exon 27) in 1 allele of RB1 gene. By parental testing, 5 mutations were found to originate from the fathers and 1 was inherited from the mother who was mosaic for the mutation.

**Conclusions:** This study provides the spectrum of germline RB1 gene mutations in the Vietnamese patients with retinoblastoma. Screening of RB1 gene mutations can help to identify the heritable Rb and contribute to clinical management and genetic counseling for affected families.

**Mar 06, 2019 (Wed)**

**09:00 - 10:30**

**Venue: Boardroom 3**

### Prognostic Significance of Loss of NEMO Protein in Uveal Melanoma

*First Author: Seema KASHYAP*

*Co-Author(s): Kunzang CHOSDOL, Neelam PUSHKER, Seema SEN, Mithalesh SINGH*

**Purpose:** Uveal melanoma, although a rare form of cancer, is the most common primary malignancy of the eye in adults. Nuclear factor- $\kappa$ B (NF $\kappa$ B) is a transcription factor that transactivates genes involved in the regulation of cell growth, apoptosis, angiogenesis, and metastasis, but the molecular mechanisms that negatively regulate NF $\kappa$ B activation are not fully understood. NF $\kappa$ B can also be activated by DNA damage pathway through NEMO protein. Therefore, the objective of this study was to elucidate the role of NEMO/IKK $\gamma$  protein in uveal melanoma patients.

**Methods:** Sixty-nine formalin fixed paraffin embedded prospective tissues of uveal melanoma were included in the present study. These cases were reviewed and investigated for the expression of NEMO protein by immunohistochemistry and validated by western blotting. Expression levels were correlated with the clinicopathological parameters and patient's outcome.

**Results:** Immunohistochemistry showed cytoplasmic expression of NEMO expression in only 20 out of 69 (28.98%) cases. This result was confirmed by western blotting and correlated well with the immunohistochemical expression of NEMO protein (48 kDa). On statistical analysis, loss of NEMO protein was correlated with neovascularization, high mitotic count, and presence of vascular loop ( $P < 0.05$ ). There was less overall survival rate with low expression of NEMO protein in patients with uveal melanoma.

**Conclusions:** This was the first study suggesting the relevant role of protein and highlights the prognostic significance with outcome in uveal melanoma patients.

**Mar 06, 2019 (Wed)**

**09:00 - 10:30**

**Venue: Boardroom 3**

### Ruthenium-106 Plaque Brachytherapy for Intraocular Tumors in Thailand: The First Report from South East Asia

*First Author: Thitiporn THONGBORISUTH*

*Co-Author(s): Pawipon NISARAT, Daranee PIRIYASANG, Duangnate ROJANAPORN, Tharikarn SUJIRAKUL*

**Purpose:** To report the efficacy and safety of Ruthenium plaque brachytherapy for intraocular tumors in Thailand.

**Methods:** We retrospectively reviewed medical records of 30 eyes of 29 patients who received Ruthenium plaque brachytherapy at the setting of a tertiary care center in Bangkok, Thailand, from April 2013 to December 2017.

**Results:** Of 30 eyes, 13 (43.3%) were diagnosed with choroidal melanoma, 10 (33.3%) with retinoblastoma, 3 (10%) with choroidal metastasis, 2 (6.7%) with retinal vasoproliferative tumor (VPT), 1 (3.3%) with diffuse choroidal hemangioma, and 1 (3.3%) with RPE adenoma. The mean tumor thickness was 5.1 millimeters (range, 2.4 – 8.2). The scheduled dose was 100 gray (Gy) for choroidal melanoma and RPE adenoma, 80 Gy for VPT (retreatment), 60 Gy for choroidal hemangioma, and 50 Gy for choroidal metastasis, retinoblastoma, and VPT. Four patients required retreatment with Ruthenium plaque due to partial tumor response. At the mean follow-up period of 27.9 months (range, 2.5 - 55.2), the rate of overall globe salvage was 93.3%. Complications included cataracts in 10 (33.3%), radiation retinopathy in 8 (26.7%), radiation maculopathy in 8 (26.7%), radiation papillopathy in 7 (23.3%), and branch retinal vein occlusion in 5 (16.7%) patient(s). All retinoblastoma patients are alive without metastasis. One patient with choroidal melanoma developed bone metastasis. One patient who had choroidal metastasis from breast carcinoma, passed away due to Influenza pneumonia.

**Conclusions:** Ruthenium plaque brachytherapy is effective and safe in the treatment of various intraocular tumors. Further study with a larger number of patients and longer follow-up duration is required.

**Mar 06, 2019 (Wed)**

**09:00 - 10:30**

**Venue: Boardroom 3**

### Transpupillary Thermotherapy in Circumscribed Choroidal Hemangioma

*First Author: Harshit VAIDYA*

*Co-Author(s): Vikas KHETAN*

**Purpose:** To study the outcomes of transpupillary thermotherapy (TTT) in patients with circumscribed

choroidal hemangioma (CCH).

**Methods:** A retrospective, interventional case series evaluating 42 consecutive patients presenting to our tertiary eye care center between 2009 and 2018. Patients with CCH were treated with TTT using an infrared diode laser (810 nm) adapted on a Haag Strait slit lamp bio-microscope and delivered through a Mainster lens. The median spot size of 1.2 mm, power of 250 mW, and exposure time of 2.5 minutes was needed in our patients.

**Results:** The mean age was  $41 \pm 13$  years with a M:F ratio of 2.8:1. The median tumor dimensions were (in mm): thickness (3.3); horizontal diameter (8.2); vertical diameter (7.4). Foveal involvement was observed in 11 patients. The size and location of the lesion did not significantly affect the final visual outcome. An average of 2.7 sessions was needed in the study group. All patients showed partial or complete resolution of sub-retinal fluid. At the final visit, visual acuity improved or maintained in 30 (71.4%) eyes and worsened in 12 (28.6%) eyes. Common causes for worsening were foveal involvement, exudative retinal detachment, and larger tumor size.

**Conclusions:** TTT is a cost-effective treatment modality in patients with CCH, with acceptable anatomical outcomes even in large-sized tumors.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Boardroom 4**

### **Establishing a Retinoblastoma Center in a Tertiary Eye Care Center of Bangladesh: A New Hope for Retinoblastoma Patients**

*First Author: Soma ROY*

**Purpose:** Retinoblastoma is the most common primary intraocular tumor in children and represents 11% of cancer developed in the first year of life. It is one of the malignancies which has the highest survival rates among all pediatric cancers and is 95% in developed countries. But still retinoblastoma is a deadly cancer worldwide, with an estimated death rate of more than 40% and most of them from Asia and Africa. Bangladesh is one of the developing countries of Southeast Asia with a population of 160 million. Retinoblastoma constitutes 25% of all pediatric cancer and total service for this dreadful disease is not available in all ophthalmic centers. The purpose was to describe the process of establishing a retinoblastoma center and its outcome in a tertiary eye care center of Bangladesh.

**Methods:** For maintaining standard management protocol in a team approach, we have made a team consisting of ocular oncologist, pediatric oncologist, radiation oncologist, pediatrician, oculoplastic surgeon, retina specialist, pediatric ophthalmologist, and

ocularist from March 2017. Retinoblastoma patients are getting services like chemotherapy, surgeries, laser, cryo, genetic and general counseling, regular follow up, visual rehabilitation, and screening procedures from a single center. All are receiving services at a low cost or free of cost.

**Results:** Fifty-six cases diagnosed, 16 were bilateral and 40 unilateral. Twenty-nine underwent primary enucleation, 24 received chemotherapy, local therapy, and enucleation. One sibling has detected during screening.

**Conclusions:** This effort will save both lives and vision, and will also reduce patient loss due to multiple refer.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Boardroom 4**

### **Progesterone Receptor and Neurofibromatosis-2 Expression, the Use of Exogenous Progesterone, and Their Association with Risk of Orbitocranial Meningioma in Females**

*First Author: Agus SUPARTOTO*

*Co-Author(s): Banu DIBYASAKTI, Datu RESPATIKA, Purjanto UTOMO*

**Purpose:** The association between exogenous progesterone use and the pathogenesis of meningioma in females has remained unclear. In this study we aimed to observe expression of progesterone receptor (PR) and neurofibromatosis-2 (NF2) and assess their relationships to risk of meningioma and exogenous progesterone use.

**Methods:** A total of 115 females, 40 cases who diagnosed with orbito-cranial meningioma and 75 controls of healthy patients, were involved in a case control study. The demographic characteristics, reproductive factors, and history of progesterone use were obtained in-depth face-to-face interviews. The expression of serum PR and NF2 mRNA were assessed by real-time quantitative polymerase chain reaction (RT-qPCR).

**Results:** The expression of PR and NF2 mRNA were found significantly lower in cases than in controls. The lower expression of PR and NF2 mRNA were significantly associated with longer duration of progesterone exposure. Significant association between lower expression of PR (OR 11.7; 95% CI 4.17 – 32.9;  $P < 0.001$  comparing the lowest quartile vs 3 highest quartile of PR) and NF2 (OR 4.23; 95% CI 1.85 – 9.67;  $P = 0.001$  comparing the 2 lowest quartiles vs 2 highest quartiles) with increased risk of meningioma were also reported.

**Conclusions:** In this study we showed that low expression of PR and NF2 mRNA were significantly associated with higher risk of meningioma. Thus, low

PR and NF2 expression due to inactivation of NF2 might play a key role in progesterone-associated meningioma tumorigenesis and may be potential clinical markers for females with a higher risk of meningioma.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Boardroom 4

### Unilateral Squamous Papilloma in the Setting of Bilateral Ocular Cicatricial Pemphigoid

First Author: Leo **MANUEL**

**Purpose:** To discuss a rare case (3 published cases worldwide) of an Unilateral Squamous Papilloma associated with Bilateral Mucous Membrane Pemphigoid on a 42-year-old female, its clinical approach, differential diagnosis, diagnostics, and updates on treatment.

**Methods:** Observational case report.

**Results:** This is a case of a 42-year-old female who complained of 22 years of chronic tearing with associated gradual blurring of vision on both eyes. Upon physical examination, she had chronic bilateral cicatricial conjunctivitis and brown papilliform mass on the right eye that revealed squamous papilloma. Inferior forniceal tissue biopsy was sent for direct immunofluorescence, which confirmed mucous membrane pemphigoid. Due to high dropout rates with Dapsone, she was started on Mycophenolate mofetil and on close follow-up using revised MMPDAI.

**Conclusions:** Presented is a case of unilateral squamous papilloma, a life-threatening condition due to its risk of malignant degeneration in the setting of bilateral ocular cicatricial pemphigoid, a rare autoimmune disease. This is the first documented case in our institution, first to use a forniceal specimen for DIF, first to use MMPDAI for standardized patient monitoring and outcome measures, and first to be treated with Mycophenolate mofetil, with good control. There is a great interest in finding causal relation between these two distinct disease entities. A worldwide database search of major research and case study databases revealed that this will be the 4th reported case worldwide.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Boardroom 4

### Vitreous Body Change: How It Looked in Tumors?

First Author: Suklengmung **BURAGOHAIN**

Co-Author(s): Harsha **BHATTACHARJEE**, Kasturi **BHATTACHARJEE**, Dipankar **DAS**

**Purpose:** To study the vitreous body in tumor specimen and compare with non-tumor samples.

**Methods:** Five specimens were studied in the ocular pathology laboratory of the institute in tumor samples of retinoblastoma and choroidal melanoma and were compared with the specimens of a phthisical eye, Coat's disease, and staphylomatous blind eye. Direct visualization was done under a microscope, and routine and special staining were done in those samples to study tumor dissemination and macrophagic changes. The changes were noted and documented meticulously.

**Results:** Various gross and histopathological changes were observed, along with inflammation and macrophagic alteration in retinoblastoma and choroidal melanoma, and they were correlated with immunohistochemistry of the same specimen.

**Conclusions:** Tumor behavior in the vitreous body can be significant clinically and pathologically in knowing the biology and progression of intraocular tumors.

## Ophthalmic Epidemiology, Telemedicine, Big Data & AI

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: Boardroom 3

### Application of Deep Learning Image Assessment Software VeriSee for Diabetic Retinopathy Screening

First Author: Yi-Ting **HSIEH**

Co-Author(s): Chang-Hao **YANG**, Chung-May **YANG**

**Purpose:** To validate the accuracy of a deep learning image assessment software VeriSee™ in the grading of the severity of diabetic retinopathy (DR) and to compare it with the diagnosis by ophthalmologists and internal physicians.

**Methods:** Diabetic patients who had received nonmydriatic single-field 45-degree color fundus photography in the Diabetes Education Center of National Taiwan University Hospital between July 2007 and June 2017 were retrospectively recruited. A total of 7524 judgable fundus pictures were collected and were graded for the severity of DR by senior ophthalmologists. Among these pictures, 5649 of them along with another 31,612 color fundus images from the EyePACS dataset were used for model training of VeriSee. The other 1875 pictures were graded for the severity of DR by internal physicians, junior ophthalmologists, and VeriSee, respectively; the sensitivity and specificity for the diagnosis of DR were compared among them.

**Results:** The sensitivity for diagnosing any DR and the sensitivity for diagnosing proliferative diabetic retinopathy (PDR) by VeriSee (91.0% and 97.0%,

respectively) were both higher than those by internal physicians (62.1% and 20.6%) and those by junior ophthalmologists (86.9% and 89.1%). VeriSee also had good specificity for diagnosing any DR and PDR (95.5% and 94.4%, respectively) when compared to internal physicians (71.1% and 99.5%) and junior ophthalmologists (97.5% and 99.8%).

**Conclusions:** VeriSee was validated to have good sensitivity and specificity in grading the severity of DR for color fundus pictures. It might offer clinical assistance to internal physicians for screening of DR with nonmydriatic color fundus photography.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Boardroom 3**

### **Community Outreach: An Indicator for Assessment of the Prevalence of Amblyopia**

*First Author: Saurabh **DESHMUKH***

*Co-Author(s): Harsha **BHATTACHARJEE**, Krati **GUPTA**, Damaris **MAGDALENE**, Diva **MISRA**, Prabhjot Kaur **MULTANI***

**Purpose:** To study the prevalence and determine the magnitude and cause of amblyopia amongst children aged 6 months to 16 years in Kamrup district, Assam, India.

**Methods:** Of the total population of 1,517,542 in Kamrup district, there were 39,651 children who belonged to the age group 6 months to 16 years. A door to door screening of these children was conducted by trained workers. For children above 5 years of age who failed to read the 6/9 line, camps were conducted in the nearby schools. Children below 5 years of age were directly referred to the tertiary eye care institute. After visual acuity assessment at the institute, cycloplegic refraction and a complete ophthalmic examination were done to rule out other causes of diminution of vision. Axial length measurement and corneal topography were performed in children with high refractive errors.

**Results:** Of the total 39,651 children screened, 469 were diagnosed to have amblyopia at the camp and 223 were diagnosed at the institute. The prevalence of amblyopia was 1.75%. Amblyopia was more common amongst the males (52.50%) as compared to females. A maximum number of patients were found in the age group 11 - 16 (63.58%). Refractive amblyopia was found to be the most common cause of amblyopia (45.29%). In children below 5 years, deprivation amblyopia and strabismic amblyopia were more common.

**Conclusions:** Early detection and awareness of amblyopia among the parents are essential for early detection and treatment of the disease early in its course, which will, in turn, reduce the burden of childhood visual impairment.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Boardroom 3**

### **Efficacy of Trash to Treasure Retcam Among Diabetic Patients with Retinopathy**

*First Author: Prithvi **CHANDRAKANTH***

*Co-Author(s): A **SRIPAL***

**Purpose:** 1. To assess the potential to detect retinal pathology by the Trash To Treasure (T3) Retcam compared with regular dilated fundus imaging system (Canon CR 1). 2. To assess the utility as a screening tool. Diabetic retinopathy is a major public health problem with a huge economic burden. Therefore, it warrants an inexpensive screening tool for its detection. This study analyses the efficacy of the T3 Retcam as a tool for mass screening. The T3 Retcam is an innovative smartphone fundus photography device made from the used materials in the clinic so as to align the 20D lens and the phone and take good quality fundus and anterior segment photographs. It is a cost-effective, portable, convenient, and easy to make (within minutes) device that allows you to document, analyze, and share photos and videos.

**Methods:** Cross-sectional study of diabetic patients coming to the Ophthalmology OPD. Sample size: 20 patients; calculated by Buderer's formula by assuming 80 sensitivity, 5% allowable error and prevalence 15%. Diagnosis made by a senior ophthalmologist, and then retinal images from both of the devices were classified by 2 other ophthalmologists who were blinded to each other's findings. SPSS, version 24, and Cohen's kappa coefficient were used for statistical analysis.

**Results:** The sensitivity and specificity of the T3 Retcam were 88.46% and 100%, respectively.

**Conclusions:** The T3 Retcam is an inexpensive, quick, convenient, and portable device, with high sensitivity, specificity, and diagnostic accuracy. Therefore, it is a useful tool for mass screening of diabetic retinopathy and to help reduce ocular morbidity.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Boardroom 3**

### **Epidemiology of Astigmatism in Hong Kong Children and Their Parents**

*First Author: Ka Wai **KAM***

*Co-Author(s): Arnold Shau Hei **CHEE**, Chin Yeung Rex **TANG**, Jason **YAM**, Alvin **YOUNG***

**Purpose:** To determine the prevalence of astigmatism in school children and evaluate parental influences.

**Methods:** A total of 3260 school children aged 4.4 to 16.4 years and 4690 parents were recruited from a population-based study. Refractive astigmatism

was obtained using auto-refractor from children and their parents. Corneal astigmatism was obtained with partial coherence laser interferometry. Multiple logistic regression was conducted to evaluate association between astigmatism of parents and their child.

**Results:** Refractive astigmatism (RA) and corneal astigmatism (CA) were defined as  $\leq -1.0$  diopters (D) and  $\geq 1.0$  D. The prevalence of RA in children was 21.6% and higher in boys. Parents had higher prevalence of RA at 29.5%. 5.8% of children and 6.6% of parents had RA of  $\leq -2.0$  D. The prevalence of CA was 62.7% in children and 47.6% in parents. 9.8% of children and 11.8% of parents had CA of  $\geq 2.0$  D. For both RA and CA, with-the-rule astigmatism type constituted the majority, with an against-the-rule shift observed towards older parents. There was a moderate increase in the risk of astigmatism in the child if both parents were astigmats, as evidenced by a 75.2% increased odds for RA (OR = 1.752, 95% CI 1.118-2.745,  $P < 0.0132$ ) and a 120.9% increased odds for CA (OR = 2.209, 95% CI 1.569-3.108,  $P < 0.0001$ ) after adjusting for the age and sex of the child.

**Conclusions:** Refractive astigmatism is the second most common refractive error among children of Hong Kong after myopia. The risk of astigmatism in children is affected by parental astigmatism.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Boardroom 3**

### Factors Associated with Presbyopia Progression in Asians: The Singapore Epidemiology of Eye Diseases Study

*First Author: Shivani MAJITHIA*

*Co-Author(s): Miao Li CHEE, Ching-Yu CHENG, Yih-Chung THAM, Charlene WONG, Tien-Yin WONG*

**Purpose:** To investigate the factors of presbyopia progression in a multi-ethnic Asian population.

**Methods:** Participants aged 40 years and above were included from the Singapore Epidemiology Eye Disease (SEED) study. These subjects participated in both the baseline and 6-year follow-up visit of the SEED study. Standardized examinations including visual acuity measurements, subjective refraction, and lifestyle questionnaires were performed. Presbyopia progression was defined as an increment in near addition power of  $\geq +0.5$  diopters (D) from baseline to follow-up visit. Multivariable poisson regression analyses were used to determine baseline ocular and systemic factors associated with presbyopia progression.

**Results:** Among 10,033 baseline SEED participants, 6762 returned for the 6-year follow-up visit. Of which, 1547 participants (2708 eyes) had near subjective refraction data measured at both baseline and follow-

up visits. Overall, presbyopia progression rate was 0.25 D over 6 years. Malays (0.37 D over 6 years) had the highest diopter progression over 6 years, followed by Indians (0.24 D) and Chinese (0.16 D). Malays were more likely to have presbyopia progression (RR = 1.61; 95% CI 1.37 to 1.88;  $P < 0.001$ ) compared to Chinese, after adjusting for baseline age, gender, BMI, hypertension, presence of cataract, refractive error, daily hours spent on near work. Older age groups such as those aged 60 - 69 years (RR = 0.75;  $P = 0.003$ ), or 70 - 79 years (RR = 0.51;  $P < 0.001$ ), at baseline were less likely to progress in presbyopia, compared to those aged 40 - 49.

**Conclusions:** Different Asian ethnicities differ in their rate of presbyopia progression. Given that Malays had the highest presbyopia progression rate, regular near vision assessments are suggested for Malays.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Boardroom 3**

### Identification of Serum Metabolites Associated with Intraocular Pressure: The Singapore Epidemiology of Eye Diseases (SEED) Study

*First Author: Sahil THAKUR*

*Co-Author(s): Miao Li CHEE, Miao Ling CHEE, Ching-Yu CHENG, Charumathi SABANAYAGAM, Yih-Chung THAM*

**Purpose:** To identify serum metabolites associated with intraocular pressure (IOP) in an Asian population.

**Methods:** Cross-sectional data from a total of 8212 eyes from 4106 (1190 Indians and 2916 Chinese) participants was included for the analysis. Standardized bio-sample collection, systemic and ocular examination was conducted for the participants. The serum samples were analyzed using Nuclear Magnetic Resonance spectroscopy to extract information of 228 metabolites. Multivariable regression analysis was used to evaluate the association between serum metabolites and IOP, adjusting for age, gender, ethnicity, BMI, systolic blood pressure, anti-hypertensive medication, HbA1c, anti-diabetic medications, smoking status, and central corneal thickness (CCT). Eyes with IOP lowering treatment were excluded from the analysis. The change in IOP for every 1 standard deviation (SD) change in the metabolite was expressed as  $\beta$  coefficient.

**Results:** The mean (SD) age was 59.3 (9.6) years; 49.5% were females and 2.30% ( $n = 189$ ) had glaucoma. The mean IOP was 14.8 (3.2) mm Hg. Multivariable regression analysis showed that 15 serum metabolites were significantly associated with IOP. Higher levels of albumin ( $\beta = 0.26$ ,  $P = 3.79E-09$ ), alpha-1-acid glycoprotein ( $\beta = 0.19$ ,  $P = 1.33E-05$ ), lactate ( $\beta = 0.22$ ,  $P = 1.79E-06$ ), and 11 lipoprotein subclasses ( $\beta$  ranged from 0.25 to 0.19, all  $P < 2.19E-04$ ) were associated with higher IOP. Higher levels of glutamine ( $\beta = -0.18$ ,  $P$

= 1.47E-04), however, was associated with reduced IOP.

**Conclusions:** We identified serum metabolites, in particular, lipoprotein subclasses, associated with higher IOP. Our findings provide further insights into the relationship between IOP and systemic metabolic profile. Further prospective studies may confirm this association.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Boardroom 3**

### **Increasing the Size of Training Samples for Lesion-Based Diabetic Retinopathy Diagnosis**

*First Author: Sangchul **YOON***

*Co-Author(s): Hae Min **KANG**, Kangrok **OH**, Kyoung Yul **SEO**, Moi **YOUN***

**Purpose:** To investigate ways to increase the size of training samples for lesion-based diabetic retinopathy diagnosis.

**Methods:** Lesion-based classification for diabetic retinopathy (DR) diagnosis was performed based on the Convolutional Neural Networks and Maximally Stable Extremal Regions (MSER) method. The MSER provides a subsequent number of image sub-regions, which are normalized in size. The targeted lesions for diabetic retinopathy diagnosis in this work include dot microaneurysms (MA), hemorrhages and microaneurysms (HMA), and soft/hard exudates (SE and HE).

**Results:** An in-house dataset consisting of 300 DR and 50 non-DR ultra-wide fundus images are collected. Each lesion is composed of 32 x 32 pixels as a unit. For each type of lesion for DR diagnosis, more than 15,000 training samples are extracted and normalized from the 350 images. Average accuracies of 88.02%, 85.37%, 88.55%, and 92.78%, and average AUC values of 0.89, 0.92, 0.85, and 0.74 are acquired for MA, HMA, SE, and HE classification, respectively.

**Conclusions:** In this study, ways to increase the number of training samples are investigated to handle the insufficient number of training samples. The number of training samples to build lesion classifiers is increased from 350 to more than 15,000, which is around 42 times more than the initially given number of ultrawide fundus images. Our immediate future works include fusing the proposed lesion classifiers for automatic DR diagnosis using a larger size dataset.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Boardroom 3**

### **Is Kidney Function Associated with Primary Open-Angle Glaucoma? Meta-Analysis from the Asian Eye Epidemiology Consortium**

*First Author: Yih-Chung **THAM***

*Co-Author(s): Ching-Yu **CHENG**, Jost **JONAS**, Tyler Hyungtaek **RIM**, Ningli **WANG**, Ian **WONG***

**Purpose:** To comprehensively examine the association between kidney function and primary open-angle glaucoma (POAG) in 8 population-based studies across Asia.

**Methods:** The Asian Eye Epidemiology Consortium is a network of population-based studies across Asia. In all studies, POAG was defined based on the standardized International Society of Geographical and Epidemiological Ophthalmology criteria. Each study performed multiple logistic regression, following a standardized analysis protocol with estimated glomerular filtration rate (eGFR), chronic kidney disease (defined as eGFR <60 mL/min/1.73 m<sup>2</sup>) as exposures, adjusting for age, gender, hypertension, diabetes, hyperlipidaemia, body mass index, current smoking status, and IOP. The effect estimates of these exposures from each study were then pooled and summarized using random-effects meta-analysis.

**Results:** A total of 24,274 individuals from 8 population-based studies (from Singapore, India, China, and Hong Kong) were included in this meta-analysis. Among them, the mean age was 55.9 ± 12.1 years, 13,016 (53.6%) were females, 2070 (8.5%) had CKD, and 917 eyes of 627 individuals (2.6%) had POAG. After adjusting for relevant covariates, lower eGFR (per 10 mL/min/1.73 m<sup>2</sup>) was not associated with POAG [odds ratio (OR) = 1.01; 95% CI, 0.93 to 1.09; P = 0.798]. In addition, CKD was also not associated with POAG (OR = 1.14; 95% CI, 0.88 to 1.48; P = 0.329). This was similarly observed among subgroups of diabetics (P ≥ 0.736) and hypertensive individuals (P ≥ 0.423).

**Conclusions:** In this largest meta-analysis to date, we found no evidence of significant association between kidney function and POAG, which is contrary to findings reported in previous individual Asian study samples.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Boardroom 3**

### **Population Prevalence and Pattern of Retinal Diseases in Nepal: The Bhaktapur Retina Study**

*First Author: Raba **THAPA***

**Purpose:** Retinal diseases are the second leading cause

of blindness in Nepal. This study aimed to explore the prevalence and pattern of retinal diseases among the elderly population at the ages of 60 years and above residing in one of the districts in Nepal.

**Methods:** This was a population-based, cross-sectional study. A sample size of 2100 was calculated from 30 clusters in the district. Detailed history, visual acuity, anterior segment and posterior segment examinations were done.

**Results:** A total of 1860 (response rate 88.6%) subjects above the age of 60 years were enrolled. The age of the participants ranged from 60 to 95 years, with mean age of  $69.6 \pm 7.3$  years. The overall population prevalence of any retinal diseases in 1 or both eyes was 52.5% [95% confidence interval (CI): 50.06 - 54.65]. The prevalence of unilateral retinal disease was 18.8% (95% CI: 17.16 - 20.78), while bilateral disease was 33.8% (95% CI: 31.24 - 35.58). The overall population prevalence of age-related macular degeneration (AMD) was 35.4% and advanced AMD comprised of 1.7%. The prevalence of diabetic retinopathy (DR) was 23.8% among those with diabetes. The overall population prevalence of retinal vein occlusion (RVO) was 2.95%, and branch RVO comprised 2.7%. In multivariate analysis, pseudophakia and smoking had a significantly higher risk of retinal diseases.

**Conclusions:** The prevalence of retinal diseases was 52.5% at the elderly age group of 60 years and above. AMD (35.4%), followed by DR and RVO, were the most common retinal problems. Pseudophakia and smoking had a significant association with retinal diseases.

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: Boardroom 3

### Prevalence and Severity of Smartphone Addiction and Dry Eye Disease in University Students

First Author: Kendrick **SHIH**

Co-Author(s): Vishal **JHANJI**, Jimmy **LAI**, Louis **TONG**

**Purpose:** To describe the prevalence and severity of smartphone addiction and dry eye disease in university students, and to investigate the association between smartphone addiction and dry eye disease in university students.

**Methods:** A cross-sectional study was conducted on second-year undergraduate students at the Li Ka Shing Faculty of Medicine, University of Hong Kong, Hong Kong SAR. A total of 101 consecutive second-year undergraduate students were recruited. Dry eye assessment was done with the SBM Sistemi ICP Dry Eye Analyzer (Torino, Italy) to evaluate non-invasive tear break-up time (NITBUT). Ocular symptoms were evaluated via the Ocular Surface Disease Index (OSDI). We adopted the Asia Dry Eye Society's definition of

DES; having an OSDI  $\geq 13$  and NITBUT  $\leq 5$  seconds. Smartphone addiction was assessed using the Smartphone Addiction Scale- Short Version (SAS-SV). Addiction was defined as scores  $>31$  for men and  $>33$  for women.

**Results:** The prevalence of short TBUT DES was 38.7% among undergraduate university students (mean age  $19.71 \pm 1.44$  years, female 45%). Mean smartphone addiction score was  $31.35 \pm 8.26$  with 41.5% of subjects having significant smartphone addiction. Average time of smartphone use was  $5.13 \pm 3.18$  hours and average daily sleeping hours was  $6.54 \pm 1.12$ . Subjects with smartphone addiction had significantly higher OSDI scores and NITBUT times as well as shorter sleep duration than those who were deemed not addicted. There was significant inverse correlation between smartphone addiction severity and average sleep duration.

**Conclusions:** Both smartphone addiction and dry eye disease are common problems in university students.

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: Boardroom 3

### Prevalence, Risk Factors, and Vision Associated with OCT Diagnosed Epiretinal Membrane in the SEED Cohort

First Author: Kelvin **TEO**

Co-Author(s): Ning (Danny) **CHEUNG**, Yih-Chung **THAM**, Tien-Yin **WONG**

**Purpose:** This study aimed to describe the prevalence of OCT graded epiretinal membrane (ERM) in the multiracial Singapore Epidemiology of Eye Diseases cohort of 10,324 eyes (5162 individuals) and report any association with vision or specific risk factors with the presence of ERM.

**Methods:** Cross-sectional observational study analyzing a total of 10,324 eyes of individuals residing in Singapore. Comprehensive history and examinations were performed to assess potential risk factors. The presence of ERM on spectral domain OCT was defined as a corrugation of the retinal surface with a bridging hyperreflective membrane across the top of the corrugation. Cysts could also be present in the outer retinal layers.

**Results:** The age and ethnic-standardized prevalence was 7.4% for ERM. Prevalence was 13.6% in the older (60 - 80 years old) population. Significant factors associated with ERM were older age [odds ratio (OR) 1.10 per year increase;  $P < 0.01$ ], Malay and Indian ethnicity (OR 1.48;  $P < 0.01$ ; OR 1.39 vs Chinese;  $P < 0.01$  respectively), longer axial length (OR 1.42 per mm increase;  $P < 0.01$ ), and cataract surgery (OR 1.87;  $P < 0.01$ ). Poorer vision was associated with ERM in phakic eyes ( $B = 0.024$ ,  $P < 0.01$ ), but not in pseudophakic eyes

(B=0.003, P = 0.84).

**Conclusions:** The prevalence rate of ERM is comparable to other population studies when comparing similar age groups. Our findings of differences in vision association with ERM between phakic and pseudophakic eyes suggests that staging of procedures may be prudent as the removal of cataracts may be enough to improve vision without the necessity of combination surgery.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Boardroom 3**

### **Risk Factors for Severe Dry Eye Disease: Large-Scale Crowdsourced Research Using iPhone Application DryEyeRhythm**

*First Author: Takenori INOMATA*

*Co-Author(s): Keiichi FUJIMOTO, Yoshimune HIRATSUKA, Akira MURAKAMI, Masahiro NAKAMURA, Yuichi OKUMURA*

**Purpose:** To identify risk factors for severe DED using the iPhone application DryEyeRhythm.

**Methods:** We conducted an observational study from November 2016 to November 2017, to identify risk factors associated with severe DED using the iPhone application DryEyeRhythm. The study included iPhone users in Japan who downloaded DryEyeRhythm and electronically provided informed consent. DryEyeRhythm was used to assess risk factors (such as demographic characteristics, medical history, and lifestyle habits) for DED. The main outcome was the severity of DED as determined by the Ocular Surface Disease Index (OSDI) score, odds ratio of each risk factor, and cumulative odds ratio for severe DED.

**Results:** Of 18,225 users who downloaded DryEyeRhythm, 10,961 (median age, 23.0 ± 12.3 years; female, 60.8%) participants completed the demographic information and medical history survey; 5265 participants (median age, 27.2 ± 12.4 years; female, 66.5%) completed the lifestyle history survey and OSDI questionnaire; and 1600 participants (30.4%) had an OSDI score greater than 33, indicating severe DED. The fully-adjusted odds ratios (95% confidence interval) for the risk factors were as follows: age, 0.99 (0.98 – 0.99); female sex, 1.85 (1.60 – 2.14); collagen disease, 2.81 (1.34 – 5.90); depression, 1.68 (1.23 – 2.29); current use of contact lens, 1.24 (1.09 – 1.41); hay fever, 1.18 (1.04 – 1.33); extended screen time, 1.02 (1.01 – 1.03), and smoking, 1.53 (1.31 – 1.79). Presence of 3 or more risk factors was significantly associated with severe DED (P = 0.023).

**Conclusions:** The findings of our large-scale clinical study using DryEyeRhythm suggest that the above-mentioned risk factors may exacerbate the symptoms of DED.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Boardroom 3**

### **Survey of Primary Healthcare Physicians on Tele-Ophthalmology Practice in Singapore**

*First Author: Preethi JEYABAL*

**Purpose:** To assess general practitioners' (GPs') perspective towards incorporating tele-ophthalmology into primary care in Singapore.

**Methods:** This is a cross-sectional study conducted by administering written anonymized questionnaires to GPs.

**Results:** In total, 104 GPs completed the questionnaires - mean age of 54.16 ± 9.15 years and mean numbers of years in general practice is 24.22 ± 10.38 years. Our survey showed that 91.34% have not participated in telemedicine, but 87% gave a rating of 3 or above for their willingness to participate in tele-ophthalmology (1-not keen, 5-very keen). Tele-ophthalmology was felt to be useful for conditions like diabetic retinopathy (89.28%), glaucoma (57.12%), cataracts (50%), post-cataract surgery review (39.20%), external eye lesions (3.57%), and acute eye conditions (3.57%). Decrease in unnecessary specialist referrals, cost and time effectiveness, and gaining patients' trust and confidence in managing ophthalmological conditions were felt as advantages by 86%, 64%, 36%, and 28% respectively. Expensive machinery, time consuming nature, lack of human interaction, and loss of patient confidentiality were felt as disadvantages by 64%, 50%, 29%, and 21% respectively. Portability/requirement of less storage space, ease in usage, and low cost were the top 3 features expected in this equipment.

**Conclusions:** Our study showed that most GPs in Singapore do not participate in telemedicine but are willing to participate in tele-ophthalmology. We also showed the GPs' preferences in types of eye conditions to manage and the features of equipment to support tele-ophthalmology.

# Orbital and Oculoplastic Surgery

Mar 09, 2019 (Sat)  
11:00 - 12:30  
Venue: Auditorium

## A Novel Technique of Ultrasound-Guided Intralesional Injection of Bleomycin for Orbital Lymphangioma

First Author: Kirthi **KOKA**  
Co-Author(s): Bipasha **MUKHERJEE**

**Purpose:** Lymphangiomas are venolymphatic malformations causing unsightly proptosis, retrobulbar hemorrhage, and even blindness. Management of these infiltrative lesions is extremely difficult. We aimed to evaluate the efficacy of ultrasound guided intralesional bleomycin injection in the management of orbital lymphangiomas.

**Methods:** Patients presenting with deep orbital lymphangiomas from September 2015 to January 2018 were enrolled in this prospective, non-comparative, interventional study. Intralesional injection of reconstituted bleomycin (0.5 IU/kg body weight) was administered under ultrasound guidance to 22 patients. The procedure was repeated as and when required, after 4 weeks, based on clinical and imaging findings. Patients with less than 6 weeks follow-up were excluded from the study.

**Results:** The mean age of these patients was 14.40 years (range 2 – 38 years); 10 were male while 12 were female. The most common presenting symptom was prominence, followed by lid swelling and ptosis. Patients were treated with 1-4 injections of intralesional bleomycin under ultrasound guidance under general anesthesia in children or topical anesthesia in adults. The mean cumulative dose of bleomycin injected was 37.73 IU. Mean follow-up was 6.95 months. All 22 patients showed significant clinical improvement, with radiological improvement noted in 18 patients. None had any significant complications.

**Conclusions:** Ultrasonography guided intralesional bleomycin can be utilized for safe and accurate delivery of sclerotherapy into orbital lymphangioma.

Mar 09, 2019 (Sat)  
11:00 - 12:30  
Venue: Auditorium

## Age-Related Changes in Anthropometric Measurements in the Ocular Region From Childhood to Adulthood in a Han Chinese Population

First Author: Rong **LU**  
Co-Author(s): Xianxian **CAI**, Ying **CHEN**, Huan **MA**

**Purpose:** The periorcular region is the most important facial feature, and it changes with age. This study assessed the age-related changes of the periorcular morphologies in children, and young and middle-aged adults in the Chinese Han Population.

**Methods:** A total of 899 volunteers of Chinese Han ethnicity were recruited: 310 children of 7 to 10 years, 309 young adults of 20 to 30 years, and 280 middle-aged adults of 50 to 70 years of age. Two-dimensional photographs were acquired from each subject. Anthropometric measurements, including 11 linear and 3 angular parameters, were measured, and 3 indices were further derived. The presence of epicanthal fold and the eyelid morphology were also recorded. The above-mentioned parameters were compared across the 3 age groups.

**Results:** Statistical significances were found between the age groups for various parameters: palpebral fissure height and width, margin reflex distance, outer canthal width, distance from the medial end of the eyebrow to the medial canthus, distance from the midtarsal to the lower end of the eyebrow, distance from the lateral end of the brow to the lateral canthus, eyebrow height, angle of endocanthion and exocanthion, palpebrae fissure index, canthal index, and angular index ( $P < 0.05$ ). On the other hand, the distribution and prevalence of different types of eyelid creases were statistically significant between the age groups.

**Conclusions:** Age-related differences exist for periorcular parameters between children and adults, which included eye shapes, periorcular morphologies, as well as epicanthal types. Our study provided reference data for esthetic evaluation and cosmetic surgery for East-Asian ethnics.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Auditorium

### Clinoid Process as a Surrogate Landmark for Proptosis Measurement in Thyroid Eye Disease Post Decompression

First Author: Stephanie **YOUNG**

Co-Author(s): Stephanie **LANG**, Ai Peng **TAN**, Vincent **TIONG**

**Purpose:** To determine if the clinoid process (CLP) can be used as a surrogate landmark for the measurement of proptosis from computed tomography (CT) scans in thyroid eye disease (TED) patients who have undergone surgical decompression where the lateral wall has been removed.

**Methods:** Two methods of measuring proptosis were performed and correlated with clinical exophthalmometry: 1) Traditional method of using the interzygomatic (IZ) line, where a horizontal line is drawn joining the anterior zygomatic arches and perpendicular measurements are made from the line to the anterior surface of the cornea and 2) Proposed new method of using the posterior CLP, where a line is drawn from its most anterior aspect to the most anterior surface of the cornea.

**Results:** The CT scans of a total of 20 patients and 40 orbits were analyzed. Mean measurements for proptosis reduction pre and post decompression were  $1.6 \pm 1.9$  mm,  $2.1 \pm 2.0$  mm, and  $3.2 \pm 4.3$  mm for IZ method, CLP method, and clinical exophthalmometry respectively. There was good correlation between the IZ method and CLP method for proptosis measurement pre ( $P < 0.001$ ) and post ( $P = 0.002$ ) decompression (Pearson's correlation). There was also significant correlation between IZ method and clinical exophthalmometry ( $P = 0.002$ ), as well as between CLP method and clinical exophthalmometry ( $P = 0.02$ ) for proptosis measurement.

**Conclusions:** The CLP method shows good correlation to the IZ method for radiological measurement of proptosis, and to clinical exophthalmometry. It simplifies measurement by requiring only 2 objective lines, and is not subject to limitations post-surgical decompression where the lateral wall may have been removed.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Auditorium

### Congenital Nasolacrimal Duct Obstruction: A Case Series

First Author: Md. **ISLAM**

**Purpose:** To evaluate the presentations of congenital nasolacrimal duct (NLD) obstruction.

**Methods:** This was a single center observational case series study in Bangladesh. The study period was from January 2000 to December 2017. Babies brought by parents with the complaints of watering and discharge from eyes since birth and attending up to 3.5 years old were selected for the study. Those who had watery eyes with regurgitation of fluid on pressure over lacrimal sac area and having normal nasal cavity were diagnosed as patients of congenital NLD obstruction. Unilateral or bilateral NLD obstruction was studied as a single case. A total of 183 patients were included in the study.

**Results:** Among the total, 111 were male and 72 were female. Right sided NLD obstruction were 46, among them male 30 and female 16. Left sided NLD obstruction 35 were male, 19 female. Bilateral involvement was 83, where 47 were male and 36 female. According to birth issue, 1st issue was 125, where male and female were 72 and 53, respectively. In 2nd birth issue, male and female were 31 and 17, 3rd issue male and female were 4 and 2, and in 4th issue male and female were 1 and 1, respectively. Only 1 male in 6th birth issue.

**Conclusions:** There is a preponderance of congenital nasolacrimal duct obstruction among first children, and among all males outnumbered females.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Auditorium

### Correlation Between Ocular Surface Disease Index and Clinical Activity Score in Thyroid Eye Patients

First Author: Christopher **LO**

**Purpose:** The goal is to explore how thyroid eye disease (TED) symptoms relate to dry eye symptomatology. Using Clinical Activity Score (CAS) as a proxy for inflammation, we compared this to Ocular Surface Disease Index (OSDI).

**Methods:** A retrospective review at a single institute was performed on TED patients looking at CAS, OSDI, time since onset of disease, punctate epithelial erosions (PEE), chemosis, and hertels. After an exploratory analysis, the patients were divided into 2 groups based on time to follow up. Multivariate linear regressions assessed correlation of clinical variables to change in OSDI.

**Results:** Thirty-seven patients were included. A total of 33 (89.2%) patients were female. Average age was 45.9. There were 24 patients in the group with follow-up to onset of symptoms under 9 months, and 13 patients had follow-up over 9 months of onset. Using multiple linear regressions with difference in OSDI from baseline set as the dependent variable, CAS was found to be an important predictor for OSDI scores ( $P < 0.01$ ), while

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other variables (time since onset of disease, hertel, PEE, chemosis) were not significant. In the group with follow-up under 9 months from onset, every increase in CAS of 1 yielded an increase of OSDI on average 8.145 ( $P < 0.01$ ). For the patients with follow-up over 9 months, there was no significant correlation to CAS.

**Conclusions:** OSDI correlates with CAS within the first 9 months, but not over 9 months. PEE did not correlate with OSDI; TED patients may describe ocular surface irritation despite lack of clinical signs.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Auditorium**

### **Fornix Reconstruction: External Bolster vs Internal Fixation**

*First Author: Syeed* **KADIR**

*Co-Author(s): Golam* **HAIDER**, *Rajendra* **MAURYA**, *Md Harun* **RASHID**, *Sadia* **SULTANA**

**Purpose:** To assess the outcome of fornix reconstruction with external bolster or without external bolster (internal fixation).

**Methods:** This interventional study was carried out in 2 tertiary care eye hospitals in Bangladesh. All patients were enucleated previously due to various causes. Patients 11 to 60 years old were included in this study. Fornix reconstruction with external bolster was done in 20 cases and fornix reconstruction without external bolster (internal fixation) was in 20 cases. Fornix was deepened by fixing the conjunctiva with the periosteum by lower lid swinging technique in fornix reconstruction without external bolster (internal fixation).

**Results:** Most of the cases (70%) were in those below 40 years of age. The mean age was 28.64 years. The distribution of different types of contracted socket were Grade I - 7.5%, Grade II - 57.5%, Grade III - 30%, and Grade IV - 5%. External bolster causes ugly scarring (100%) on lower eyelid skin. Internal fixation provides a good cosmetic outcome in all cases. Recurrences were found in 25% of cases that were using external bolster and 15% of cases of fornix reconstruction by internal fixation.

**Conclusions:** Fornix reconstruction is a difficult surgery and the cosmetic outcome is often unsatisfactory. Fornix reconstruction with internal fixation prevention recurrence is common in young individuals and resulted in a satisfactory cosmetic outcome.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Auditorium**

### **In Vivo Periocular Tissue Response of Thai Silk Fibroin-Based Biomaterial**

*First Author: Seechompoo* **THANGSATTAYATISATHAN**

*Co-Author(s): Vannakorn* **PRUKSAKORN**, *Juthamas* **RATANAVARAPORN**, *Kasem* **RATTANAPINYOPITUK**, *Preamjit* **SAONANON**

**Purpose:** Thai silk fibroin (TSF) was evaluated for the potential value as periocular implantation biomaterial. This in vivo study focused on inflammatory response and biodegradation behavior of the TSF material.

**Methods:** Six different formulas of TSF sheets were implanted to the New Zealand White rabbits' left lower eyelids. A piece of rabbit's preserved sclera was used as a control measure and implanted to its right lower eyelid. The TSF were placed between the tarsus and lower eyelid retractor via transconjunctival approach. All rabbits were evaluated daily postoperatively. The TSF and surrounding lower eyelid tissue were harvested at 1 and 3 weeks after the implantation. The evidence of material biodegradation, inflammatory reaction, and tissue integration was microscopically evaluated.

**Results:** In gross examination, there were dense fibrovascular capsule formations around the material with no material resorption. From histological evaluation, there was no inflammatory cell infiltration and no remarkable changes of periocular tissue surrounding TSF compared with the control specimen.

**Conclusions:** Periocular implantation of TSF base biomaterial shows no tissue inflammatory response and no early implant degradation. TSF biomaterial might be a new alternative choice for the orbital reconstruction.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Auditorium**

### **Is Non-Endoscopic Endonasal Dacryocystorhinostomy (NEED Procedure) the Gold Standard?**

*First Author: Purevdorj* **BAYASGALAN**

*Co-Author(s): Yasser* **KHAN**

**Purpose:** Compare outcomes after dacryocystorhinostomies (DCRs), performed by traditional external approach (EX-DCR) or non-endoscopic endonasal approach (EN-DCR).

**Methods:** A total of 1078 consecutive cases of DCR were performed over a 14-year period with minimum 12 months of follow-up using either EX-DCR or EN-DCR. Only patients with primary nasolacrimal duct obstruction and no eyelid, lacrimal sac, or canalicular

pathology. Total of 290 EX-DCR and 788 EN-DCR patients were identified. EX-DCR was performed under sterile conditions, EN-DCR was performed with a clean setup. Silicone stents were placed for 6 weeks. Full success defined as no symptoms of tearing after surgery, and anatomical patency with fluorescein flow on nasal endoscopy or patency to lacrimal syringing. Partial success defined as tearing decrease compared with preoperative with anatomical patency, failure defined as no significant improvement in persistent tearing.

**Results:** There was no significant difference in age or gender distribution between the 2 groups. The mean operative duration was 28.5 minutes for EX-DCR and 10.2 minutes for EN-DCR ( $P = 0.0001$ ,  $t$  test). Surgical success rate was achieved in 95.1% of EX-DCRs, and 96.4% of EN-DCRs. The failure rate was 0.05% for EX-DCR, 0.03% for EN-DCR. There was no statistical significance between these outcomes with two-sample test for equality of proportions with continuity correction ( $P = 0.75$ ). Average follow-up time was 10.5 months in EN-DCR, 11.4 months in EX-DCR.

**Conclusions:** Surgical scarring on the face and disrupted anatomy in the medial canthal area following EX-DCR can be avoided by endonasal approach. The EN-DCR approach is more rapid than a traditional external approach, has an equivalent surgical success rate, and is preferred by patients who had alternative techniques performed on opposite sides.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Auditorium**

### Orbital Implant Migration: Are We Thinking Correctly?

*First Author: Tarjani DAVE*

**Purpose:** To demonstrate a novel method for correcting implant migration post-evisceration or enucleation.

**Methods:** Prospective review of 6 orbits operated on for inferotemporal implant migration, leading to a prosthesis tilt, between January 2014 and December 2016. All patients were treated using 3D printing technology to fabricate a customized implant. This implant was designed to sit in the basin of the inferior orbital fissure and push the migrated implant centrally.

**Results:** Mean age was 30.2 years (18 - 45 years). Mean diameter of the pre-existing migrated implant was 16.8 mm on radiology. The mean volume of the customized orbital implant was  $2.8 \text{ cm}^3$ . Postoperative centralization of migrated implant was seen in 100% of patients. At a mean follow-up of 1.2 years, there were no cases of implant extrusion.

**Conclusions:** Customized orbital implants, using 3D printing technology, offer a novel and cost-effective way to correct the implant migration, especially in

patients with fibrosis in the orbit.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Auditorium**

### Outcomes of Low-Dose Intravenous Methylprednisolone Pulse Therapy and Immunomodulation in Orbital Inflammatory Disorders

*First Author: Ankita AISHWARYA*

*Co-Author(s): Santosh HONAVAR, Abhilasha MAHESHWARI, Kaustubh MULAY, Raksha RAO, Sameeksha TADEPALLI*

**Purpose:** To report the outcomes of low-dose intravenous Methyl Prednisolone (IVMP) pulse therapy and immunomodulation in orbital inflammatory disorders (OID).

**Methods:** Retrospective cohort of 129 consecutive patients with OID who received low-dose three-weekly pulsed IVMP X 6 (4 gram) with or without oral azathioprine or mycophenolate mofetil for 6 months.

**Results:** Mean age was  $40.89 \pm 16.34$  years. Fifty-one (39.53%) cases had diffuse OID, 40 (31.00%) had dacryoadenitis, 22 (17.05%) had myositis, 9 (6.97%) were anterior OID, and 7 (5.42%) had perineuritis. Biopsy was performed to confirm the diagnosis in 65 (50.38%) cases. Twenty-eight (21.70%) patients had IgG4-related disease and 14 (10.85%) had concurrent systemic collagen-vascular disease. Immunomodulation was required in 80 (62.51%) cases. At a mean follow-up of 15.1 months, proptosis improved ( $<2$  mm difference between 2 eyes) in 52 (65.8%) of 79, tear function improved in 21 (75%) of 28, diplopia resolved in 33 (75%) of 44, ptosis resolved in 52 (96.3%) of 56, and complete resolution of the mass occurred in 74 (69.8%) of 106 cases. Remission at the last follow-up was achieved in 119 (92.24%) overall, and in 44 (86.27%) of diffuse OID, 39 (97.5%) of dacryoadenitis, 20 (90.90%) of myositis, 7 (100%) of perineuritis, and 9 (100%) of anterior OID. Thirteen (9.9%) patients had recurrence. No adverse systemic event was encountered.

**Conclusions:** Low-dose IVMP pulse therapy with immunomodulation is safe and effective in controlling OID.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Auditorium**

### Perioperative Adjustment of Levator Surgery in Neurofibromatosis-Induced Ptosis

*First Author: Golam HAIDER*

*Co-Author(s): Sharmin AHMED, Md. Ismail HOSSAIN, Hasan JAWAD, Syeed KADIR, Mukti MITRA*

**Purpose:** To assess the functional as well as the result

of LPS resection in neurofibromatosis-induced ptosis.

**Methods:** This prospective study was done in tertiary eye care center, Bangladesh, from January 2007 to May 2017. Preoperative assessment was done to give special attention on size and site of the lesion, LPS function, and associated any systemic associations. CT scan or MRI of orbit to see extension. LPS resection and reattachment was the mainstay of surgery in mild (lateral drooping), moderate (orbito-palpebral or orbito-temporal) and severe ptosis (orbito-palpebral and orbito-temporal).

**Results:** In my study, total patients were 44, mean age was  $19.34 \pm 10.45$  years (range of 10-50 years.), male 54%, and female 46%. Among all patients there was mild ptosis (lateral drooping) 27.08%, moderate ptosis (orbito-palpebral or orbito-temporal) 29.16%, and severe ptosis (orbito-palpebral and orbito-temporal) 43.75%. After surgery, outcome was poor (9.10%), fair (50%), and satisfactory (40.90%), but there was variable in recurrence rate, more in younger age group, age 10 - 20 years, 25% age, 21-30 years, 8.33%, and after 31 years there was no recurrence.

**Conclusions:** LPS resection is a good surgical option in all types of orbito-palpebral or orbito-temporal neurofibromatosis. Meticulous surgical procedure, accurate identification, justified resection and reattachment of LPS is essential for a fruitful cosmetic outcome.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Auditorium**

### **Surgical Outcome of Navigation-Guided Transcaruncular Orbital Optic Canal Decompression in Direct and Indirect Traumatic Optic Neuropathy**

*First Author: Kasturi BHATTACHARJEE*

*Co-Author(s): Harsha BHATTACHARJEE, Deepika KAPOOR, Samir SERASIYA*

**Purpose:** No definite guidelines are available in the literature for optimum management of traumatic optic neuropathy (TON). This study was undertaken to analyze the outcome of a minimally invasive surgical approach in TON under navigation guidance. Purpose: To report the outcome of navigation-guided transcaruncular orbital optic canal decompression (NGTOCD) in TON.

**Methods:** This was a prospective study of 21 eyes of 21 patients having TON and unresponsive to systemic steroids with post-injury lag time of 48 hours to 6 weeks. Following complete ophthalmic and systemic examinations, all patients had undergone stereotactic NGTOCD performed using CT, MRI, and MRA as intraoperative image-guiding tools. All surgeries were done under general anesthesia. Mean follow-up was 6

months.

**Results:** A total of 16 eyes had Direct TON due to fracture of the optic canal with bony impingement of the nerve and 5 eyes had indirect TON. Preoperative vision was  $<20/200$  ( $n = 5$ ) and absent light perception (LP) in 16 eyes. At 6th postoperative month vision was LP ( $n = 3$ ),  $\leq 20/100$  ( $n = 9$ ) and  $\geq 20/80$  ( $n = 6$ ). Three eyes remained absent LP with lag time of  $>4$  weeks from injury. Mean visual evoked potential amplitude was  $2.06 \pm 1.99 \mu V$  preoperative and  $3.87 \pm 1.47 \mu V$  postoperative ( $P = 0.002$ ) with significant improvement in latency. Significant changes recorded in the optical coherence tomography of retinal nerve fiber layer ( $P = 0.01$ ) in the study period. Color vision was recovered in 5 cases.

**Conclusions:** NGTOCD has provided precise surgical access and intraoperative guidance in TON and surgical optic canal decompression has a potential role in TON management with an excellent outcome.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Auditorium**

### **Volumetric Analysis of Extraocular Muscles in Thyroid Eye Disease**

*First Author: Stephanie YOUNG*

*Co-Author(s): Stephanie LANG, Sophia SEEN, Gangadhara SUNDAR*

**Purpose:** To analyze the volumes of extraocular muscles (EOMs) in thyroid eye disease (TED) patients and determine their relative involvement in the disease process.

**Methods:** Volumetric analysis of 1 mm thick computed tomography (CT) scans of 37 TED patients and 37 age, gender, and race matched controls were performed. Three-dimensional (3D) reconstruction of 4 EOMs [inferior rectus (IR), medial rectus (MR), superior rectus-levator palpebral superioris complex (SR-LPS), and lateral rectus (LR)] was carried out using Syngo.via (Siemens, Germany) for volume calculation. The 95% confidence interval of volumes in the control group was taken to be the normal range.

**Results:** A total of 74 patients and 148 orbits were included in the analysis. Mean volumes of all EOMs (IR, MR, SR-LPS and LR) in patients with TED were significantly larger than that of the control population (mean volume =  $2.24 \text{ cm}^3$ ,  $1.97 \text{ cm}^3$ ,  $1.67 \text{ cm}^3$ , and  $1.55 \text{ cm}^3$  respectively) ( $P < 0.01$ ). On average, the volume of the IR was larger in TED patients by 88%, while the MR and SR-LPS was larger by 78% and 72% respectively when compared to controls ( $P = 0.02$ ). However, a greater majority of orbits had enlargement of the MR ( $n = 71$ , 96%) and SR-LPS and IR enlargement affected the same number of orbits ( $n = 66$ , 89%). LR was the least affected muscle in TED. Most patients had multiple EOMs being enlarged.

**Conclusions:** Previous methods of measurements of EOMs understate the involvement of individual EOMs in TED. Our study shows that MR and SR-LPS may be more commonly affected than previously thought.

## Pediatric Ophthalmology & Strabismus

Mar 07, 2019 (Thu)

16:30 - 18:00

Venue: Boardroom 2

### A Novel Algorithm to Predict the Development of Retinopathy of Prematurity in Hong Kong

*First Author: Connie LAI*

*Co-Author(s): Michelle FAN, Lawrence IU*

**Purpose:** To develop a predictive score (HKROP-score) to identify which babies are at risk in developing Retinopathy of Prematurity.

**Methods:** All data of premature infants of <32 weeks gestational age (GA) and <1500 grams body weight (BW) born between 2012 and 2017 were retrospectively analyzed. A predictive score was developed using linear regression analysis, GA at birth, and BW as predictor variables. Receiver operating characteristic analysis was used to identify the sensitivity and specificity of the predictive score.

**Results:** A total of 507 infants were analyzed. The mean GA was 29 weeks and 6 days  $\pm$  18 days. The mean BW was 1235  $\pm$  349 grams. The HKROP-score was formulated via an equation  $1709 - 7.29 \text{ grams} \times \text{GA (days)} - 0.33 \times \text{BW (grams)}$  taken from area under receiver operating curve (AUC). The best cutoff score of -103 (sensitivity = 83%, specificity = 84.4%) to predict ROP development was derived. Premature infant with this score was significantly more likely to develop ROP (Chi square test,  $P < 0.001$ ).

**Conclusions:** The HKROP score can potentially be a useful tool to predict ROP development rates in premature infants with high sensitivity and specificity. Further prospective studies can potentially improve on the derived formula and improve its efficacy in future practice.

Mar 07, 2019 (Thu)

16:30 - 18:00

Venue: Boardroom 2

### Clinical Research on Common Pediatric Eye Diseases Presenting with Inner Canthus Mass

*First Author: Wen LIU*

*Co-Author(s): Chengyue ZHANG*

**Purpose:** To explore the pathogenesis of the common pediatric eye diseases presenting with inner canthus mass and to provide new ways for their treatment.

**Methods:** A retrospective analysis of the clinical examination, diagnosis, and treatment of 28 children who were admitted to the ophthalmology department of Beijing Children's Hospital from June 2012 to June 2018 with the chief complaint of inner canthus mass.

**Results:** According to the clinical manifestations, signs, and examination results, 6 cases were diagnosed as dermoid cysts, and the surgery was performed under general anesthesia. Four cases were diagnosed as hemangioma and treated with oral administration of propranolol. Twelve cases were diagnosed as congenital dacryocystocele, of which 4 cases received conservative treatment, and 8 cases were subjected to further nasolacrimal duct surgery after secondary acute dacryocystitis. Three cases were diagnosed as lacrimal sac diverticulum, which were removed with excision under general anesthesia.

**Conclusions:** The pathogenesis of inner canthus mass in children is varied, including dermoid cysts, hemangioma, congenital dacryocystocele, and lacrimal sac diverticulum. The diagnosis should be made based on the symptoms, signs, clinical manifestation, and imageological examinations of the patients, and then the effective treatment can be performed.

Mar 07, 2019 (Thu)

16:30 - 18:00

Venue: Boardroom 2

### Comparison of Myopia Progression in New and Established Myopia Control Treatment (MiSight) Groups

*First Author: Cheryl NGO*

*Co-Author(s): Paul CHAMBERLAIN, Debbie JONES, Nicola LOGAN, Graeme YOUNG*

**Purpose:** To evaluate myopia progression in children new to MiSight 1 Day (M1D) contact lenses, compared to an established M1D wearing group.

**Methods:** Following completion of a 3-year trial (Part 1) to assess the efficacy of M1D, existing wearers of Proclear 1 Day (P1D,  $n = 52$ ) were fitted to M1D (Part 2). The existing M1D wearer group ( $n = 56$ ) continued with M1D. The age range of both groups was 11 - 14 years at baseline. Cycloplegic autorefraction (SERE) and axial

length (AL) were measured at baseline, and then at yearly intervals. A linear mixed model (LMM) was used to compare the adjusted change in SERE and AL.

**Results:** After the 12-month visit, 100 subjects (51 P1D-M1D; 49 M1D-M1D) were analyzed. The estimated mean change from Part 2 Baseline to the 12-month visit for SERE was -0.17 diopters (D) (95% CI -0.11 to -0.22) and -0.12 D (95% CI -0.06 to -0.18) for the previous M1D and previous P1D wearers, respectively. Change in AL was 0.07 mm (95% CI 0.05 to 0.10) and 0.06 mm (95% CI 0.03 to 0.08), respectively. There were no significant differences between groups for change in SERE and AL over this 12-month period ( $P = 0.25$  and  $P = 0.35$ , respectively). There was a significant reduction in myopic progression for the previous P1D group between Part 1 and Part 2 (SERE, AL both  $P < 0.0001$ ).

**Conclusions:** There was no significant difference in myopia progression rates for 2 demographically matched populations in their first versus fourth years of MiSight lens wear.

Mar 07, 2019 (Thu)

16:30 - 18:00

Venue: Boardroom 2

### Computed Tomography for Guidance in the Diagnosis and Surgical Correction of Recurrent Dacryocystitis in Children

First Author: Chengyue **ZHANG**

**Purpose:** To identify the pathogenesis of recurrent pediatric acute dacryocystitis (PAD), and to guide management with computed tomography.

**Methods:** The medical histories, clinical manifestations, and computed tomography (CT) results of 10 children with recurrent acute dacryocystitis were retrospectively reviewed. The etiologies and treatment efficiencies were recorded.

**Results:** CT revealed 3 cases of congenital dacryocystocele with lacrimal sac cyst, enlargement of the nasolacrimal canal, and intranasal cyst of the affected sides. CT disclosed 4 cases of secondary to congenital nasolacrimal canal dysplasia with normal upper portions of the nasolacrimal canals, but stenotic or even atretic middle and terminal segments. The remaining 3 cases were secondary to congenital lacrimal sac diverticulum, and after contrast injection CT showed that the cysts at the lacrimal sac area were full of contrast, with connection to the normal lacrimal sac.

**Conclusions:** The causes of PAD can also be congenital dacryocystocele, congenital lacrimal sac diverticulum, or congenital nasolacrimal canal dysplasia. Marsupialization with endoscope, endonasal dacryocystorhinostomy, and transcutaneous dacryocystorhinostomy are all the applicable surgeries

for PAD. Computed tomography is a very important examination in diagnosis and directing therapy for children with acute dacryocystitis.

Mar 07, 2019 (Thu)

16:30 - 18:00

Venue: Boardroom 2

### Effectiveness of Using a Nonabsorbable Suture for Tendon Lengthening in Brown Syndrome

First Author: Shilpa **RAO**

Co-Author(s): Sandra **CHANDRAMOULI**

**Purpose:** To study the effectiveness of superior oblique (SO) tendon lengthening with nonabsorbable suture (chicken suture) to improve superior oblique action in Brown syndrome.

**Methods:** Medical records of 8 consecutive patients having undergone surgical correction (SO tendon lengthening) for Brown syndrome over a period of 3 years were studied retrospectively. Documentation of demographic data, visual acuity, anomalous head posture (AHP), preoperative and postoperative ocular motility detailing grade of SO underaction, vertical deviation in primary position, and fundus evaluation was carried out. Surgical procedure involved the use of a nonabsorbable suture (5-0 polyester) to achieve a lengthening of 4 - 8 mm depending on severity at presentation. At the end of the procedure, loosening of SO tendon was confirmed by forced duction testing (FDT).

**Results:** Eight patients (5 males), aged 5 to 16 years, were followed up for a mean period of 11.5 months (range 2 to 28 months). Mean SO action (elevation in adduction) improved from -3.88 (0.35) to -0.8 (1.36). All patients reported improvement in AHP and satisfaction with cosmesis. Two patients developed overcorrection of vertical deviation with diplopia in primary position, one of whom reported improvement after corrective surgery (inferior oblique anteriorization), while the other was lost to follow-up.

**Conclusions:** The use of nonabsorbable sutures (chicken suture) is safe and effective for tendon lengthening in cases of Brown syndrome requiring surgery. Compared to silicone band expansion, this method is simpler, reversible, and avoids risk of extrusion.

Mar 07, 2019 (Thu)  
16:30 - 18:00  
Venue: Boardroom 2

## Optic Nerve Head Morphology Changes Over Time in Premature Infants

First Author: Samantha **SIMKIN**

Co-Author(s): Shuan **DAI**

**Purpose:** Optic nerve head morphology is an important indicator for the presence of optic nerve hypoplasia and other optic nerve diseases. Premature infants have an increased incidence of double ring sign and more vertically oval discs than full-term counterparts. This study aimed to determine if premature infant optic nerve head morphology changes over time.

**Methods:** Digital fundus images of preterm children who had been screened for retinopathy of prematurity (ROP) were compared across 3 time points; first ROP examination, final ROP examination, and follow-up at 5 to 8 years of age. Pixel measurements of the optic nerve were used to determine the optic disc horizontal to vertical diameter ratio (H/V) and the disc-macula to disc-diameter ratio (DM/DD). Presence of a double ring sign was also noted.

**Results:** Images of 69 preterm children (mean gestational age 27.5 weeks) were included. At first screening, 40% of infants had a double ring sign, while at long-term follow-up no child had a double ring sign. Preterm infants had a mean  $\pm$  SD H/V on first examination of  $0.76 \pm 0.06$ , increasing to  $0.81 \pm 0.05$ , and then to  $0.87 \pm 0.09$  at follow-up. DM/DD decreased over time from  $3.3 \pm 0.3$  at final ROP examination to  $2.4 \pm 0.4$  at follow-up.

**Conclusions:** Optic nerve head morphology continues to develop overtime in children born prematurely, with a decrease in ovality and double ring sign. These differences in optic nerve morphology are important to be aware of if optic nerve hypoplasia or other optic nerve diseases are suspected in a premature infant.

Mar 07, 2019 (Thu)  
16:30 - 18:00  
Venue: Boardroom 2

## Refractive Outcome in Preterm Neonate with Severe Retinopathy of Prematurity Following Treatment with Retinal Laser Photocoagulation and Intravitreal Ranibizumab Injection Compared to Usage of Only Laser Photocoagulation

First Author: Rudra **GHOSH**

Co-Author(s): Soumya **CHATTOPADHYAY**, Parthapratim **DATTA**, Poushali **SEN**

**Purpose:** To prevent dreadful sequel of severe myopia like retinal detachment, myopic foveoschisis, macular

hole, choroidal thinning, neovascularisation, glaucoma.

**Methods:** This research topic was designed as a retrospective cohort study done for 6 months with sample size of 120, with gestational age of less than 37 weeks and birth weight less than 2.5 kilograms with no history of central nervous system or cardiovascular ailments. The study technique includes history-taking, clinical examination, relevant investigations, laser photocoagulation, and administration of Ranibizumab intravitreal injection and follow-up for 6 months based on indirect ophthalmoscopic finding and cycloplegic refraction.

**Results:** In 6 months follow-up in 60 patients belonging to non-exposed group had either normal regression of retinopathy of prematurity or development of hypermetropia or no refractive error in normal patients. Thirty patients who had severe retinopathy of prematurity and treated with laser photocoagulation developed severe degree of myopia with astigmatism (commonly against the rule) and anisometropia. Remaining 30 patients with severe retinopathy of prematurity treated with laser photocoagulation and intravitreal Ranibizumab developed comparatively lesser degree of myopia with astigmatism and anisometropia.

**Conclusions:** The conclusion of this research is severe retinopathy of prematurity treated with laser photocoagulation and intravitreal Ranibizumab injection develops lesser degree of myopia with astigmatism and anisometropia compared to treatment with only laser photocoagulation.

Mar 07, 2019 (Thu)  
16:30 - 18:00  
Venue: Boardroom 2

## Retrospective Study of Trends in Contact Lens Prescribing in Pediatric Aphakes

First Author: Thandalam **SURENDRAN**

**Purpose:** To determine the prescribing trend in pediatric aphakes and the visual improvement with contact lenses in a tertiary eye care center.

**Methods:** Medical records of about 459 pediatric patients (age 0 - 15 years) who reported to contact lens clinic over a period of 1 year were reviewed retrospectively. A total of 203 aphakic eyes of 189 patients were included in the study.

**Results:** The mean age ( $n = 203$ ) was  $8.31 \pm 4.76$  years. Patching was advised for 71 patients (age group: 1 month to 12 years), and the number of patching hours advised ranged from 30 minutes - 6 hours. Of the new fits prescribed, 134 were Rigid Gas Permeable (RGP) and 69 were soft contact lenses (SCL), which included 4 prosthetic type C lenses and 3 Senofilcon A lenses. Refits were 68 RGP lenses and 22 SCL. Comparison of the parameters of RGP lens

prescribed in the presenting visit and the first visit (n = 73) showed a statistically significant change in the power and diameter of the lens ( $P = 0.0001$ ,  $P = 0.016$ ). Quantifiable vision recorded in both presenting and first visits (n = 53) were analyzed. The mean vision with contact lenses in presenting and first visit was  $0.48 \pm 0.42$  log units and  $0.61 \pm 0.41$  log units respectively. There was a statistically significant difference between both these visits ( $P = 0.012$ ).

**Conclusions:** Good visual prognosis is achieved with contact lens in the pediatric aphakes although fitting could be challenging. This study showed that the majority of RGP lenses were prescribed and successful in the age group lesser than 5 years of age at our center.

Mar 07, 2019 (Thu)

16:30 - 18:00

Venue: Boardroom 2

### Single Sweep Retinoscopy: Preschool Eye Screening Made Easy

*First Author:* Lakshmi **SREEDHARAMURTHY**  
*Co-Author(s):* Deepti **JOSHI**, Anjana Kuri **KURI**, Krishnaprasad **R**

**Purpose:** To evaluate the feasibility of single sweep retinoscopy as an eye screening modality in preschool children (3-6 years).

**Methods:** Students aged 3-6 years (anganwadi going) were screened. Kids with other eye pathologies interfering with red reflex were excluded. An optometrist performed single sweep retinoscopy in both meridia and divided them as 'against' reflex (myopia) group and 'dull with' reflex (hypermetropia >5 D) group. These children were shifted to the base hospital and the refractive errors were cross-verified with automated refraction (AR) and cycloplegic refraction. The time taken for SSR and AR per child was noted and compared.

**Results:** Of the total 10,121 children, 85 (0.84%) showed 'against' reflex, of which 80 (94.11%) were confirmed as myopes of >1 diopter (D),  $P = 0.004$ . A total of 74 (0.73%) eyes showed 'dull with' reflex, of which 72 (97.29%) were hyperopes requiring spectacles. Single sweep retinoscopy has a sensitivity of 95.41% accuracy of 96.48%, and positive predictive value of 92.36% in screening refractive errors. Average time taken per child to determine refractive error by AR was  $65 \pm 10$  sec, and that by SSR was  $9 \pm 3$  sec, and this difference was statistically significant ( $P < 0.001$ ).

**Conclusions:** In developing countries, where preschool (anganwadi) screening for refractive error is held regularly, using AR is cumbersome, expensive, and tiring for trained ophthalmic personnel. Hence, in preschool children where high hypermetropia and myopia are amblyogenic, SSR is an economic, easy, and quick method to identify those who need further

evaluation.

Mar 07, 2019 (Thu)

16:30 - 18:00

Venue: Boardroom 2

### Strabismus and Depression: A Systematic Review and Meta-Analysis

*First Author:* Wing Yan Rachel **TSUI**

*Co-Author(s):* Chi Lik **AU**, Simon **KO**, Jason **YAM**

**Purpose:** Strabismus is a common ophthalmological disorder in children, with the prevalence in some studies estimated to be 6%. It is also estimated that 4% of the adult population have persistent strabismus since childhood. Strabismus can cause substantial physical and functional impairments, such as changes to facial appearance and visual impairment affecting daily activities. These impairments can affect self-esteem and impact upon societal participation of patients, thereby contributing to their psychological distress. This study aimed to evaluate the association of strabismus with depression, in both children and adult patients.

**Methods:** A systematic review and meta-analysis of studies that reported the prevalence, and/or severity grading of depression in strabismus patients and healthy controls was performed. We performed the literature search for relevant studies in MEDLINE, EMBASE via the OVID platform, PsycINFO via the ProQuest platform, ClinicalTrials.gov, and World Health Organization International Clinical Trials Registry Platform.

**Results:** Eighteen eligible studies involving both child and adult strabismic patients were analyzed. A total of 5 studies involving 424 child strabismic patients were included in the systematic review and meta-analysis. There was a statistically significant association between strabismus and an increased prevalence of depression [summary odds ratio (OR) = 2.51, 95% CI: 1.007-6.241,  $P = 0.048$ ]. The depression score was also higher in strabismus patients than in controls (mean = 23.29 vs 19.13 in controls).

**Conclusions:** Depression is both more prevalent and severe in child strabismic patients than in controls. Further systematic and meta-analysis on the remaining thirteen studies involving 1835 adult strabismic patients will be performed.

Mar 07, 2019 (Thu)  
16:30 - 18:00  
Venue: Boardroom 2

### Synergistic Divergence with Vertical Vectors, Absent Kidney, and Cryptorchidism: A Novel Congenital Cranial Dysinnervation Disorder Betraying Footprints of Atavistic Dorsal Light Reflex

First Author: Divya **KISHORE**  
Co-Author(s): Mainak **BHATTACHARYYA**, Annu **JOON**,  
Ipsita **MUNI**, Pramod Kumar **PANDEY**

**Purpose:** To report a case of synergistic divergence (SD) with vertical vectors, absent kidney, and cryptorchidism.

**Methods:** An 8-year-old child underwent a full systemic and ophthalmological evaluation for striking aberrant motility. An MRI brain and orbit along with USG abdomen and KUB was also done.

**Results:** On levoversion, SD with synergistic upshoot of right eye occurred, on attempted upgaze right eye synkinetically elevated to primary position, adducted to a large esotropic position, and then slightly depressed with no pupillary constriction/convergence retraction nystagmus, adduction was maximum on straight upgaze. On attempted downgaze, there was synergistic elevation and abduction of right eye that was maximum in levodepression. There was an A pattern, no dynamic globe retraction, no ptosis, convergence was absent in right eye and weak in left eye. Right fundus was intorted, gaze evoked grade 4 extorsion occurred on attempted upgaze. Left fundus torsion was normal, upgaze induced torsional changes could not be documented in left eye. Gaze evoked horizontal jerk nystagmus was noted on dextroversion. On levoversion, a torsional nystagmus with a see saw exponential was noted. MRI brain and orbits revealed a hypoplastic right MR. Left renal agenesis was noted on abdominal ultrasound, and on physical examination right undescended testis was noted.

**Conclusions:** This case showcases that simultaneous involvement of 3rd, 4th, and 6th nerve nuclei and nerves can take place in CCDDS, creating bizarre presentations. Paradoxical gaze-induced extorsion, synergistic vertical divergence, gaze-induced horizontal jerk, and torsional nystagmus are novel features in this case and are difficult to conceptualize.

Mar 07, 2019 (Thu)  
16:30 - 18:00  
Venue: Boardroom 2

### The Current Picture of Cerebral Visual Impairment in New Zealand

First Author: Samantha **SIMKIN**  
Co-Author(s): Shuan **DAI**

**Purpose:** Cerebral visual impairment (CVI) is the leading cause of visual impairment in developed countries. CVI can range from mild visual impairment to blindness. CVI is caused by retro-chiasmic pathway pathology and thus comorbidities are common. This study aimed to determine the current incidence and etiological causes of CVI in New Zealand.

**Methods:** This cross-sectional review study was undertaken at the Blind and Low Vision Education Network New Zealand (BLENNZ), a national support service for all children in New Zealand with vision  $\leq$  6/18. Individuals included had to have a confirmed diagnosis of CVI. Data collected included demographic data, vision, underlying etiology, and the presence of associated comorbidities, which included hearing loss, physical handicap, epilepsy, and developmental delay.

**Results:** A total of 225 children (60% male) were identified to have CVI. Etiological causes were 27.6% unknown, 24.4% hypoxia/asphyxia, 11.6% trauma from non-accidental injury, with infective, genetic, and prematurity factors comprising the remainder. Visual function was 6/18-6/60 in 28.0% of children. Almost 30% of children had fixing and following vision, whilst 16.0% had no measurable vision. A comorbidity was present in 91.1% of children, comprised of 6.7% hearing loss, 55.1% physical handicap, 51.6% epilepsy, and 88.9% developmental delay.

**Conclusions:** CVI is the leading cause of pediatric visual impairment in New Zealand. The majority of children affected by CVI have 1 or more comorbidities, with the preponderance being developmental delay. Etiological causes vary, but a large number are considered avoidable. Thus, further research to prevent or intervene in such cases is needed.

Mar 09, 2019 (Sat)  
11:00 - 12:30  
Venue: C Ground Meeting Room 2

### Electroretinography, a Reliable Tool in the Exclusion Criteria for Amblyopia

First Author: Krati **GUPTA**  
Co-Author(s): Harsha **BHATTACHARJEE**, Saurabh **DESHMUKH**, Damaris **MAGDALENE**, Diva **MISRA**

**Purpose:** To establish if a retinal pathology coexists with the established cortical pathology in amblyopic patients not responding to conventional patching therapy by reviewing the electroretinographic (ERG)

findings in these cases.

**Methods:** A total of 316 children diagnosed with refractive amblyopia were given occlusion therapy after exclusion of unilateral and bilateral amblyogenic factors. The patients unresponsive to occlusion therapy were subjected to ERG once they were able to perform the test.

**Results:** Of the total 316 children, 17 patients did not improve with occlusion therapy. There were 16 males and 1 female with a visual acuity of 6/36 to 6/12 who did not improve following occlusion therapy, which lasted from 6 months to 10 years. The ERG was flat in 12 cases, reduced in 2 cases and scotopic flat in 3 cases. Three of the children who were on long-term follow-up developed changes in the retina over a period of time (above 12 years).

**Conclusions:** Refractive amblyopia without any other amblyogenic factors like nystagmus usually improves with glasses and occlusion therapy. Although the loss of visual acuity in amblyopia is considered to be cortical in origin, it remains unclear whether the retina is also affected in patients with amblyopia. A conventional ERG in cases which did not improve following occlusion therapy points that there could be a retinal pathology causing amblyopia, which cannot be detected clinically. So, conventional ERG should be performed when there is no improvement in vision following occlusion therapy in patients with no other amblyogenic factors.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: C Ground Meeting Room 2**

### **Evaluation of the Therapeutic Effect of Patching in Intermittent Exotropia**

*First Author: Rimsha SAROSH*

*Co-Author(s): Rashid OMAR*

**Purpose:** To assess the therapeutic significance of patching in patients of intermittent exotropia in relation to control of deviation, absolute measurements, and stereopsis.

**Methods:** This prospective study was carried out in the Squint and Pediatric ophthalmology clinic of a tertiary care hospital. Seventeen patients underwent patching of the dominant eye or alternate occlusion in case no preference was seen, for a duration of 6 hours / day. Objective prism cover test measurements, stereopsis evaluation, and 3 point control of deviation scoring were done before and after the 6 months duration. Paired samples *t* test and Stuart-Maxwell marginal homogeneity test were employed for analysis.

**Results:** The mean near and distance deviation was  $20.35 \pm 4.663$  SD and  $21.18 \pm 6.885$  SD improving to  $13.82 \pm 5.065$  SD and  $19.49 \pm 5.478$  SD respectively ( $P < 0.001$ ). Angle of strabismus showed a positive trend and decline for near as well as distance measurements

with conversion of exotropia subtypes into pseudo divergence excess. Improvement in stereopsis was noted with fine stereopsis of 60 sec seen in 14 patients (82.35%) post-patching as against 9 patients (52.94%) before starting the treatment ( $P = 0.03$ ). Control grading showed a significant improvement, with 11 patients (64.70%) attaining a score of 1, whereas before the start of patching the majority (ie, 10 patients, 58.82%) had a control score of 3 ( $P = 0.004$ ).

**Conclusions:** Patching induces improvement in degree of control, stereopsis, and reduction in angle of deviation.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: C Ground Meeting Room 2**

### **Inferior Oblique Muscle Adherence Following Unilateral Inferior Oblique Anteriorization**

*First Author: Shilpa RAO*

*Co-Author(s): Sandra CHANDRAMOULI, Aashish DHAGE*

**Purpose:** To report a case of inferior oblique (IO) muscle adherence with fat adherence, which developed following unilateral IO anteriorization (IOAT).

**Methods:** A 14-year-old child with developmental delay and no prior trauma or surgery, having V pattern left exotropia, bilateral IO overaction, bilateral dissociated vertical deviation (DVD), and strabismic amblyopia (OS) underwent recess/resect procedure [recession of left lateral rectus (LLR) by 8 mm and resection of left medial rectus (LMR) by 4 mm], along with IOAT. He developed consecutive esotropia and pseudoptosis with marked limitation of levoelevation (-4). Differential diagnoses of antielevation syndrome and adherence syndrome were considered. On surgical exploration, forced duction test (FDT) was positive for elevation. LIO muscle insertion was found 3 mm anterior to the inferior rectus (IR) insertion. Fat adhesions to LIO near inferior fornix were released, and then it was reattached 3 mm behind and 2 mm lateral to IR insertion. LLR, previously recessed by 8 mm, was advanced by 3 mm, thereby creating a net LR recession of 5 mm.

**Results:** Following resurgery the patient had 6 prisms left esophoria and a hypotropia 9 prisms, with minimal limitation of levoelevation (-1). One month later, it was seen that the hypotropia had increased to 18 prism diopters and limitation of elevation was -2.

**Conclusions:** Adherence syndrome is a rare and severe complication of IO weakening procedures. The initial postoperative improvement achieved in elevation and hypotropia in primary position was not maintained over subsequent follow-ups.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: C Ground Meeting Room 2

### Macular and Peripapillary Retinal Nerve Fiber Layer Thickness in Amblyopia

First Author: Sonia **PHULKE**

Co-Author(s): Punita **GARG**, Nitesh **KUMAR**, Tushar **KUMAR**

**Purpose:** The purpose of this study was to investigate the central macular thickness (CMT) and peripapillary retinal nerve fiber layer (RNFL) thickness in different types of amblyopic eyes versus the normal fellow eyes as measured by optical coherence tomography (OCT).

**Methods:** This was a prospective, observational, cross sectional study. Method - The study included 42 patients of different types of amblyopia. In all patients, CMT and peripapillary RNFL thickness were measured by OCT and compared with other fellow eyes.

**Results:** A total of 42 patients with different types of amblyopia were included. The mean age of presentation was  $27.26 \pm 13.06$  years. The mean CMT in amblyopic eyes was  $233.21 \pm 32.1$   $\mu$ m and RNFL thickness was  $89.4 \pm 14.7$   $\mu$ m. The mean CMT in normal fellow eye was  $233.7 \pm 22.9$  and RNFL was  $87.7 \pm 11.5$   $\mu$ m. The difference between amblyopic and fellow normal eyes was not statistically significant.

**Conclusions:** There was no significant relationship between macular and RNFL thickness with amblyopia. More studies with large sample sizes must be performed to extend the present results.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: C Ground Meeting Room 2

### Managing Traumatic Paediatric Cataract: A Review

First Author: Aditya **SETHI**

Co-Author(s): Sahebaan **SABHARWAL**, Arun **SETHI**, Reena **SETHI**, Vaibhav **SETHI**

**Purpose:** Traumatic cataracts in the pediatric age group requires special concern. There are multiple factors involved, including type of trauma, type of cataract, procedure of choice, intraocular lens (IOL) type and placements, lens status, corneal status / biometry, etc that lead to a favorable outcome. So, it is wise to have a strategic approach before planning on any pediatric traumatic cataract. This free paper would cover all the various topics and plans before deciding on a particular approach for a particular situation of traumatic pediatric cataract, doing a review on the various.

**Methods:** Pediatric traumatic cataracts operated were retrospectively analyzed, and articles regarding the same were assessed to draw out a strategic plan.

**Results:** Timing between trauma and cataract surgery is dependent on various factors, like the age of the patient, IOP, and inflammation. The IOL power calculation is a major challenge, but it was found that Topo Sim K and Standard K showed best results. Surgery was best avoided at time of primary repair. No difference in the visual outcome, whether IOL inserted as primary or secondary procedure in adults. Concurrent issues like iris trauma, glaucoma, etc need simultaneous planning and management.

**Conclusions:** Cataract management is best avoided at the time of primary repair except in limited situations. In the amblyogenic age group, it's crucial to plan a clearing of the visual axis with the utmost priority. It is important to weigh the risks of amblyopia due to aphakia vis a vis uncorrected astigmatic anisometropia due to IOL calculation issues. Primary implantation of IOL has undebatably the best visual outcome at all age groups.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: C Ground Meeting Room 2

### Oral Propranolol in the Treatment of Infantile Eyelid Hemangioma

First Author: Riffat **RASHID**

Co-Author(s): Syeed **KADIR**, Sadia **SULTANA**

**Purpose:** To evaluate the rate of regression by size and to evaluate color change of infantile eyelid hemangioma treated with oral propranolol.

**Methods:** The prospective study was carried out in the department of Oculoplasty, Ispahani Islamia Eye Institute and hospital during the period of January 1, 2013 to December 31, 2014. We included all patients of 1 to 60 months, clinically diagnosed infantile eyelid hemangioma of either sex attended in the outpatient department during the study period with relative indication for treatment. The exclusion criteria were: hemangioma with presenting life-threatening condition, cardiovascular disorders contraindicating propranolol use, family history of bronchial asthma, or recent/repeated outbreak of wheezing, low birth weight newborns, and previously treated with intralesional Triamcinolone. Patients were treated by oral Propranolol: 2 mg/kg/day. Follow-up visits were initially scheduled after 2 and 4 weeks of therapy and then monthly for 6 months.

**Results:** This study included a total of 93 patients with infantile eyelid hemangioma. The age of the patients in the study group ranged from 1 months to 42 months. Male 36 and female 57. Right eye involved in 40 patients and left eye 53. After 6 months of treatment, overall color clearance was seen in all patients, and 70 (75%) had an excellent response. After 6 months of treatment, overall regression of size was seen in all patients. A total of 75 (80%) patients had an excellent

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response.

**Conclusions:** Propranolol has been found clinically effective and also cost-effective in the treatment of infantile eyelid hemangioma. It also demonstrated better tolerance with minimal adverse effects.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: C Ground Meeting Room 2**

### **Predicting Factors of Long Term Successful Outcome for Childhood Esotropic Strabismus Surgery**

*First Author: Tchat **ARIYANONT***

*Co-Author(s): Sirinya **SUWANNARAJ***

**Purpose:** To evaluate the long-term surgical success rate and predicting factors affected the outcome of childhood esotropic strabismus surgery in tertiary care center.

**Methods:** Medical records of 287 esotropic childrens who underwent the first surgery at Srinagarind hospital during the period of January 2010 to December 2015 and completed follow up at 6 months period were reviewed. The post-operative angle of deviation  $\leq 10$  prism diopter (PD) was defined as successful outcome.

**Results:** Of those 287 esotropic childrens, 168 (58.53%) were female, mean age of onset was  $10.87 \pm 14.13$  months (median 6 months), mean age at the time of surgery was  $63.20 \pm 39.75$  months, mean visual acuity was 0.25 in logMAR, mean preoperative deviation was  $57.79 \pm 14.51$  PD. The majority of cases were congenital esotropia (97.56%). At 6 months of follow up, the overall success rate was 57.14%. Only preoperative angle of deviation  $\leq 57$  PD has statistically significant for the successful outcome ( $P = 0.007$ ) meanwhile sex, age of onset, age at surgery, visual acuity and present of amblyopia has no significant difference. Re-operative rate after 6 months was 23.43%. The preoperative angle of deviation has statistically significant for the re-operative rate ( $P = 0.03$ ). Complication rate was found 1.3% in this series.

**Conclusions:** According to our study, preoperative angle of deviation  $\leq 57$  PD has significantly higher success rate for esotropic strabismus surgery in children. The re-operation rate was high (23.43%) and related with preoperative large angle. However complication after strabismus surgery was minimal.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: C Ground Meeting Room 2**

### **Prevalence and Causes of Amblyopia in Children 6 Months to 16 Years in Kamrup Metro (Urban) District**

*First Author: Anshul **SINGH***

**Purpose:** To study the prevalence and determine the magnitude and cause of amblyopia among children aged 6 months to 16 years in Kamrup district, Assam.

**Methods:** Among a total of 39,651 children between 6 months to 16 years of age, door to door screening was conducted by trained workers. For children above 5 years who fail to read 6/9 line, camps were conducted in the nearby schools. 60 camps were conducted within the district and each camp had about 150 patients. Children below 5 years were directly referred to the tertiary eye care institute. After visual acuity assessment at the institute, cycloplegic refraction and complete examination was done to rule out other causes of diminished vision. Axial length measurement and corneal topography was performed in high refractive errors.

**Results:** Out of 8388 screened children from 39,651 children, 469 were diagnosed at the camp and 223 were diagnosed at the institute. The prevalence of amblyopia was 1.75%. Males (52.50%) were more frequently diagnosed than females. Age wise, distribution showed more than half of the patients in the age group of 11 - 16 years (63.58%). Refractive amblyopia was the most common cause in children reporting to the institute. In children below 5 years, sensory deprivation, amblyopia, and strabismic amblyopia were more common.

**Conclusions:** Early detection and awareness of amblyopia among the parents is essential in order to identify and treat the disease early in its course, which will reduce the burden of a child's visual impairment.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: C Ground Meeting Room 2**

### **Retinoblastoma in Older Children: A Case Report and Review**

*First Author: Dianita **GINTING***

*Co-Author(s): Maya **KUNTOYO***

**Purpose:** To report a case of retinoblastoma in an older than 4 years of age child, and a review of 11 children older than 4 years old with retinoblastoma.

**Methods:** A case report and retrospective non-comparative case series, from medical records of patients older than 4 years old diagnosed with retinoblastoma.

**Results:** From January 2012 to December 2017, 395 consecutive patients with retinoblastoma showed that 16 (4.05%) patients were older than 4 years of age at the time of initial diagnosis. An evaluation of the 11 patients showed several unique features. At the time of diagnosis, their median age was 6 years (range 5 - 9 years). The presenting symptoms included leukocoria, proptosis, and decreased vision. All of the 11 patients (100%) had unilateral sporadic retinoblastoma, and most cases were diagnosed in advanced stages.

**Conclusions:** Misdiagnosis before referral was common in these older children with active retinoblastoma because of its low incidence and low level of suspicion at this age. Therefore, it is important that physicians are aware of this disease in order to perform an earlier diagnosis and decrease treatment-related morbidity.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: C Ground Meeting Room 2**

### **Role of Ultrasound Biomicroscopy in Management of Pediatric Cataract**

*First Author: Yogita GUPTA*

*Co-Author(s): Chirakshi DHULL, Sudarshan KHOKHAR, Ayushi SINHA, Kabita TIWARI*

**Purpose:** To describe the role of ultrasound biomicroscopy (UBM) in management of cataracts in pediatric eyes.

**Methods:** A prospective, cross-sectional, and non-randomized study was conducted between January 2016 and July 2018, including 180 consecutive eyes of 100 pediatric patients, aged 0 to 10 years, with unilateral or bilateral congenital or developmental cataracts. Preoperatively, visual acuity, lens morphology, corneal clarity, and presence of gross anterior segment or posterior segment anomaly were noted. In examination under general anesthesia, UBM was performed using 35 MHz probe to see anatomic details of anterior segment. The parameters recorded were: lens morphology, white to white (WTW), sulcus-to-sulcus (STS), and bag diameters (BD). STS and BD were used as a guide for planning intraocular lens in the bag / sulcus.

**Results:** Mean age of subjects was  $4.19 \pm 3.9$  years. Of 180 eyes examined, cataract morphology was as follows: zonular cataract in 31.7%, total cataract in 27.5%, posterior subcapsular cataract in 16%, membranous cataract in 13.6%, anterior capsular plaque in 2.3%, posterior capsular plaque in 1.6%, posterior capsular defect (PCD) in 3.2%, associated with persistent fetal vasculature in 2.2%, and others were 1.9%. Mean WTW, STS, and BD were  $10.65 \pm 1.39$ ,  $10.09 \pm 1.25$ , and  $8.17 \pm 1.28$ , respectively.

**Conclusions:** UBM is a useful diagnostic tool in pediatric cataracts. Planning of surgery using UBM can facilitate cataract surgery in pediatric eyes.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: C Ground Meeting Room 2**

### **Simultaneous Weakening of Both Obliques with Horizontal Recti Surgery for Large Sensory Exotropias**

*First Author: Divya KISHORE*

*Co-Author(s): Mainak BHATTACHARYYA, Annu JOON, Ipsita MUNI, Pramod Kumar PANDEY*

**Purpose:** Sensory exotropia (XT) constitutes a sizeable chunk of exodeviations. Large deviations, associated vertical/pattern strabismus, DVD may pose formidable surgical challenges. Supramaximal horizontal surgery may cause side gaze incomitance and undercorrection.

**Methods:** Ten patients with sensory XT >50 prism diopters (PD) were studied. VA, ocular deviation, oblique muscle action, and pattern strabismus were evaluated. LR recession 10 mm, medial rectus resection 6 mm, IO recession 10 mm, and temporal SO tenotomy were done in the affected eye. Results were evaluated at 12 weeks, and success defined as final alignment within 8 PD.

**Results:** Correction achieved was 70 PD with SD of 14. No vertical deviation was induced, no side gaze incomitance or palpebral aperture narrowing noted.

**Conclusions:** Adjunctive simultaneous weakening of both oblique muscles with horizontal recti surgery works well for large sensory XT (> 50 PD). Obliques weakening may produce an additional correction of 20 PD or more over isolated horizontal surgery.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: C Ground Meeting Room 2**

### **Use of Conjunctival Autograft for Prophylaxis of Postoperative Diastase of Superficial Tissues in Surgery of Great Angles of Squint**

*First Author: Konstantin NAUMOV*

**Purpose:** To estimate the results of conjunctiva autografting for plastic of superficial tissues defects appearing in the result of operation wound diastase during relaxing interventions on extraocular muscles.

**Methods:** Fifteen patients with vast conjunctival diastases that appeared during squint surgery in projection zone of recessed muscle were treated by transplantation of an autoconjunctival graft taken on the side of resected muscle. The extent of graft re-epithelization above the sclera, range of eyeball motility, and patient's comfort were estimated immediately after surgery as well as in 2, 4, 16, and 24 weeks.

**Results:** Mean follow-up period was 16 weeks (range, 4 to 24 weeks). Suture dehiscence and conjunctival

diastases were not noticed as well as graft necrosis or lysis. Conjunctival graft was re-epithelized in all patients 4 weeks after surgery without signs of scarring or mobility limitation.

**Conclusions:** Method gives a possibility to decrease the frequency of post-op complications such as sutures dehiscence due to less stretching of superficial tissues and rapid vascularization of the graft, to improve functional outcomes of surgery and to increase the volume of eyeball motions.

## Prevention of Blindness

Mar 07, 2019 (Thu)

16:30 - 18:00

Venue: Boardroom 2

### Analysis of Prescription Glasses in First Grade Thai Students

*First Author:* Kwanjai **WONGKITTIRUX**

*Co-Author(s):* Sirin **LUEANGARAM**, Supawan **SURUKRATTANASKUL**, Sumalin **TRICHAIPORN**, Nutsuchar **WANGTIRAUMNUAY**

**Purpose:** To study the prevalence and success of prescription glasses in the first-grade students in the policy "Good Sight for Thai Children" (GSTC).

**Methods:** Cross-sectional study including the prescription glasses of the first-grade students in all regions of Thailand provided from the visual screening in school children GSTC policy in 2016 and 2017. Trained class-teachers screened visual acuity of their students and referred children who had visual acuity less than 20/40 to hospital for eye examination and glasses prescription.

**Results:** A total of 786,729 students were screened. 20,401 (2.59%) students were referred to the hospital. Only 9867 (48.37%) students presented at the hospital. Spectacles were prescribed to 5324 (53.96%) students. Mean spherical equivalent was -1.08 (-19.00 to +10.00, SD 2.32) diopters. There were 1626 (30.54%) children with amblyopic risk without glasses. Analysis of the prescription on each eye revealed plano lenses (4.06%), minus spherical lenses (20.88%), plus spherical lenses (7.56%), minus cylindrical lenses (20.47%), and sphere with minus cylindrical lenses (47.03%). In each category, 5.49% were high myopia, 5.22% were high hyperopia, and 28.58% were high astigmatism. Cylindrical lens analysis showed 81.53% were with the rule astigmatism, 4.07% were against the rule astigmatism, and 14.40% were oblique astigmatism.

**Conclusions:** There were a number of students who needed spectacles. Visual screening programs for school children are valuable and should be continued and expanded. More than half of the failed visual

screening students didn't come to the hospital. Further studies are needed to understand the barriers and to solve the problems.

Mar 07, 2019 (Thu)

16:30 - 18:00

Venue: Boardroom 2

### Burden of Blindness Due to Glaucoma in a Teaching Hospital in Southern India

*First Author:* Elfride **SANJANA**

**Purpose:** Retrospective analysis of glaucoma charts between 2016 and 2018 to determine the burden of blindness due to glaucoma.

**Methods:** Charts of patients with a diagnosis of glaucoma, glaucoma suspect, and ocular hypertension were analyzed, adhering to International guidelines for definition of various glaucomas. Visual acuity and visual field criteria according to the National Program for Control of Blindness was used to determine whether patients met the criteria for legal blindness. Patients with ocular comorbidities such as corneal, retinal, and lenticular pathologies were excluded from the study.

**Results:** Among the 249 patients analyzed, 17.3% of glaucoma patients met the criteria for legal blindness, POAG being the predominant type of glaucoma. Out of these patients, 15.6% did not receive any prior treatment. There was a higher preponderance of legal blindness among men (21.3%). There was no correlation between the presence of systemic hypertension and diabetes (Pearson's correlation coefficient was 0.737 and 0.057 for hypertension and diabetes respectively) with legal blindness.

**Conclusions:** Our study revealed a higher percentage of burden of blindness due to glaucoma in Southern India compared to literature in the relevant geography. This implies a lack of awareness and the need to further strengthen community outreach programs. Primary open angle glaucoma being asymptomatic in its course poses challenges in reducing the burden of legal blindness.

Mar 07, 2019 (Thu)

16:30 - 18:00

Venue: Boardroom 2

### Ocular Disorders in Children with Hearing Impairment and Speech Disability

*First Author:* Watanee **JENCHITR**

*Co-Author(s):* Thitipa **BENJAPOL**, Nantawan **CHUKAEO**

**Purpose:** To determine prevalence and characteristics of ocular disorders in students with sensori-neural hearing loss.

**Methods:** Between March and December 2017, students attending 2 schools for the deaf in Thailand

underwent ocular examination including: visual acuity, binocular evaluation, and external and posterior segment eye examination with fundus photography. Objective and subjective refraction were provided to students with VA <20/25 with free of charge eyeglasses.

**Results:** A total of 446 students (92.53% of all students) with ages ranging from 4 - 25 years (mean 11.27) were examined. A total of 308 students (69.06%) had hearing loss with speech disability, while 73 (13.36%) had hearing loss with speech disability plus intellectual disability and/or mental retardation, and 137 students (30.72%) had at least one ocular disorder, with some having multiple disorders. Refractive error was the most common disorder, found in 102 students (22.87%). Thirty-eight students (8.52%) were found to have retinal disorders; 35 (7.85%) had lid, conjunctiva or lacrimal disorders; 11 (2.47%) had strabismus; 4 (0.90%) had refractive amblyopia; 2 (0.45%) had cataracts; and 1 student (0.22%) had optic atrophy. Only 46 students with refractive error (45%) had corrected power eyeglasses.

**Conclusions:** Ocular disorders were found in 30.72% of these students, resulting in double or triple disabilities. Early detection and treatment of ocular disorders in this population may reduce difficulties in their learning and social adjustment and improve the children's quality of life.

## Refractive Surgery

Mar 08, 2019 (Fri)

14:30 - 16:00

Venue: Boardroom 3

### Biomechanical Changes and Improved Visual Performance After a New Presbyopia Therapy: Laser Scleral Microporation

First Author: Sunil **SHAH**

Co-Author(s): Robert **ANG**, Annmarie **HIPSLEY**, Eddie **HSIAO**, Mitchell **JACKSON**

**Purpose:** To evaluate the visual outcomes as well as biomechanical and physiological changes in the eye following bilateral laser scleral microporation (LSM) therapy for restoring accommodation function in presbyopes.

**Methods:** Twelve eyes of 6 patients aged >40 years who showed loss of accommodative ability and near visual acuity of 20/50 or worse were treated with LSM. An Er:YAG laser was used in 4 quadrants on the sclera to rejuvenate age-related ocular rigidity in 5 critical zones of anatomical and functional significance, to improve pliability and biomechanical efficiency of the ciliary muscles. Visual outcomes were assessed using the Early Diabetic Retinopathy Study (EDTRS) logMAR

charts, and intraocular pressure (IOP) was evaluated using a pneumatic tonometer for up to 1 month postoperatively.

**Results:** Binocular uncorrected visual acuities at near (40 cm; UNVA), intermediate (60 cm; UIVA), and distance (4 m; UDVA) improved from  $+0.60 \pm 0.14$  (logMAR),  $+0.47 \pm 0.20$  (logMAR),  $+0.14 \pm 0.12$  (logMAR) respectively preoperatively, to  $+0.14 \pm 0.17$  (logMAR) ( $P = 0.00010$ ),  $+0.08 \pm 0.19$  (logMAR) ( $P = 0.0087$ ),  $+0.00 \pm 0.00$  (logMAR) ( $P = 0.020$ ) respectively at 1 month postoperatively. At 1 month postoperatively, binocular UNVA showed a median improvement of 5 lines (range 2-7) from preoperative UNVA.

**Conclusions:** Preliminary results indicated that LSM performed using the Er:YAG laser appears to be a safe and effective procedure for restoring visual performance in all ranges of vision including near, intermediate, and distance. The mechanism of action of LSM is still being studied, but early results are compelling. Ongoing studies are being pursued.

Mar 08, 2019 (Fri)

14:30 - 16:00

Venue: Boardroom 3

### Retreatment in Laser In Situ Keratomileusis: Flap Lift or Surface Ablation?

First Author: Colin **CHAN**

**Purpose:** To review safety and efficacy outcomes following retreatment for residual refractive errors in prior LASIK eyes and determine the most appropriate course of action for patients.

**Methods:** A review of all patients undergoing LASIK enhancement at a single refractive surgery center between 2012 and 2017 was undertaken. Pre- and post-enhancement refraction and biomicroscopy results were collated and analyzed according to the method of enhancement (LASIK Lift flap or surface ablation).

**Results:** A total of 108 eyes were included in the analysis. 58 eyes underwent flap lift and 50 proceeded to surface retreatment with mean times to enhancement of 22.3 and 53.2 months respectively. The mean spherical equivalent prior to enhancement was  $-0.43 \pm 0.69$ D and  $-1.03 \pm 1.01$  diopters (D) for the lift and surface groups respectively. The absolute difference from intended refraction was statistically significant (lift  $0.16 \pm 0.24$  D vs surface  $0.31 \pm 0.35$  D,  $P = 0.01$ ). The difference was more pronounced for prior hyperopic eyes ( $P = 0.041$ ). The incidence of haze following retreatment was 3.4% in the lift eyes vs 10.0% in the surface treated eyes. 8.6% of lift eyes had evidence of epithelial ingrowth against 4.0% of surface eyes. There was no correlation between time to enhancement or refraction and the incidence of haze or ingrowth following the enhancement procedure.

**Conclusions:** More recently, there has been a trend

towards treating residual LASIK refractive errors through surface ablation. Our review suggests that LASIK lift may represent a more accurate refractive outcome albeit with an expected greater risk of epithelial concernss.

Mar 08, 2019 (Fri)

14:30 - 16:00

Venue: Boardroom 3

### Scleral Wound Healing Profiles and Stability Following Laser Scleral Microporation for Presbyopia Correction

First Author: Jodhbir **MEHTA**

Co-Author(s): Annmarie **HIPSLEY**, Yu-Chi **LIU**, Chan Lwin **NYEIN**, Erica **TEO**

**Purpose:** To evaluate the scleral wound healing and long term stability following laser scleral microporation (LSM) using an Er:YAG laser.

**Methods:** Six non-human primates (n = 12 eyes) at presbyopic age underwent LSM. Half of the eyes randomly selected underwent concurrent collagen-gel treatment. Slit lamp, anterior segment optical coherence tomography (ASOCT), and intraocular pressure (IOP) measurements were performed postoperatively. The eyes were harvested 1, 6, and 9 months postoperatively for histological analysis by Hematoxylin and Eosin staining, and immunohistochemistry analysis with the markers for inflammation (CD11b and CD 45), wound healing [fibronectin,  $\alpha$ -smooth muscle actin ( $\alpha$ -SMA), tenascin, and Thy-1], cellular stress response (HSP-47), and angiogenesis marker (CD31).

**Results:** The laser spots were at 33-57% depth of scleral thickness assessed by ASOCT. There were no significant changes in IOP postoperatively. Histological analysis revealed inflammatory cell infiltrates and focal coagulative necrosis around the scleral micropores at 1 month, with less in the collagen-gel treated group. At 9 months, there was minimal scleral fibroblast migration into the micropores. At the scleral laser area, the expression of fibronectin, tenascin, and HSP-47 was more distinct in the non-collagen-treated group, but they subsided with time. In all eyes, there was no expression of CD11b, CD45,  $\alpha$ -SMA, or CD31 in the sclera.

**Conclusions:** LSM is associated with an acceptable range of inflammatory and wound healing responses, which eventually subside with time. Concurrent collagen gel treatment can reduce these responses. Wound healing shows long term stability.

Mar 08, 2019 (Fri)

14:30 - 16:00

Venue: Boardroom 3

### What Causes Reduction in Biomechanical Strength: Flap/Cap/Laser?

First Author: Pavitra **PATEL**

Co-Author(s): Mathew **FRANCIS**, Pooja **KHAMAR**, Abhijit **SINHA ROY**, Rohit **SHETTY**

**Purpose:** To study the biomechanical implications of flap and cap cut during LASIK and SMILE procedures, respectively, on contralateral in vivo human cornea.

**Methods:** A total of 25 subjects, with bilaterally matched refraction, pachymetry, and intraocular pressure, underwent contralateral LASIK and SMILE. We evaluated peak deformation amplitude (DA) and corneal stiffness (kc) before surgery. Then LASIK only flap cut in 1 eye and SMILE only cap and lenticule cut in the contralateral eye was done, and after waiting for 3 hours, the DA and kc were measured again. Then the surgery was completed; that is, the flap was lifted and excimer laser was fired and in the contralateral eye, the lenticule dissection was done and lenticule was removed and then DA and kc were measured postoperatively and also at 1-month follow-up.

**Results:** kc of LASIK eyes was  $107.6 \pm 5.4$ ,  $99.8 \pm 5$ ,  $88.5 \pm 3.9$  and  $88.4 \pm 4.2$  N/m, respectively. kc of SMILE eyes was  $97.9 \pm 3.2$ ,  $92.3 \pm 2.5$ ,  $84.7 \pm 3.6$  and  $84.3 \pm 3.6$  N/m, respectively. Difference in kc between before and after cut for LASIK and SMILE were  $-7.8 \pm 2.5$  and  $-5.6 \pm 2.2$  N/m ( $P = 0.2$ ). Difference in DA were  $0.06 \pm 0.02$  and  $0.05 \pm 0.02$  mm, respectively.

**Conclusions:** SMILE cap (without lenticule removal) causes less biomechanical weakness compared to only flap. These are novel discoveries, which attempts to understand how much weakness is contributed by individual components of modern refractive surgery. The implications of this study help in understanding the impact of biomechanical changes which occur post-refractive surgery and thus help to determine the surgery best suited for the patient.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Meeting Room 1

### Analysis of Corneal Stromal and Corneal Nerve Changes Following LASIK Using In Vivo Confocal Microscopy

First Author: Isha **AGARWALLA**

Co-Author(s): Kasturi **BHATTACHARJEE**, Nilutparna **DEORI**, Diva **MISRA**, Pooja **SHUKLA**

**Purpose:** Cellular and structural changes induced by refractive surgery may aid in understanding the natural cellular process and the potential complications that occur after refractive surgery. IVCM enables

near-histological visualization and quantification of cellular and neural changes, which can help improve postoperative outcomes of refractive surgery. The main purpose of this study was to evaluate the ultra-structure of cornea using in vivo confocal microscopy in patients undergoing myopic Lasik before the surgery and 1 week, 3 months, and 6 months post-surgery.

**Methods:** A hospital-based prospective, non-randomized study was conducted at a tertiary eye care hospital. After obtaining informed consent and fulfilling selection criteria, 80 patients (160 eyes) undergoing myopic Lasik were enrolled into this study. Our present study for the first time at a nationwide level evaluated the corneal stromal and nerve plexus changes at the cellular level before and after undergoing Lasik, so the postoperative outcomes could be improved and matched to perfection. The parameters assessed were keratocyte density in anterior and posterior stromal layers, flap thickness, hexagonal cells number, and corneal nerve changes pre- and post-Lasik and their regeneration.

**Results:** Epithelial thickness increased 21% by 12 months, no change in stromal thickness between 1 and 36 months, and sub-basal nerve fiber density was reduced initially, but in the 3rd follow-up regeneration of the nerve plexus was seen.

**Conclusions:** The study of live cellular physiology of the cornea in patients before and after undergoing Lasik has enabled intra vital corneal imaging for the diagnosis and management of corneal disorders.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Meeting Room 1**

### Breastfeeding and Photorefractive Keratectomy: A Retrospective Cohort Study

*First Author: Siamak ZAREI-GHANA VATI*

*Co-Author(s): Mojtaba ABRISHAMI, Amir-Reza DANESHMAND ESLAMI*

**Purpose:** To evaluate the refractive outcomes, visual function, and safety of photorefractive keratectomy (PRK) in myopic breastfeeding women and to compare with healthy matched female controls.

**Methods:** In a retrospective matched cohort study, 12 mothers (23 eyes) who underwent PRK while they were still breastfeeding (B group) and continued it for at least 3 months were included. Twelve women (23 eyes) who were matched by age, refractive error, and operation data (NB group) were selected as the control group. Post-PRK results and complications were compared between the 2 groups.

**Results:** Twenty-four women with a mean age of 29.70 years  $\pm$  1.8 (standard deviation) (range from 27 to 33 years) were included. The average age in the study and the control group were 29.83  $\pm$  1.80 and 29.58  $\pm$  1.98,

respectively ( $P = 0.749$ , T-test, poverty 0.1). The mean duration of breastfeeding was 47 weeks before surgery and 35 weeks after surgery. Table 1 shows the baseline characteristics. There were no statistically significant differences in UCVA, BCVA, the manifest, and cycloplegic refraction. The manifest refractions showed no statistically significant difference in sphere, cylinder, also SE between groups, additionally all patients were mildly myopic. (Table 3). MRSE was mildly hyperopic and statistically lower in the study group than the control group, (0.35  $\pm$  0.60 vs 0.28  $\pm$  0.60, respectively) ( $P = 0.157$ , GEE).

**Conclusions:** Refractive outcomes, visual function, and safety of photorefractive keratectomy (PRK) in myopic breastfeeding women doesn't change in comparison with healthy matched female controls.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Meeting Room 1**

### Comparison of Visual Outcomes and Safety of Transepithelial Photorefractive Keratectomy Using Alcon Wavelight EX500 with Conventional Photorefractive Keratectomy

*First Author: Mubashir PARKAR*

*Co-Author(s): Pratik GOGRI, Anahita KATE, Akanksha KOUL, Jagadesh REDDY, Pravin VADDAVALLI*

**Purpose:** To compare the outcomes of trans-epithelial photorefractive keratectomy (tPRK) with conventional photorefractive keratectomy (c-PRK) for the treatment of myopia and myopic astigmatism.

**Methods:** In this prospective, randomized, contralateral eye study, 54 eyes of 27 patients with myopia or myopic astigmatism were included. One eye of each patient was randomized to transepithelial-PRK (t-PRK) group, while the contralateral eye was randomized to the conventional-PRK (c-PRK) group. All procedures were performed using EX500 excimer laser (WaveLight, Alcon, Fort Worth, TX). Outcome measures included uncorrected visual acuity (UCVA), epithelial healing time, and postoperative pain using Visual Analog Scale (VAS).

**Results:** Fifty-four eyes of 27 patients were included, with each study group consisting of 27 eyes. Postoperatively, there was no significant difference between the 2 groups with respect to UCVA ( $P = 0.30$ ). The epithelial healing time in the t-PRK group was 3.44  $\pm$  0.57 days and in the c-PRK group was 3.80  $\pm$  0.76 days and this difference was statistically significant ( $P = 0.01$ ). The VAS scores in the t-PRK group from the first to fourth postoperative days were 58.00  $\pm$  16.02, 48.17  $\pm$  16.52, 2.85  $\pm$  10.35, and 5.00  $\pm$  9.40 respectively and, in the c-PRK group were 74.50  $\pm$  9.55, 50.93  $\pm$  10.68, 19.28  $\pm$  10.97, and 5.00  $\pm$  7.20 respectively. These values were statistically significant on the first ( $P$

= 0.0008) and second ( $P = 0.015$ ) postoperative days, however the significance was lost on the third ( $P = 0.4$ ) and fourth ( $P = 0.5$ ) day.

**Conclusions:** Transepithelial PRK is superior to conventional PRK with respect to epithelial healing time and immediate postoperative pain and is comparable with it in regard to visual outcomes.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Meeting Room 1

### Comparison of Visual and Aberration Outcomes Between Transepithelial Photorefractive Keratectomy, Wavefront-Guided Laser In Situ Keratomileusis, and Small Incision Lenticule Extraction

First Author: Zelda **DADACHANJI**

Co-Author(s): Pooja **KHAMAR**, Rohit **SHETTY**

**Purpose:** To compare the visual and aberration outcomes of trans-epithelial photorefractive keratectomy (Trans PRK), wavefront-guided laser in situ keratomileusis (WFG LASIK), and small incision lenticule extraction (SMILE).

**Methods:** Fifty eyes each of Trans PRK (SCHWIND), WFG LASIK (Abbott Medical Optics), and SMILE (Carl Zeiss) were analyzed using Pentacam HR data preoperatively and postoperatively at 6 months.

**Results:** Safety index was  $0.97 \pm 0.01$ ,  $0.98 \pm 0.04$ , and  $0.90 \pm 0.10$  (mean  $\pm$  standard deviation) respectively for TransPRK, WFG LASIK, and SMILE. Efficacy index was  $1.17 \pm 0.24$ ,  $1.00 \pm 0.04$ , and  $1.12 \pm 0.14$ , respectively. Change in Higher order RMS (HORMS) of aberration (preoperatively to postoperatively) was  $-0.08$  ( $-0.3$ ,  $0.06$ ),  $-0.06$  ( $-0.17$ ,  $0.04$ ), and  $-0.06$  ( $-0.34$ ,  $0.05$ ) respectively (median and range). Spherical aberration was  $0.01$  ( $-0.04$ ,  $0.2$ ),  $0.01$  ( $-0.1$ ,  $0.05$ ), and  $0.05$  ( $-0.13$ ,  $0.12$ ) respectively. Coma was  $0.02$  ( $-0.2$ ,  $0.26$ ),  $0.06$  ( $-0.12$ ,  $0.21$ ), and  $0.07$  ( $-0.27$ ,  $0.30$ ) respectively. All above indices were statically similar.

**Conclusions:** Trans PRK was comparable to WFG LASIK and SMILE in the safety, efficacy, and quality of visual outcomes.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Meeting Room 1

### Early Clinical Observation of Intraoperative Corneal Stromal Pocket Irrigation by Dexamethasone in Small Incision Lenticule Extraction

First Author: Gang **LIANG**

**Purpose:** To observe the effect of Dex (dexamethasone balance fluid) keratome under SMILE on postoperative

visual acuity and corneal tissue.

**Methods:** Prospective cohort study. Twenty-four patients (48 eyes) underwent SMILE surgery. Each patient was randomized to 1 eye for intraoperative corneal cap subtomach lavage (experimental group), and the other eye was not flushed (control group). The corneal epithelium, nerve, stroma, and endothelial morphology were observed by confocal microscopy and optical coherence tomography (OCT) before and after surgery. The visual acuity and refractive status of the 2 groups were observed at 1, 7, and 1 month after operation.

**Results:** There was no significant difference in visual acuity and SE between the 2 groups at the same time,  $P > 0.05$ . In the same period, there were no significant differences in shape, density, and arrangement of corneal epithelial cells, no obvious high-reflective substances; no significant difference in subepithelial nerve fibers, continuous integrity, no short-board or white-lined nerve fibers; same depth stromal cells. The density and shape were similar, and no obvious high-reflecting particles appeared. The activation of stromal cells in the near-cut surface was similar. The density, shape, arrangement, and boundary of the endothelial cells were clear and there was no significant difference. At the same time, there were no obvious layer gaps and effusions under the OCT corneal caps of the 2 groups. There was no obvious corneal edema at the incisions.

**Conclusions:** The lavage of Dex under SMILE surgery has no significant effect on postoperative naked eye vision, diopter, and corneal tissue.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Meeting Room 1

### First Direct Comparison of Surface Ablation vs CIRCLE for Enhancement After Myopic SMILE

First Author: Martin **DIRISAMER**

Co-Author(s): Nikolaus **LUFT**, Siegfried **PRIGLINGER**, Jakob **SIEDLECKI**

**Purpose:** Many options of retreatment after small incision lenticule extraction (SMILE) are available, with surface ablation and VisuMax CIRCLE-assisted flap creation being the most widely used ones. Both have been found to be safe and effective, but no data comparing the 2 options are available.

**Methods:** The databases of centers involved were screened for patients who had undergone either surface ablation (S) or CIRCLE (C) assisted enhancement after myopic-SMILE. Out of 74 eyes, 24 (12 for each method) had matching partner concerning pre-SMILE and pre-enhancement mean refractive spherical equivalent (MRSE), age, corrected/uncorrected

distance visual acuity (CD/UDVA), and astigmatism. Refractive and functional outcomes were compared after follow-up of 3 months.

**Results:** Retreatment was performed after a mean  $9.7 \pm 7.2$  (S) and  $11.0 \pm 4.4$  (C;  $P = 0.57$ ) months for a residual MRSE of  $-0.91 \pm 0.55$  (S) and  $-0.90 \pm 0.61$  D (C). At three months, MRSE was similar with  $-0.07 \pm 0.19$  (S) and  $-0.13 \pm 0.35$  D (C) ( $P = 0.57$ ). UDVA improvement was similar to a final of  $0.02 \pm 0.10$  (S) vs  $0.03 \pm 0.07$  logMAR (C;  $P = 0.78$ ). Only 1 eye in the surface ablation group lost one line of CDVA. UDVA was significantly better after CIRCLE at 1 week (S:  $0.20 \pm 0.12$  vs C:  $0.06 \pm 0.10$  logMAR;  $P = 0.014$ ). Postoperative worsening of CDVA was only seen after surface ablation at 1 week (S:  $0.13 \pm 0.08$  vs C:  $0.03 \pm 0.05$ ;  $P = 0.005$ ).

**Conclusions:** In first study directly comparing surface ablation versus CIRCLE enhancement after SMILE, both methods yielded similar results at 3 months. However, there was improved speed of recovery concerning UDVA and CDVA in CIRCLE retreated eyes at 1 week.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Meeting Room 1**

### Outcomes of Photorefractive Keratectomy for the Treatment of Irregular Astigmatism Following Deep Anterior Lamellar Keratoplasty or Penetrating Keratoplasty

*First Author: Mubashir PARKAR*

*Co-Author(s): Pratik GOGRI, Anahita KATE, Akanksha KOUL, Jagadesh REDDY, Pravin VADDAVALLI*

**Purpose:** To report the outcome of stepwise ablation using photorefractive keratectomy (PRK) for the correction of irregular astigmatism following either penetrating keratoplasty (PKP) or deep anterior keratoplasty (DAEK).

**Methods:** A retrospective review of all cases who underwent PRK between November 2014 and August 2018, for treatment of irregular astigmatism after PKP or DALK was done. Eleven eyes of 11 patients were included, and preoperative and postoperative uncorrected visual acuity (UCVA), best corrected visual acuity (BCVA), manifest spherical equivalent (S.E.), and higher order aberrations were recorded and analyzed.

**Results:** The mean age of the patients was  $33.18 \pm 7.82$  years. Male: female ratio was 1.2. Nine eyes (81.81%) underwent DALK while 2 eyes (18.18%) underwent PKP. The most common indication for keratoplasty was keratoconus (7 eyes – 63.63%), followed by corneal opacity (4 eyes – 36.36%). The mean follow-up period following PRK was  $9.2 \pm 13.17$  months. The mean UCVA and BCVA before PRK were  $-0.78 \pm 0.37$  logMAR and  $-0.26 \pm 0.21$  logMAR units, respectively, which improved to  $-0.31 \pm 0.19$  logMAR ( $P = 0.18$ ) and  $-0.16 \pm 0.15$  logMAR ( $P = 0.03$ ) respectively, at the last follow-

up. The mean preoperative and postoperative S.E. was  $-2.6 \pm 1.23$  and  $-0.75 \pm 1.05$ , and this difference was found to be statistically significant ( $P = 0.01$ ). Statistically significant improvement was seen in aberrometry indices (total root mean square, higher-order aberration root mean square, defocus, coma, trefoil, and spherical aberration).

**Conclusions:** In cases of irregular astigmatism, topography-guided PRK is useful in improving the visual outcomes and can be employed after refractive stability has been achieved.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Meeting Room 1**

### Results After Implantation of Multifocal LentisM Plus Toric in Amblyopic Eyes

*First Author: Magda RAU*

**Purpose:** To evaluate the optical, functional outcomes and patients satisfaction after Implantation of asymmetric multifocal toric Lentis Mplus toric in the eyes with refractive, anisometropic, amblyopia.

**Methods:** In a retrospective case study from May 2010 until October 2012 we implanted after coaxial micro phacoemulsification through 2.2 mm incision, LENTIS Mplus-toric in 15 eyes of 15 patients. The preoperative best corrected visual acuity are in the range of 0.3-0.6, the mean BCVA 0.45. The preoperative refraction was in the range +2.5 to +4.75 the astigmatism 1.75 to 4.5. We evaluated the postoperative uncorrected (UCVA), best corrected visual acuity (BCVA) for distance, distance corrected intermediate and near visual acuity. The follow up was three months after implantation. The quality of vision, glare, halos and the personal satisfaction of the patients was assessed with a validated questionnaire.

**Results:** All patients achieved preoperatively the best corrected visual acuity, 4 patients gained 1 line, 2 patients 3 lines, the mean UCVA for distance was 0.53; 60% patients were able to read without glasses the newspaper, and perform the activities of a daily live. 20% experienced glares and halos during driving in the night. 70% of the patient were completely satisfied, 20% satisfied, 10% not satisfied with the achieved results.

**Conclusions:** The multifocal Lentis M plus toric opens a new possibility of indication in anisometropic, amblyopic eyes. All patients achieved the preoperative best corrected visual acuity. The average best corrected visual acuity.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Meeting Room 1

### Tissue Addition Combined with Collagen Cross Linking: A New Treatment Modality for SMILE Ectasia

First Author: Sheetal **BRAR**

**Purpose:** To report the 6-month outcomes of tissue addition combined with collagen cross linking as a new treatment modality for SMILE ectasia.

**Methods:** Two cases of SMILE ectasia were treated with tissue addition (tissue obtained from another SMILE donor and matched for spherical error of the eye) and combined collagen cross linking 2 years post primary SMILE and were followed up for a minimum period of 6 months. In both cases, a SMILE lenticule from another donor was taken and punched in the center before implantation, to create a doughnut-shaped tissue. Followed by this, a pocket C3R using 0.25% riboflavin and a UV-A radiation at 30 mW2 for 3 minutes to deliver an energy of 5.2 mW to the cornea.

**Results:** Both cases had ectasia in their right eyes after uneventful SMILE procedures done 2 years ago for high myopia of -6 and -9 SE of myopia, respectively. The refractive error of -1.00 D sph / -1.5 D cyl @ 30 deg and case 2 had SE of -1.5 D sph / -2.00 D cyl @ 80 deg, with corrected distance visual acuity (CDVA) of 6/12 and 6/9 in RE, respectively. At 6 months postop, both cases have postop SE within -0.75 D, and improvement in CDVA with both eyes recovering their CDVA to 6/6 p. No incidence of infection, haze, or rejection happened in either eye at the end of 6 months.

**Conclusions:** Tissue addition, combined with collagen cross linking, may be a valid treatment option to manage ectasia after SMILE.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Meeting Room 1

### Translational Impact of Lysyl Oxidase on Cross-Linking/Refractive Surgery and Allied Novel Point-of-Care Diagnostic Kit

First Author: Pooja **KHAMAR**

Co-Author(s): Arkasubhra **GHOSH**, Nimisha **NIMI**, Swaminathan **SETHU**, Rohit **SHETTY**

**Purpose:** To investigate the role of lysyl oxidase (LOX), an endogenous cross-linker on refractive surgery/cross-linking outcomes and the relevance of point-of-care diagnostic kit to determine LOX status in clinical practice.

**Methods:** LOX expression was studied in 3 groups of patients. Group-A: LOX and collagens (COLIA1 and COLIVA1) gene expressions in debrided corneal

epithelia of KC patients (90 eyes) undergoing cross-linking (CXL) and control subjects (52 eyes) without KC but undergoing photorefractive keratectomy (PRK) were measured by qPCR. LOX activity was measured in the tears as well. Group-B: LOX expression was measured in epithelium of KC patients (42 eyes) undergoing CXL. Postoperative outcomes were correlated to pre-op LOX status. Group C: LOX expression was measured in preserved lenticules of a single patient with normal pre-op topography developing ectasia post-SMILE (PSE) and in controls (did not develop ectasia, n = 25).

**Results:** Group-A: Significant ( $P < 0.05$ ) reduction in LOX expression and activity was observed in corneal epithelium and tears of KC patients, which also correlated with disease severity. Group-B: Preoperative expression of cone specific LOX and COLIVA1 were significantly ( $P < 0.05$ ) higher in cases with positive cross-linking outcomes. Group-C: Reduced expression of LOX (0.57) and COLIVA1 (0.5) was observed in PSE eyes compared to controls.

**Conclusions:** Reduced pre-existing LOX and collagen expression levels may predispose clinically healthy eyes undergoing refractive surgery to ectasia, due to deficient endogenous cross-linking activity. Similarly, in keratoconic eyes, it may lead to suboptimal cross-linking outcomes. Hence, developing a point-of-care kit to measure these biomarkers in preoperative tears will improve patient selection, risk evaluation, and evidence-based prediction of surgical outcomes.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Meeting Room 1

### Vector Analysis of High ( $\geq 3$ Diopters) Astigmatism Correction Using Small-Incision Lenticule Extraction and Laser In-Situ Keratomileusis

First Author: Tommy **CHAN**

Co-Author(s): George **CHENG**, Vishal **JHANJI**, Alex Lap Ki **NG**, Yan **WANG**

**Purpose:** To compare the astigmatic correction in high myopic astigmatism between small-incision lenticule (SMILE) and laser in-situ keratomileusis (LASIK) using vector analysis.

**Methods:** A total of 105 patients who had correction of myopic astigmatism of greater or equal to 3 diopters (D) were included. Forty patients underwent SMILE and 65 patients underwent femtosecond LASIK. Only the left eye was included for analysis. Visual and refractive results were presented and compared between groups. Vector analysis for astigmatic correction was performed based on the Alpins method.

**Results:** The mean preoperative manifest cylinder was  $-3.42 \pm 0.55$  D for the SMILE group and  $-3.47 \pm 0.49$  D

for the LASIK group ( $P = 0.655$ ). At 3 months, all eyes in each group had an uncorrected distance visual acuity of 20/25 or better. One (2.5% for SMILE; 1.5% for LASIK) eye in each group lost  $\geq 1$  line. There was no significant group difference in the manifest spherical equivalent ( $P = 0.145$ ). A total of 90.0% and 95.4% of eyes were within  $\pm 0.5$  D of the attempted cylindrical correction for the SMILE and LASIK group, respectively ( $P = 0.423$ ). Vector analysis showed comparable target-induced astigmatism ( $P = 0.709$ ), surgically induced astigmatism vector ( $P = 0.449$ ), difference vector ( $P = 0.335$ ), and magnitude of error ( $P = 0.413$ ) between groups. The absolute angle of error was  $1.88 \pm 2.25$  degrees for SMILE and  $1.37 \pm 1.58$  degrees for LASIK ( $P = 0.217$ ).

**Conclusions:** The current study showed that SMILE offered comparable astigmatic correction to LASIK in eyes with high myopic astigmatism.

## Retina (Medical)

Mar 08, 2019 (Fri)

09:00 - 10:30

Venue: Boardroom 3

### Increased Levels of Dickkopf-1 in Vitreous of Patients with Pathologic Myopia and Its Correlation with Axial Length, Subfoveal Choroidal Thickness, and Inflammatory Cytokines

First Author: Manjuan **PENG**

Co-Author(s): Shaochong **ZHANG**

**Purpose:** Dickkopf (DKK)-1 functions as a natural antagonist of the Wnt/ $\beta$ -catenin signaling. The aim of this study was to examine the levels of DKK1 in the vitreous of patients with pathologic myopia (PM), searching for possible correlations of DKK1 with axial length (AL), subfoveal choroidal thickness (SFCT), and other cytokines.

**Methods:** The expression of DKK1 and other cytokines in vitreous samples of 36 patients with pathologic myopia and 32 patients with idiopathic epiretinal membranes (ERM) or macular hole (MH) were examined by using multiplex cytokines detection technology. Spectral-domain optical coherence tomography (OCT) was performed to measure SFCT. AL was obtained by A-scan ultrasonography.

**Results:** The intravitreal levels of DKK1 were markedly increased in the PM group [345.9 pg/mL (155.7 pg/mL, 698.6 pg/mL)] compared with the control group [136.5 pg/mL (91.0 pg/mL, 231.6 pg/mL)] ( $P < 0.0001$ ). Significantly higher levels of IL-6 were present in the PM group [12.5 pg/mL (7.5 pg/mL, 27.4 pg/mL)] compared with the control group [3.3 pg/mL (2.4 pg/mL, 6.8 pg/mL)] ( $P < 0.0001$ ). The levels of IL-8 were also elevated in the PM group [4.6 pg/mL (3.1 pg/mL,

13.5 pg/mL)] compared with the control group [2.3 pg/mL (1.5 pg/mL, 4.0 pg/mL)] ( $P = 0.001$ ). Additionally, we found that correlations of DKK1 were positively correlated with the AL ( $r = 0.615$ ,  $P < 0.0001$ ), SFCT ( $r = -0.533$ ,  $P < 0.0001$ ), and levels of IL-6 ( $r = 0.5757$ ,  $P < 0.0001$ ) and IL-8 ( $r = 0.5002$ ,  $P < 0.0001$ ).

**Conclusions:** It is conceivable that dysregulation of DKK1 is involved in the progression of axial elongation and choroidal thinning in PM patients, thus serving as a potential therapeutic target for patients with PM.

Mar 08, 2019 (Fri)

09:00 - 10:30

Venue: Boardroom 3

### Mitochondrial Morphology Change and the Expression of Mitochondrial Fission/Fusion Genes in RPE Cells Under Oxidative Stress

First Author: Xu **LIU**

**Purpose:** To assess the expression of mitochondrial fission genes (Fis1, Dnmp1, MTP18) and fusion genes (Mfn1, Mfn2) in different concentrations of hydrogen peroxide ( $H_2O_2$ ) under the oxidative damage in ARPE-19 cells.

**Methods:** The obtained ARPE-19 cells were divided into normal control group and oxidative damage groups treated by different concentrations of  $H_2O_2$ . The oxidative damage groups were treated by  $H_2O_2$  at the concentrations of 75, 150, and 200  $\mu$ mol/L respectively for 24 hours. MTT assay was applied for cell viability. The cell morphology change was observed by phase contrast microscope. The mitochondrial morphology change was recorded by transmission electron microscope. The mRNA levels of mitochondrial fission genes and fusion genes were measured by RT-PCR and Real-time PCR.

**Results:** With the increased concentration of  $H_2O_2$ , cells were shrinking aggravatingly and cell death increased. The mitochondrial structures were destroyed with membranes and cristae. RT-PCR results showed the decreased expression of Fis1 gene, compared with the normal control group in different  $H_2O_2$  treatment ( $P < 0.05$ ). The expression of other genes showed no significant change. Real-time PCR results demonstrated that the expression of Fis1 gene decreased with different concentrations of  $H_2O_2$  treatment, whereas the expression of Mfn2 gene increased in the treatment of 200  $\mu$ M  $H_2O_2$ . There were no significant differences of other genes expression.

**Conclusions:** The abnormal expression of mitochondrial fission gene Fis1 and fusion gene Mfn2 caused mitochondrial dysfunction in ARPE - 19 cells, indicating the imbalance of mitochondrial dynamics, which might participate for these cell deaths in oxidative stress environment.

Mar 08, 2019 (Fri)  
09:00 - 10:30  
Venue: Boardroom 3

### Prevalence of Maculopathy as Occupational Hazard in Arc Welders

First Author: Praveena **TANDON**

**Purpose:** To study the prevalence of occupation related phototoxic maculopathy in welders by using spectral domain optical coherence tomography (SD-OCT), and to study if it can occur despite use of protective measures with strict adherence.

**Methods:** This prospective study included 60 Arc welder (18 - 60 years) patients having exposure of at least 2 years in the occupation. Detailed occupational history was taken for each patient. The diagnosis of maculopathy was based on ophthalmoscopic examination and OCT evaluation using Heidelberg spectral domain OCT.

**Results:** Prevalence of welding maculopathy was detected to be 60% by OCT and 56.3% by ophthalmoscopy. Most common finding on ophthalmoscopy was yellowish red lesion at fovea (43.4%) and on OCT was retinal pigment epithelium (RPE) defect with inner segment/outer segment (IS/OS) junction disruption. Decrease in visual acuity was noticed in 50% patients with welding maculopathy. A lesser prevalence (52.38%) was noticed in those taking strict safety measures as compared to those not taking these measures (77.8%). Higher prevalence was observed in patients with longer occupational exposure.

**Conclusions:** This study emphasizes the importance of using standard protective devices. Duration of occupational exposure was noticed to be a risk factor for welding maculopathy. OCT is a noninvasive, sensitive tool to detect the defect. Welders should be educated about the potential ocular hazards of their occupation.

Mar 08, 2019 (Fri)  
09:00 - 10:30  
Venue: Boardroom 3

### Protection of Mitochondria-Targeted Antioxidant Peptide on ARPE-19 Cells Under Oxidative Damage

First Author: Yun **XU**  
Co-Author(s): Yuan **HE**

**Purpose:** To investigate the effect of SS31 on human retinal pigment epithelium cells (ARPE-19 cells) in vitro oxidative damage.

**Methods:** ARPE-19 cells were treated with different concentrations of H<sub>2</sub>O<sub>2</sub> (0, 100, 200, 250, 300 µmol/L) respectively. The cell activity of ARPE-19

cells was measured by MTT assay and the optimal concentration of H<sub>2</sub>O<sub>2</sub> injured cells was determined. The apoptotic model was constructed with 200 µmol/L H<sub>2</sub>O<sub>2</sub> treatment. The cells were divided into blank control group, H<sub>2</sub>O<sub>2</sub> damage group, 10 nmol/LSS31+ H<sub>2</sub>O<sub>2</sub> group, 100 nmol/LSS31+ H<sub>2</sub>O<sub>2</sub> group and 1 µmol/LSS31+ H<sub>2</sub>O<sub>2</sub> group. MTT assay was used to detect the survival rate of the cells and evaluate the optimal SS31 concentration for sequential study, the cellular morphology was observed by inverted phase contrast microscope.

**Results:** Cells disposed in H<sub>2</sub>O<sub>2</sub> were sparse and shrinkage, whereas it could be reversed by adding of SS-31. MTT assay showed that the cells viability of H<sub>2</sub>O<sub>2</sub> damage group at different concentration was lower than the normal group. The cell viability of H<sub>2</sub>O<sub>2</sub> group treated with 200 µmol/L was 63.45% (± 4.18), which was lower than normal control (100%) (P < 0.05). The cell viability in 10 nmol/LSS31+ H<sub>2</sub>O<sub>2</sub>, 100 nmol/LSS31+ H<sub>2</sub>O<sub>2</sub> and 1 µmol/LSS31+ H<sub>2</sub>O<sub>2</sub> were 68.87% (± 8.47), 79.38% (± 7.70), and 80.78% (± 6.65), respectively, which were higher than H<sub>2</sub>O<sub>2</sub> damage group. A highest survival rate was 80.78% (± 6.65) in the concentration of 1 µmol/L SS-31 + H<sub>2</sub>O<sub>2</sub> group, which was statistically significant in comparison with H<sub>2</sub>O<sub>2</sub> alone (P < 0.05).

**Conclusions:** We propose that SS-31 can prevent ARPE-19 cells death from oxidative damage.

Mar 08, 2019 (Fri)  
09:00 - 10:30  
Venue: Boardroom 3

### The Association Between Central Serous Chorioretinopathy and Risk of Depression: A Population-Based Cohort Study

First Author: Yu-Yen **CHEN**

**Purpose:** To investigate the association between central serous chorioretinopathy (CSCR) and the subsequent risk of developing depression. The risk factors associated with depression in CSCR patients were assessed.

**Methods:** A population-based retrospective cohort study using the Taiwan National Health Insurance Research Database was conducted from January 1, 2001 through December 31, 2013. CSCR patients (n = 25,939) and age- and gender-matched control subjects without glaucoma (n = 103,756) were enrolled in the study. Kaplan-Meier curves were generated to compare the cumulative hazard of subsequent depression between the CSCR and control groups. A Cox regression analysis estimated the crude and adjusted hazard ratios (HRs) for depression. Risk factors leading to depression were investigated among the CSCR patients.

**Results:** CSCR patients had a significantly higher cumulative hazard for depression compared to the control group (P < 0.0001). The Cox regression model

indicated that the CSCR group had a significantly higher risk for depression (adjusted HR = 1.33). Within the CSCR group, significant risk factors for depression included age, female gender, low income, and first-onset CSCR. The recent use of steroids prior to CSCR, by all routes of administration, also significantly increased the risk for depression.

**Conclusions:** Patients with CSCR are at significantly greater risk of developing depression. Among CSCR patients, age, female gender, low income, first-onset CSCR, and recent use of steroids prior to CSCR were significant risk factors for depression.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Plenary Hall 3**

### **A 10-Year Retrospective Review of the Real-Life Use of Anti-VEGF in Patients with Age-Related Macular Degeneration in Hong Kong**

*First Author: Ian WONG*

*Co-Author(s): Callie KO, Chi Wai TSANG, Raymond WONG, Lai Ting YIP, Nick FUNG*

**Purpose:** To review the real-life situation regarding the use of anti-vascular endothelial growth factor (anti-VEGF) in patients with age-related macular degeneration in Hong Kong over a 10-year period.

**Methods:** Medical records of patients with AMD treated at the 4 recruiting hospitals in Hong Kong from 2008 to 2017, and those with a minimum follow-up period of 12 months were reviewed. Background demographics, baseline ocular characteristics, and presenting features were reviewed. Treatment outcome, choice of anti-VEGF agents, reimbursement model, switching between agents, and rate of recurrence were reviewed.

**Results:** A total of 759 subjects were included for review. Mean age was  $73.6 \pm 11.5$  years, and 428 (56.4%) were male. An average of  $3.1 \pm 1.2$  injections were given in the first 12 months. Majority (533, 73.7%) were self-paid, while 101 of them (22.8%) were eligible for reimbursement. At baseline mean Snellen mean visual acuity was  $0.29 \pm 0.19$  (logMAR equivalent  $0.81 \pm 0.49$ ). At 12 months, mean Snellen visual acuity was  $0.35 \pm 0.21$  (logMAR equivalent  $0.69 \pm 0.50$ ). The improvement in visual acuity was statistically significant ( $P = 0.0001$ ). Among these, 444 subjects (58.5%) were initially started on ranibizumab, while 259 (34.1%) were initially started in aflibercept. Among those started on ranibizumab, 45% switched to aflibercept when recurrence occurred. However, only less than 10% switched for those who were initially started on aflibercept.

**Conclusions:** The real-world data regarding patients with AMD in Hong Kong over a 10-year period was reported. The phenomenon of switching between

different anti-VEGF agents is not uncommon.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Plenary Hall 3**

### **Aqueous Levels of Cytokines in Eyes with Myopic Macular Degeneration**

*First Author: Chee-Wai WONG*

*Co-Author(s): Ning (Danny) CHEUNG, Gemmy CHEUNG, Andrew TSAI, Yasuo YANAGI*

**Purpose:** To compare differences in the aqueous humor levels of cytokines in highly myopic eyes with or without myopic macular degeneration (MMD) and non-highly myopic controls.

**Methods:** Retrospective clinic-based case control study of 17 eyes with high myopia (HM) (axial length  $\geq 26.5$  mm), and a control group of 14 non-highly myopic eyes, enrolled from the Singapore National Eye Center. MMD, graded according to the META-PM Classification and defined as META-PM category  $\geq 2$ , was present in 10 of 17 eyes (58.8%) with high myopia. Aqueous humor was obtained during cataract surgery and analyzed for the following cytokines: pigment epithelium derived factor (PEDF), matrix metalloproteinase 2 (MMP-2), tissue inhibitor of metalloproteinase (TIMP-2), vascular endothelial growth factor isoform A (VEGF-A), interleukin 8 (IL-8), interleukin 6 (IL-6), C reactive protein (CRP), and angiopoietin 2 (Ang2).

**Results:** Mean AL was  $29.4 \pm 1.3$  mm in the HM with MMD group,  $27.3 \pm 0.6$  mm in the HM without MMD group, and  $24.3 \pm 1.1$  mm in controls ( $P < 0.001$ ). Eyes with MMD were found to have significantly lower VEGF-A levels ( $148 \pm 91$  pg/mL vs  $351 \pm 164$  pg/mL,  $P = 0.004$ ) and higher MMP-2 levels ( $4186 \pm 1658$  pg/mL vs  $2303 \pm 1059$  pg/mL,  $P = 0.01$ ) than control eyes. There were no significant differences in cytokine levels between controls and high myopes without MMD. Both MMP-2 ( $r = 0.60$ ,  $P = 0.001$ ) and VEGF-A were strongly correlated with AL ( $r = -0.72$ ,  $P < 0.001$ ).

**Conclusions:** Lower levels of VEGF-A and higher levels of MMP-2 were observed in eyes with MMD. These cytokines may reflect the underlying processes involved in the pathogenesis of MMD.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Plenary Hall 3**

### **Central Serous Choroidopathy: Epidemiology, Clinical Characteristics, and Influence of Systemic Conditions**

*First Author: Devesh KUMAWAT*

*Co-Author(s): Atul KUMAR, Pranita SAHAY*

**Purpose:** To determine the epidemiology, clinical features, and systemic associations of central serous

choroidopathy (CSC) in an Asian Indian setting.

**Methods:** Cross-sectional ocular and systemic evaluation was done in 116 patients of acute or chronic CSC after Institutional Review Board approval.

**Results:** Patients were mostly young (median age 36 years, range 25 – 73 years), male (77.6%, 90/116), with bilateral disease in 17.2% (20/116), recurrence in 13.8% (16/116) and median presentation of 60 days (range 2 days – 3 years). Systemic evaluation revealed: sleep disturbance in 13.8% (n = 16), anti-tubercular treatment in 14.6% (n = 17), steroid use in 3.4% (n = 8), substance abuse in 20.7% (n = 24), psychiatric illness in 10.3% (n = 12), obesity in 6.9% (n = 8), high risk of sleep apnea in 17.2% (n = 20), hypertension in 18.1% (n = 21), 8AM serum cortisol level above reference level in 3.4% (n = 4), and thyroid disorder in 20.7% patients (n = 24, hypothyroidism in 18, hyperthyroidism in 6).

**Conclusions:** Endogenous abnormalities like sleep apnea, hypertension, and thyroid disorders were associated more commonly than steroid use in CSC patients.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Plenary Hall 3**

### **Clinical Features of Poor Responders in Half-Dose Photodynamic Therapy for Central Serous Chorioretinopathy**

*First Author: Natsuki KUSADA*

*Co-Author(s): Hideki KOIZUMI, Kentaro KOJIMA, Chie SOTOZONO, Nobuhiro TERAU, Tetsuya YAMAGISHI*

**Purpose:** To determine the clinical features of poor responders in half-dose photodynamic therapy (PDT) for central serous chorioretinopathy (CSC).

**Methods:** We retrospectively reviewed 60 CSC patients (54 males and 6 females, mean age 55 years) treated with half-dose PDT. The patients were divided into the following 2 groups: 1) Responder group: patients with resolution of subretinal fluid (SRF) at 3 months post-treatment, and 2) Poor-responder group: patients in whom SRF remained at 3 months post-treatment. Baseline factors [ie, age, sex ratio, symptom duration, corticosteroid exposure, bilateral onset, baseline best corrected visual acuity (BCVA), axial length, central retinal thickness, intrachoroidal structure, rate of descending tract, type of fluorescein angiography (FA) leakage, and PDT lesion diameter] were compared between the 2 groups.

**Results:** Of the 60 patients, there were 53 eyes in the responder group and 7 eyes in the poor-responder group. With statistical significance, the poor-responder group tended to show worse baseline BCVA (logMAR: 0.56 vs 0.22, respectively,  $P < 0.01$ ), and higher rates of focal leakage on FA (100% vs 38%, respectively,  $P < 0.01$ ) than the responder group. Mean choroidal

thickness and large choroidal vessel layer thickness in the responder group significantly decreased from 425  $\mu\text{m}$  and 338  $\mu\text{m}$ , respectively, at baseline to 366  $\mu\text{m}$  and 278  $\mu\text{m}$ , respectively, at 3 months post-treatment ( $P < 0.01$  for both), whereas no significant change was observed in the poor-responder group.

**Conclusions:** VA and FA leakage type at baseline may be predictors of response to half-dose PDT in patients with CSC.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Plenary Hall 3**

### **Comparison of Treatment Outcomes Among Subtypes of Polypoidal Choroidal Vasculopathy in a Multicenter Randomized Controlled Study (EVEREST Study)**

*First Author: Louis LIM*

*Co-Author(s): Wei Kiong NGO, Colin TAN*

**Purpose:** To evaluate the frequency and characteristics of polypoidal choroidal vasculopathy (PCV) subtypes among patients from a multicenter randomized controlled trial, and to determine the impact of the subtypes on clinical outcomes.

**Methods:** Sixty patients with macular PCV from the EVEREST Study were analyzed. The diagnosis of PCV was confirmed by a Central Reading Center using standardized indocyanine green (ICGA) and fluorescein angiography (FA). Type A PCV had polyps with interconnecting channels, Type B had polyps with branching vascular networks with no leakage on FA, and Type C had polyps with branching vascular networks with significant leakage on FA. The visual acuity (VA) and central retinal thickness (CRT) of the PCV subtypes were evaluated.

**Results:** Of the 54 patients who were gradable for PCV subtype, 8 had Type A PCV (14.8%), 27 had Type B (50%), and 19 had Type C (35.2%). Both VA and reduction in retinal thickness varied significantly with PCV subtype. At month 6, Type A PCV had the best VA compared to Types B and C (80.1 letters vs 67.2 vs 50.4 respectively,  $P < 0.001$ ). Type A PCV gained 13 letters vs 8.5 (Type B) and 6.9 (Type C) ( $P < 0.001$ ). The proportion of patients with VA  $\geq 20/40$  was highest for Type A compared to Types B and C (100% vs 51.9% vs 10.5%,  $P < 0.001$ ). Post-treatment, the CRT was thickest for Type C PCV.

**Conclusions:** The PCV subtype affects visual outcomes following treatment. This PCV subtype classification is useful in prognosticating patients presenting with PCV.

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: Plenary Hall 3

### Dexamethasone Implant for Diabetic Macular Edema in Naive Compared to Refractory Eyes. The International Retina Group Real-Life 24 Month Multicenter (IRGRel-DEX) Study

First Author: Adrian **FUNG**

Co-Author(s): Catharina **BUSCH**, Matias **IGLICKI**, Anat **LOEWENSTEIN**, Mali **OKADA**, Dinah **ZUR**

**Purpose:** To investigate the real-life efficacy and safety of intravitreal dexamethasone (DEX) implants for diabetic macular edema (DME) over 24 months, comparing eyes that were treatment-naïve with eyes refractory to anti-VEGF treatment.

**Methods:** This was a multicenter, international, retrospective study. Primary outcome measures were the change in best corrected visual acuity (BCVA) and central subfield thickness (CST) at 24 months of patients who received DEX implants. Safety data (intraocular pressure rise and cataract surgery) were recorded.

**Results:** A total of 130 eyes from 125 patients were included. Baseline BCVA and CST were similar for naïve ( $n = 71$ ) and refractory eyes ( $n = 59$ ). Both groups improved significantly in vision after 24 months ( $P < 0.001$ ). However, naïve eyes gained significantly more vision than refractory eyes ( $+11.3 \pm 10.0$  versus  $7.3 \pm 2.7$  letters,  $P = 0.01$ ) and were more likely to gain  $\geq 10$  letters (OR 3.31, 95% CI 1.19-9.24,  $P = 0.02$ ). At 6, 12, and 24 months, CST was significantly decreased compared to baseline in both naïve and refractory eyes. CST was lower in naïve compared to refractory eyes at 12 months (CST  $268 \pm 60$  versus  $326 \pm 131$  microns,  $P = 0.01$ ), but by 24 months this was no longer statistically significant (CST  $279 \pm 61$  versus  $313 \pm 125$  microns,  $P = 0.10$ ).

**Conclusions:** Over a follow-up of 24 months, vision improved in diabetic macular edema eyes after treatment with dexamethasone implants, both in eyes that were treatment-naïve and eyes refractory to anti-VEGF treatment; however, improvement was greater in naïve eyes.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Plenary Hall 3

### Efficacy of Adjuvant Topical Timolol-Dorzolamide With Intravitreal Bevacizumab Injection in Diabetic Macular Edema: Contralateral Eye Pilot Study

First Author: Mojtaba **ABRISHAMI**

**Purpose:** To evaluate the efficacy of adjuvant topical

Timolol-Dorzolamide with intravitreal bevacizumab (IVB) injection on anatomic and functional outcomes in eyes with diabetic macular edema (DME).

**Methods:** In a prospective contralateral eye, interventional pilot study at a tertiary referral academic center, patients with bilateral DME who were treatment naïve were enrolled. Enrolled patients received a regimen of topical dorzolamide-timolol twice daily in the right eye and 3 bilateral monthly IVB injection 1.25 mg/ 0.05 mL were planned. Baseline central macular thickness (CMT) measured by spectral-domain optical coherence tomography and clinical data, including best corrected visual acuity (BCVA) and intraocular pressure (IOP), were obtained at enrollment and 1 month after the third injection.

**Results:** Eleven patients (7 female) with DME were included. BCVA and CMT were improved in both eyes and IOP was decreased in the right eye but was not changed in the left eye. In repeated measures ANOVA analysis, decrease in CMT, and improvement in BCVA was significant in the right eye.

**Conclusions:** Data of our study suggest that adjuvant topical dorzolamide-timolol in combination with IVB may be further reducing central macular thickness in eyes with DME.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Plenary Hall 3

### Efficacy of Intravitreal Aflibercept Administered Using Treat-and-Extend Regimen Over 2 Years in Patients with Neovascular Age-Related Macular Degeneration: Baseline Characteristics of ARIES

First Author: Paul **MITCHELL**

Co-Author(s): Frank G **HOLZ**, Philip **HYKIN**, Edoardo **MIDENA**, Eric **SOUJED**, Sebastian **WOLF**

**Purpose:** To assess whether intravitreal aflibercept (IVT-AFL) administered in an early-start treat-and-extend (T&E) regimen (initiated after the first 8-week treatment interval) is noninferior to IVT-AFL administered in a late-start T&E regimen (initiated at the end of Year 1) in patients with neovascular age-related macular degeneration (nAMD).

**Methods:** ARIES (NCT02581891) is a multicenter, randomized, open-label, active-controlled, parallel-group, Phase 4/3b study that compared the efficacy of IVT-AFL administered by 2 different T&E regimens over 2 years in treatment-naïve patients with nAMD. Here we presented the baseline data of the study. All patients received 3 initial monthly doses of IVT-AFL (Weeks 0, 4, 8), followed by a subsequent injection at an 8-week treatment interval (Week 16). At Week 16, patients were randomized 1:1 to an early-start T&E

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arm [T&E regimen extended by 2 weeks or an initial 4-week interval (maximum 16 weeks)] or a late-start T&E arm (IVT-AFL 2q8 regimen). The primary endpoint was the mean change in best corrected visual acuity (BCVA) (Early Treatment Diabetic Retinopathy letter score) from randomization to Week 104.

**Results:** At Week 16, 271 patients were randomized to an early- or late-start T&E regimen. The mean age was 76.5 years; more than half of patients were female (56.8%). Mean baseline BCVA was 60.4 ETDRS letters and mean baseline central retinal thickness was 472.9  $\mu\text{m}$ .

**Conclusions:** This Phase 3b/4 study will compare the efficacy of IVT-AFL, administered by either an early-start or a late-start T&E regimen, in patients with nAMD.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Plenary Hall 3**

### Eplerenone for Chronic Central Serous Chorioretinopathy with Cystoid Macular Edema

*First Author: Vignesh T P*

**Purpose:** To evaluate the efficacy of Eplerenone in the treatment of chronic central serous chorioretinopathy with cystoid macular edema.

**Methods:** Seven eyes of 6 patients with chronic central serous chorioretinopathy (CSCR), defined as CSCR persisting for more than 3 months, with cystoid macular edema were included in the study. Fundus fluorescein angiography (FFA) and optical coherence tomography (OCT) was done in all patients, and oral Eplerenone 25 mg once daily was started in all patients and followed up monthly for 3 months with OCT and serum potassium monitoring monthly.

**Results:** Four eyes of 2 patients showed complete resolution of sub-retinal fluid (SRF) as well as cystoid macular edema (CME). One eye of a patient showed a significant reduction in SRF and CME, and 2 eyes of a patient showed persistent SRF and CME. No adverse effects were observed in these patients.

**Conclusions:** Eplerenone, a mineralocorticoid antagonist used as an antihypertensive agent, has been recently used in the treatment of central serous chorioretinopathy with beneficial effects. Our study also has shown a beneficial effect of Eplerenone in the treatment of Chronic central serous chorioretinopathy with cystoid macular edema, with resolution of SRF as well as CME. Eplerenone can be considered a therapeutic in chronic CSCR when the leaks are diffuse and extensive, where laser or photodynamic therapy (PDT) has to be applied on multiple large areas, in bilateral cases, in cases where patients cannot afford PDT, and in cases of CSCR with chronic CME. A large

prospective study is warranted to study the efficacy of Eplerenone in Chronic CSCR.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Plenary Hall 3**

### Evaluation of Indocyanine Green Angiographic Features in Symptomatic Macular Polypoidal Choroidal Vasculopathy Over 24 Months: Results from the EVEREST II Study

*First Author: Colin TAN*

*Co-Author(s): Tock-Han LIM, Soumil PARIKH*

**Purpose:** To evaluate changes in polyps and the branching vascular network (BVN) in patients with symptomatic macular polypoidal choroidal vasculopathy (PCV).

**Methods:** EVEREST II was a 24-month, randomized, multicenter study. A total of 322 patients diagnosed with PCV were randomized 1:1 to ranibizumab (RBZ) and verteporfin photodynamic therapy (vPDT), combination therapy (n = 168), or RBZ monotherapy (n = 154). Indocyanine green angiography (ICGA) were graded by the central reading center at baseline and months 3, 6, 12, and 24.

**Results:** At baseline, the number of polyps in both treatment arms was comparable. At month 12, combination therapy was superior to RBZ monotherapy in achieving complete polyp regression (CPREG; 69.7% vs 33.8%;  $P < 0.0001$ ) and this superiority was maintained at 24 months (56.6% vs 26.7%;  $P < 0.0001$ ). In the combination arm, the proportions of patients with CPREG were comparable at months 3, 6, and 12 (71.4%, 71.3% and 69.7%, respectively) with a slight decrease at month 24 (56.6%). In the monotherapy arm, the proportion increased from 21.7% at month 3 to 30.4% at month 6 and 32.6% at month 12, decreasing slightly at month 24 (26.7%). The percent reduction in polyp size from baseline was numerically higher in the combination arm than in the monotherapy arm: 65.2% vs 32.8% at month 12 and 52.3% vs 33.7% at month 24. Active BVN size increased from baseline in both treatment arms.

**Conclusions:** RBZ and vPDT combination therapy was superior to RBZ monotherapy in PCV patients in terms of CPREG and was more effective in reducing polyp size and regulating BVN size over 24 months.

Mar 09, 2019 (Sat)  
09:00 - 10:30  
Venue: Plenary Hall 3

### Global Assessment of Retinal Arteriolar and Capillary Microcirculations Using Fundus Photographs and Optical Coherence Tomography Angiography in Diabetic Retinopathy

First Author: Tien-En **TAN**

Co-Author(s): Jacqueline **CHUA**, Quang **NGUYEN**, Gavin, Siew Wei **TAN**, Daniel **TING**, Tien-Yin **WONG**

**Purpose:** To evaluate retinal arteriolar and capillary microvasculature in patients with and without vision-threatening diabetic retinopathy (VTDR).

**Methods:** Cross-sectional study, involving 49 diabetics from a tertiary ophthalmology referral center in Singapore. Optic disc-centered fundus photographs were analyzed using software [Singapore I Vessel Assessment (SIVA)] to measure arteriolar and venular parameters, including central retinal arteriolar equivalent (CRAE), central retinal venular equivalent (CRVE), and fractal dimension (FD). 3x3-mm macula optical coherence tomography angiography (OCT-A) scans were used to measure capillary parameters, including capillary density index (CDI) and capillary FD of superficial (SVP) and deep (DVP) vascular plexuses. Associations of arteriolar and capillary parameters with VTDR status in right eyes were assessed using logistic regression analysis.

**Results:** Eyes with VTDR (n = 20) had narrower CRAE (135.7 vs 151.3; P = 0.009) and sparser SVP CDI (0.336 vs 0.354; P = 0.001) than eyes without VTDR (n = 29). Capillary parameters (pseudo-R<sup>2</sup> 0.651; P < 0.001) were more correlated with VTDR than arteriolar and venular parameters (pseudo-R<sup>2</sup> 0.367; P = 0.080). However, combining both arteriolar and capillary parameters provided the strongest association with VTDR (pseudo-R<sup>2</sup> 0.725; P = 0.002). After adjusting for age and gender, lower CRAE [odds ratio (OR) 0.35; P = 0.009], arteriolar FD (OR 0.43; P = 0.030) and SVP CDI (OR 0.23; P = 0.004) were associated with VTDR.

**Conclusions:** Retinal arteriolar and capillary microcirculations are both affected in VTDR, reflecting widespread microvascular impairment in perfusion.

Mar 09, 2019 (Sat)  
11:00 - 12:30  
Venue: Plenary Hall 3

### Intravitreal Aflibercept Treat-and-Extend Dosing for Wet Age-Related Macular Degeneration: ALTAIR 96-Week Results

First Author: Yoshimi **NAGAI**

Co-Author(s): Masato **KOBAYASHI**, Masahito **OHJI**, Annabelle **OKADA**, Yasuhiro **TERANO**, Kanji **TAKAHASHI**

**Purpose:** To evaluate 96-week efficacy and safety of intravitreal aflibercept (IVT-AFL) injections with 2 different treat-and-extend (T&E) dosing regimens in Japanese patients with wet age-related macular degeneration.

**Methods:** Randomized, open-label Phase 4 study conducted in Japan. Patients received 3 initial monthly IVT-AFL injections, and were randomized 1:1 at Week 16 to T&E groups with either a 2-week adjustment (2W-Adj) or a 4-week adjustment (4W-Adj).

**Results:** A total of 246 patients were included. Baseline demographics were similar between groups. Mean change in best corrected visual acuity from baseline to Week 96 was 7.6 versus 6.1 Early Treatment Diabetic Retinopathy Study letters in the 2W-Adj and 4W-Adj groups, respectively. The proportion of patients who could be extended to 16 weeks and not shortened was similar between groups (41.5% vs 42.3%). Incidence of any serious adverse events (SAE) was similar between groups (16.9% vs 18.7%). The most common ocular SAE was cataracts (2.4% vs 1.6%).

**Conclusions:** Improved visual acuity with an extended dosing interval was seen with 2 different T&E dosing regimens of IVT-AFL. The safety profile of IVT-AFL was consistent with previous reports.

Mar 09, 2019 (Sat)  
11:00 - 12:30  
Venue: Plenary Hall 3

### PLANET Study: 2-Year Anatomical and Morphological Outcomes with Intravitreal Aflibercept Monotherapy Versus Aflibercept Plus Rescue Photodynamic Therapy Assessed by Optical Coherence Tomography

First Author: Gemmy Chui Ming **CHEUNG**

Co-Author(s): Shih-Jen **CHEN**, Tomohiro **IIDA**, Sergio **LEAL**, Won Ki **LEE**, Eric **ZHANG**

**Purpose:** To describe anatomical and morphological outcomes in patients with polypoidal choroidal vasculopathy (PCV) receiving intravitreal aflibercept (IVT-AFL) monotherapy or IVT-AFL plus rescue photodynamic therapy (PDT) in the PLANET study. Outcomes were assessed by optical coherence tomography (OCT) and measured by reading center

assessment (RCA), then compared with outcomes evaluated by investigator assessment (IA).

**Methods:** Exploratory analysis included percent of patients with subretinal fluid (SRF) assessed by OCT and presenting with serous/hemorrhagic pigment epithelial detachment (PED). These outcomes were evaluated (PED by RCA only, SRF by IA and RCA) for both IVT-AFL monotherapy and IVT-AFL plus rescue PDT groups at Week 96.

**Results:** At Week 96, the percentage of patients with no SRF on OCT was similarly high for IVT-AFL monotherapy and IVT-AFL plus rescue PDT: 73.5% versus 70.1% (RCA) and 83.1% versus 81.0% (IA), respectively. The percent of patients with PED (RCA only) was similar in both treatment groups: 4.4% versus 4.1%. The most frequent ocular adverse events were conjunctival hemorrhage (6.4%) in the IVT-AFL monotherapy group and dry eye (6.8%) in the IVT-AFL plus rescue PDT group.

**Conclusions:** Results from the 2-year PLANET study of patients with PCV showed positive outcomes, which were similar by RCA or IA evaluation for SRF, in both IVT-AFL monotherapy and IVT-AFL plus rescue PDT treatment groups. These findings support the robustness of the PLANET study results, where treatment decisions were driven by IA.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Plenary Hall 3**

### **PLANET Study: Year 2 Treat-and-Extend Intravitreal Aflibercept Use in Patients with Polypoidal Choroidal Vasculopathy**

*First Author: Won Ki LEE*

*Co-Author(s): Tatsuro ISHIBASHI, Sergio LEAL, Paul MITCHELL, Yuichiro OGURA, Tien-Yin WONG*

**Purpose:** To evaluate 96-week outcomes in patients with polypoidal choroidal vasculopathy (PCV) utilizing a treat-and-extend (T&E) intravitreal aflibercept (IVT-AFL) regimen in the PLANET study.

**Methods:** From Weeks 52 to 96, patients not requiring rescue photodynamic therapy (PDT) could have their treatment intervals extended by 1- to 2-week increments each visit, at investigator's discretion. Patients were randomized at Week 12 to IVT-AFL plus sham PDT (IVT-AFL monotherapy) or IVT-AFL plus rescue PDT.

**Results:** In IVT-AFL monotherapy and IVT-AFL plus rescue PDT groups, respectively, 57.9% and 51.9% patients reached  $\geq 10$  weeks treatment intervals; 41.2% and 37.0% reached intervals of  $\geq 12$  weeks. Mean best corrected visual acuity (BCVA) change from baseline to Week 96 was +11.1 and +11.0 Early Treatment Diabetic Retinopathy Study (ETDRS) letters ( $\geq 10$ -week group) and +10.5 and +11.5 ETDRS letters ( $\geq 12$ -week

group). Mean number of injections from Weeks 52 to 96 was 4.1 and 4.4 ( $\geq 10$ -week group) and 3.9 and 4.2 ( $\geq 12$ -week group), respectively. Over 96 weeks, 15.9% patients in IVT-AFL monotherapy and 18.0% in IVT-AFL plus rescue PDT groups met the rescue criteria and gained +2.6 and 0.0 letters, respectively. Most frequent ocular adverse events were conjunctival hemorrhage (6.4%) in IVT-AFL monotherapy group and dry eye (6.8%) in IVT-AFL plus rescue PDT group.

**Conclusions:** At 2 years, patients receiving IVT-AFL monotherapy in a T&E regimen had considerable improvements in visual and anatomical outcomes, similar to those with fixed dosing in Year 1, but with fewer injections. Furthermore, IVT-AFL was noninferior to IVT-AFL plus rescue PDT in patients with PCV.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Plenary Hall 3**

### **Patterns of Hydroxychloroquine and Chloroquine Retinopathy in Thai Patients**

*First Author: Nantinee VILAINERUN*

*Co-Author(s): Prut HANUTSAHA*

**Purpose:** To evaluate patterns of Hydroxychloroquine (HCQ) and Chloroquine (CQ) retinopathy in Thai patients.

**Methods:** Retrospective observational study. The medical records of patients taking HCQ and CQ who visited ophthalmology department for retinopathy screening from January 1st 2016 to December 31st 2016 were reviewed for spectral domain optical coherence tomography, computed tomography visual fields, and fundus autofluorescence for evidence of drug-induced retinopathy. Retinopathy patterns were classified as parafoveal (retinal changes 2 - 7 degrees from fovea or within central 2.5 mm), perifoveal (retinal changes greater than 8 degrees from fovea), and mixed (retinal changes in both parafoveal and perifoveal area).

**Results:** Among 930 patients screened in 2016, 25 (3.2%) of 771 and 26 (16.3%) of 159 were diagnosed with toxicity in HCQ and CQ group, respectively. Of total 25 patients with HCQ retinopathy, 1 patient with Bull's eye retinopathy was excluded, 18 (75%) patients had typical parafoveal pattern, and 6 (25%) patients had perifoveal pattern. Of 26 patients with CQ retinopathy, 3 patients with Bull's eye retinopathy were excluded, 19 (82%) had parafoveal pattern, 2 (8.6%) had perifoveal pattern, and 2 (8.6%) had mixed pattern. We also noticed that patients with perifoveal pattern, though they were the minority, were often delayed diagnosis due to previously unrecognized patterns of retinal damage and an inappropriate screening test (CTVF 10-2).

**Conclusions:** Parafoveal pattern was predominant among Thai patients in both HCQ and CQ group.

However, Thai ophthalmologists should be able to recognize perifoveal retinopathy more promptly by using appropriate screening exam (an oct macula and CTVF of at least 24 degrees).

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Plenary Hall 3**

### **Phase I/II Study: Safety and Bioactivity of Carotuximab (DE-122) for Refractory Wet Age-Related Macular Degeneration**

*First Author: Harvey UY*

*Co-Author(s): Raymund ANGELES, Victor GONZALEZ, Naveed SHAMS*

**Purpose:** Carotuximab is a novel antibody to endoglin, a receptor expressed on proliferating endothelium, including in choroidal neovascularization, that is essential for angiogenesis and upregulated following anti-vascular endothelial growth factors (VEGFs). Concurrent targeting of endoglin and VEGF potentially inhibits angiogenesis in preclinical models. This Phase I/II study assessed the safety, tolerability, and bioactivity of a single intravitreal (IVT) injection of 4 escalating dose levels of carotuximab in patients with wet AMD refractory to anti-VEGF therapy.

**Methods:** Open-label, dose-escalation, sequential-cohort study of 12 patients (n = 3 per dose) with refractory wet AMD on current anti-VEGF therapy who received a single IVT injection of carotuximab in the study eye and were followed for up to 90 days. Rescue therapy with anti-VEGF therapy was allowed at Day 8 and 60 if rescue criteria were met.

**Results:** Twelve patients received a single IVT injection of carotuximab in the study eye without a serious adverse event. One adverse event (yellowish deposits in the vitreous) was reported to be related to the drug that resolved spontaneously. Bioactivity (decrease in central subfield thickness, improvement in visual acuity, and/or decreased fluorescein leakage) was observed in 8 of 12 patients.

**Conclusions:** A single IVT injection of carotuximab was well tolerated in patients with refractory wet AMD, with evidence of bioactivity.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Plenary Hall 3**

### **Progressive Retinal Neurodegeneration and Microvascular Change in Diabetic Retinopathy: A Longitudinal Study Using Optical Coherence Tomography Angiography**

*First Author: Kiyoun KIM*

*Co-Author(s): Eung Suk KIM, Seung Young YU*

**Purpose:** To investigate association between

progressive macular ganglion cell/inner plexiform layer (mGCIPL) thinning and change of optical coherence tomography angiography (OCT-A) derived microvascular parameters in early stage of diabetic retinopathy (DR).

**Methods:** A total of 41 eyes presented with no DR or mild non-proliferative DR at baseline and 20 healthy controls were recruited. All participants underwent structural-domain OCT and OCT-A at baseline and 6, 12, 18, and 24 months. Change of mGCIPL thickness and OCT-A metrics including FAZ area and FAZ circularity, vessel density, and perfusion index were measured. Correlations between mGCIPL thickness and OCT-A metrics were explored using regression models.

**Results:** Average progressive mGCIPL loss was 0.45  $\mu\text{m}$  per year. Three microvascular parameters have been significantly impaired over 24 months compared to baseline (FAZ area: 0.34 to 0.36  $\text{mm}^2$ , VD: 18.9 to 18.5/mm, PI: 0.35 to 0.34). A strong positive correlation was found between loss of mGCIPL and vessel density from baseline to 24 months. ( $r = 0.817$ ,  $P < 0.001$ ). Multivariable regression analysis showed that thinner baseline mGCIPL and greater loss of mGCIPL thickness ( $B = 0.658$ ,  $P < 0.001$ ) were significantly associated with change of vessel density.

**Conclusions:** In early stage of DR, progressive structural retinal neurodegeneration and parafoveal microvascular change seems to be highly linked process. Advanced mGCIPL thinning might precede microvascular impairment in early DR.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Plenary Hall 3**

### **RGC-IPL Thickness and Choroidal Thickness in SD-OCT as a Tool for Early Prediction of Hydroxychloroquine Retinal Toxicity**

*First Author: Remya PAULOSE*

**Purpose:** To detect early predictors of hydroxychloroquine (HCQ) retinal toxicity before it is clinically evident using spectral domain optical coherence tomography (SD-OCT). Objectives of the study included 1. To compare choroidal thickness and retinal ganglion cell- inner plexiform (RGC- IPL) layer thickness in HCQ patients and control group; 2. To detect the correlation between the choroidal thickness and RGC-IPL thickness with duration of HCQ intake and cumulative dose.

**Methods:** Prospective case-control study conducted from February 2017 to June 2018. A total of 100 eyes of 50 patients on treatment with HCQ with no clinical evidence of retinopathy were assigned in the study group and were compared to control group. Further subgroup analysis was done in patients with "flat foveal pit" and those with no foveal pit flattening. Presence of disorders such as diabetes mellitus, neurodegenerative

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diseases, glaucoma, etc were excluded.

**Results:** Average RGC-IPL thickness of HCQ group (mean:  $77.88 \pm 8.7 \mu\text{m}$ ) was significantly thinner than that of control group ( $P < 0.05$ ). Average choroidal thickness of HCQ group (mean:  $303.54 \pm 63.78 \mu\text{m}$ ) was also significantly thinner than control group ( $P < 0.05$ ). There was positive correlation between patients in “flat foveal pit” group with respect to the choroidal thickness. However, a negative correlation was found between the cumulative dose and the RGC-IPL thickness.

**Conclusions:** HCQ group showed significant thinning of the choroid and RGC-IPL thickness and hence may be used as an objective parameter to assess early HCQ induced retinal toxicity.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Plenary Hall 3**

### Real-World Data of Intravitreal Aflibercept for Diabetic Macular Edema: 6-Month Outcomes of Japan Postmarketing Surveillance

*First Author: Masahiko **SUGIMOTO***

*Co-Author(s): Mineo **KONDO**, Toshiaki **SAKAGUCHI**, Yasuhiro **TERANO***

**Purpose:** To assess the safety and effectiveness of intravitreal aflibercept (IVT-AFL) in patients with diabetic macular edema (DME) in Japan.

**Methods:** J-PMS DME is a prospective, multicenter, observational, regulatory study that is monitoring 24-month outcomes following IVT-AFL for DME. Safety, vision, and anatomic outcomes at 6 months were assessed as an interim analysis. Safety data from 508 patients and efficacy data from 399 patients were analyzed. Descriptive data analysis was performed using mean and standard deviation as appropriate.

**Results:** Mean age of patients was  $64.9 \pm 11.2$  years. The most commonly reported serious adverse events were cerebral infarction (0.79%) and retinal detachment (0.39%). Mean best corrected visual acuity (BCVA) at baseline and at Month 6 were 0.43 logMAR [63.6 Early Treatment Diabetic Retinopathy Study (ETDRS) letters] and 0.36 logMAR (67.2 ETDRS letters), respectively. Mean central retinal thicknesses (CRT) at baseline and at Month 6 were  $444.3 \mu\text{m}$  and  $353.9 \mu\text{m}$ , respectively. Mean number of IVT-AFL injections over 6 months was  $2.4 \pm 1.4$ .

**Conclusions:** The safety profile of IVT-AFL was similar to that seen in the pivotal studies in other indications. The low number of injections may be associated with the lower mean gains in vision compared to the pivotal studies.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Plenary Hall 3**

### Real-World Data of Intravitreal Aflibercept for Myopic Choroidal Neovascularization: 6-Month Outcomes of Japan Post-Marketing Surveillance

*First Author: Tae **YOKOI***

*Co-Author(s): Kyoko **OHNO-MATSUI**, Toshiaki **SAKAGUCHI**, Yasuhiro **TERANO***

**Purpose:** To assess the safety and effectiveness of intravitreal aflibercept (IVT-AFL) in patients with myopic choroidal neovascularization (mCNV) in Japan.

**Methods:** Japan post-marketing surveillance (J-PMS) mCNV is a prospective, multicenter, observational, regulatory study that is monitoring 12-month outcomes following IVT-AFL for mCNV. Safety data from 275 patients and effectiveness data from 226 patients were assessed as an interim analysis of 6 months.

**Results:** Mean age, refractive error, and axial length were  $66.3 \pm 13.2$  years (mean  $\pm$  SD),  $-8.9 \pm 5.8$  diopters, and  $28.7 \pm 2.4$  mm, respectively. 72.4% were female. Mean number of IVT-AFL injections was  $2.0 \pm 1.1$ . Serious adverse events (SAEs) and adverse reactions (ARs) occurred in 0.73% and 0.36%, respectively. Mean changes in best corrected visual acuity (BCVA) and central retinal thicknesses (CRT) from baseline to Month 6 were -0.19 logMAR [+9.5 Early Treatment Diabetic Retinopathy Study (ETDRS) letters] and  $-63 \mu\text{m}$  (Baseline; BCVA 0.59 logMAR (55.4 ETDRS letters), CRT  $332.4 \mu\text{m}$ ).

**Conclusions:** These real-world data were consistent with the known safety profile of IVT-AFL. Mean change in BCVA and CRT improved through 6 months.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Plenary Hall 3**

### Relation Between Mean Platelet Volume and Central Retinal Vein Occlusion in Hypertensive Patients

*First Author: Pritam **BAWANKAR***

*Co-Author(s): Pushkar **DHIR**, Diva **MISRA**, Preetam **SAWANT**, Awaneesh **UPADHYAY***

**Purpose:** To study the relationship between mean platelet volume (MPV) and central retinal vein occlusion (CRVO) in hypertensive patients.

**Methods:** Hospital-based, retrospective, case-control design. A hundred patients with a known history of hypertension diagnosed with CRVO served as the sample group. One hundred age and sex-matched patients with the sample group, having a sole history of hypertension without any other systemic diseases

and a best corrected visual acuity of 20/20 in both eyes, served as the control group. CRVO was diagnosed based on clinical examination. All cases and control subjects underwent complete ocular examination. MPV, platelet count, hemoglobin, white blood cell count, and hematocrit parameters were recorded in both the groups. The data of patients with CRVO was compared with the control subjects. The confidence interval was set at 95% with a P value of < 0.05.

**Results:** MPV was significantly higher among hypertensive cases diagnosed with CRVO when compared with the hypertensive control group ( $8.059 \pm .016$  vs  $7.442 \pm 0.15$  fL, respectively;  $P < 0.001$ ). The platelet count was lower in the control group, but the difference did not reach a statistically significant level. The systolic blood pressure was significantly higher in the hypertensive cases group with central retinal vein occlusion.

**Conclusions:** Our study concluded that mean platelet volume was statistically increased in central retinal vein occlusion patients who were hypertensive. The present study showed that platelet activation has a crucial role in the pathogenesis of CRVO in hypertensive cases, and further studies are mandatory regarding its potential use as a prognostic biomarker in patients of CRVO.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Plenary Hall 3**

### **Safety and Bioavailability of Complete and Half Dose Intravitreal Ziv-Aflibercept Injection in an Experimental Model: Contralateral Eye Study**

*First Author: Mojtaba **ABRISHAMI***

*Co-Author(s): Elham **ASHRAFI**, Elham **DELRIH**, Alireza **LASHAY***

**Purpose:** To evaluate the safety and bioavailability of complete and half dose of intravitreal ziv-aflibercept (IVZ) in experimental model.

**Methods:** Thirty-two eyes of 16 male rabbits received one IVZ under anesthesia. All right and left eyes respectively received 1250 and 625  $\mu\text{g}/0.05$  mL of ziv-aflibercept. Then, rabbits were randomly allocated to 4 groups. The rabbits were euthanized at predesignate intervals (at 24, 168, 336, and 720 hours) and the eyes were enucleated. Indirect ophthalmoscopy, vitreous sampling, and electrophysiological recordings were obtained before euthanization. Histological examination was performed after enucleation. Vitreous samples were evaluated by enzyme-linked immunosorbent assay (ELISA) to measure the concentration of aflibercept.

**Results:** No serious drug-related ocular inflammation and toxicity or systemic adverse events were identified. ERG findings showed no significant difference to

the baseline measurements. Remained vitreal concentration of ziv-aflibercept injection for the 625  $\mu\text{g}/\text{mL}$  group were 416, 349, 124, 41.2, and 18.1 ( $\pm 10$   $\mu\text{g}/\text{mL}$ ) and for the 1250 ( $\mu\text{g}/\text{mL}$ ) group were 833, 737, 284, 87.3, and 38.2 ( $\pm 10$   $\mu\text{g}/\text{mL}$ ), at 0, 24, 168, 336, and 720 hours after injection, respectively. The vitreous concentration of aflibercept was analyzed by one-compartment model. The area under curve from time 0 to the end point was 147637 hours $\times\mu\text{g}/\text{mL}$  for the complete dose group (1250  $\mu\text{g}/0.05$  mL) and 68498 hours $\times\mu\text{g}/\text{mL}$  for the half dose group (625  $\mu\text{g}/0.05$  mL). The assessed vitreous half-life ( $T_{1/2}$ ) of ziv-aflibercept was 113 hours in both groups.

**Conclusions:** IVZ proved to be safe and well-tolerated. It seems to be a cost-effective therapeutic option for the retinal vascular diseases. However, the long-term safety and efficacy of intravitreal ziv-aflibercept remains unknown.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Plenary Hall 3**

### **Screening Failure Rates in the EVEREST II Clinical Trial Reveal the Challenges in the Diagnosis of Symptomatic Macular Polypoidal Choroidal Vasculopathy**

*First Author: Colin **TAN***

*Co-Author(s): Soumil **PARIKH***

**Purpose:** Some retinal diseases may appear similar to polypoidal choroidal vasculopathy (PCV) on initial assessment and result in misdiagnosis of the clinical condition. We aimed to evaluate the diagnoses of patients initially reported as PCV by EVEREST II study investigators but subsequently excluded from the trial following Central Reading Center (CRC) evaluation.

**Methods:** EVEREST II was a 24-month, randomized, double-masked, multicenter study that compared the efficacy and safety of combination therapy of ranibizumab 0.5 mg and verteporfin photodynamic therapy with ranibizumab monotherapy in PCV. The presence of PCV eligibility for enrollment were confirmed by the CRC using a standardized reading protocol. The definitive clinical diagnosis of all cases not included in the study was made after evaluation of the various imaging modalities.

**Results:** Overall, 491 participants were screened by the CRC of which 88 (17.9%) were diagnosed as non-PCV. The most common retinal disease mistakenly diagnosed as PCV was typical neovascular (wet) age-related macular degeneration (AMD) (66 patients, 75.0%), of which the majority were occult choroidal neovascularization (CNV) with no classic component (53.0%) or minimally classic CNV (31.8%) lesions. Other retinal conditions included non-neovascular AMD (11.4%), central serous chorioretinopathy (5.7%), retinal angiomatous proliferation (3.4%), and

microaneurysms (1.1%).

**Conclusions:** Several retinal diseases were found to mimic PCV on initial assessment, the most common being wet AMD. The use of well-defined, stringent criteria and evaluation of all imaging modalities ensured that a definitive and accurate diagnosis of PCV cases can be made. This is important to ensure appropriate treatment.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Plenary Hall 3

### Short-Term Real-World Outcomes in Patients Undergoing Intravitreal Conbercept for Neovascular Age-Related Macular Degeneration

First Author: Xinxiao **GAO**

Co-Author(s): Tingting **HONG**, Zicheng **MA**, Jun **WANG**, Ran **YAN**

**Purpose:** To investigate the short-term visual and anatomical outcomes of intravitreal conbercept for neovascular age-related macular degeneration (AMD).

**Methods:** A total of 72 consecutive AMD patients who had at least 6 months follow-up receiving pro-re-nata conbercept treatment from June 2015 to August 2018 were evaluated. Visual acuity (VA) and central macular thickness (CMT) at baseline, 3 months, and 6 months after initiating treatment were collected.

**Results:** The mean VA improved significantly from  $41.3 \pm 15.5$  letters at baseline to  $45.2 \pm 13.6$  letters 6 months following treatments ( $P < 0.001$ ). The CMT decreased from  $456.15 \pm 113.22 \mu\text{m}$  at baseline to  $283.25 \pm 58.71 \mu\text{m}$  at 6 months ( $P < 0.001$ ). Patients underwent a mean of 3.2 injections during the follow-up of 6 months. No severe ocular or systemic adverse events were observed.

**Conclusions:** This real-life practice indicated that intravitreal conbercept was an effective and safe treatment for patients with AMD over 6 months of follow-up.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Plenary Hall 3

### The Short-Term Efficacy and Safety of Intravitreal Aflibercept in Korean Wet Age-Related Macular Degeneration Patients: Based on 2014~2017 Korean Aflibercept Post Marketing Surveillance

First Author: Min **SAGONG**

Co-Author(s): Yoenjung **LEE**, Junyeop **LEE**, Dong Hyoun **NOH**, Gahyung **RYU**

**Purpose:** To investigate the short-term efficacy and

safety of intravitreal aflibercept (IVT-AFL) for wet age-related macular degeneration (wAMD) patients in Korean clinical practice.

**Methods:** Korean Aflibercept Post Marketing Surveillance is an ongoing study conducted in 78 institutions. We analyzed the data from 1301 eyes of 1301 patients collected from May 2, 2014 to November 17, 2017. For the efficacy analysis, the mean changes of visual acuity (VA) and central retinal thickness (CRT) from baseline at 4 months and 8 months were analyzed using last observation carried forward. To define the determinants for VA and CRT at 8 months, multiple regression analysis and logistic regression analysis were conducted. The incidence rates of adverse events and adverse drug reactions were also analyzed.

**Results:** At 4 and 8 months, 91.62% and 90.70% of patients improved and maintained vision (VA loss  $< 0.3$  logMAR units), respectively. Mean VA increased from  $0.66 \pm 0.44$  at baseline to  $0.56 \pm 0.46$  and  $0.54 \pm 0.46$  logMAR ( $P < 0.0001$ ,  $P < 0.0001$ ) at 4 and 8 months, respectively, with a mean of  $2.81 \pm 0.49$  and  $3.60 \pm 0.94$  injections, respectively. A multiple regression analysis indicated that baseline VA, gender, injection number, and PCV status were the most important determinants of VA at 8 months. The safety profile was similar to previous multi-center clinical trials.

**Conclusions:** This was an observational study conducted with a large number of patients treated with IVT-AFL for wAMD. The efficacy and safety results generally showed consistency with previous pivotal studies. The study indicated injection number as an important modifiable factor for improved treatment outcomes.

Mar 09, 2019 (Sat)

11:00 - 12:30

Venue: Plenary Hall 3

### Timing of Complete Absence of Polypoidal Lesions Following Fixed Dosing Aflibercept Treatments in Polypoidal Choroidal Vasculopathy

First Author: Phit **UPAPHONG**

Co-Author(s): Neil **BRESSLER**, Voraporn

**CHAIKITMONGKOL**, Janejit **CHOOVUTHAYAKORN**, Pichai **JIRARATTANASOPA**, Direk **PATIKULSILA**

**Purpose:** To explore the timing of complete absence of polypoidal lesions on ICGA following intravitreal aflibercept treatments in PCV.

**Methods:** Eyes with newly-diagnosed PCV, by EVEREST criteria, between April 2016 and December 2017 were included. Eligible eyes received fixed-dosing aflibercept injections (3 monthly injections then every 8 weeks) for 12 months. ICGA performed at baseline and every 8 weeks (week 8, 16, 24, 32, 40, 48, 52). Two ophthalmologist graders reviewed ICGA at each

visit and determined polypoidal status ie, complete regression (absence of polypoidal lesions), incomplete regression (partial absence of polypoidal lesions), or no regression (no change on ICGA). Final decision made by agreements of both graders with open adjudications.

**Results:** Among 45 study eyes, results of 34 eyes with complete 1-year follow-up were presented here. Of 34 eyes [32 participants; 100% Thai, 56% female, mean ( $\pm$  SD) age  $65 \pm 7.5$  years], included serous (21%), serosanguinous/exudative (41%), and hemorrhagic (38%) maculopathies. Baseline number of polypoidal lesions on ICGA included:  $>5$  (72%); 2 - 5 (25%), and 1 (3%). Median duration of complete regression was 2 months (interquartile range: 2 to 5). Rate of complete regression at 2, 4, 6, and 12 months was 42%, 49%, 58%, and 70%. At 1 year, 26% had partial regression and 3% had no regression.

**Conclusions:** Following aflibercept treatment without PDT, most eyes with PCV had complete regression of polypoidal lesions on ICGA before 6 months, and few had no regression at 1 year. These findings support consideration of aflibercept for PCV initially without PDT.

## Retina (Surgical)

Mar 08, 2019 (Fri)

09:00 - 10:30

Venue: Boardroom 3

### An Innovative Versatile Cannula for Vitreoretinal Surgery

First Author: Maneesh **BAPAYE**

Co-Author(s): Charuta Maneesh Bapaye **BAPAYE**

**Purpose:** In the last decade, vitreoretinal surgery has seen advances at a rapid rate. With the development of a small gauge vitrectomy system, vitreoretinal surgery has seen significant improvement in anatomical and functional outcomes as well as reduced postoperative recovery time. However, certain intraoperative procedures like PVD induction, SRF drainage from peripheral retinal breaks, etc. remain a challenge. We described a metal cannula which can help in certain intraoperative challenges.

**Methods:** Description of instrument: It consists of a handle and bent shaft. The shaft has a 25 gauge diameter. Length is 32 mm with moderate curve. Tip of the shaft has diamond dusting and hole for aspiration on the inferior side of cannula. The handle has the shape of a vitrectomy cutter handle for an ergonomic grip. The cannula is connected to aspiration tubing for active suction.

**Results:** The cannula can be passed through valved cannulae for small gauge vitrectomy. Diamond dusting

helps in inducing posterior vitreous detachment, peeling of epirerinal membranes, as well as initiation of ILM peeling. Curve of the cannula allows aspiration of subretinal fluid from peripheral retinal breaks even in phakic patients. It also allows dusting of the retinal surface, which helps in removal of densely adherent preretinal clots in diabetic vitrectomy. The blunt end of the tip along with aspiration allows atraumatic handling of retina incarcerated in vitrectomy cannula. The instrument has advantages over diamond dusted membrane scratcher since it is difficult to pass the same through valved cannulae.

**Conclusions:** Innovative cannula helps in complex vitreoretinal surgical procedures like rhegmatogenous retinal reattachment, diabetic and macular surgery.

Mar 08, 2019 (Fri)

09:00 - 10:30

Venue: Boardroom 3

### Anatomical and Visual Outcome of 27-Gauge Transconjunctival Pars Plana Vitrectomy Without Scleral Buckling in Primary Rhegmatogenous Retinal Detachment

First Author: Ramya **APPANRAJ**

Co-Author(s): Veerappan **SARAVANAN**

**Purpose:** The purpose of this study was to evaluate the effectiveness and safety of 27 G vitrectomy without scleral buckling in rhegmatogenous retinal detachment (RRD). Primary objective was to measure the single surgery anatomical success rate, and secondary objective was to analyze complications of the surgery and surgeon's comfort.

**Methods:** Prospective study of 32 patients of primary RRD.

**Results:** Mean age of presentation was 57.03 years. Mean duration of presentation was 17.34. The single surgery anatomical success rate was 97%. The final anatomical success rate was 100%. The mean difference of the preoperative logMAR visual acuity and the 3 months postoperative logMAR visual acuity was statistically significant. The number of patients attaining postoperative visual acuity better than 6/12 was 40.63%. Surgeon was comfortable in 88% of the patients, very comfortable in 6%.

**Conclusions:** 27 G TPPV is safe and comfortable for surgeons, and the anatomical success rate was comparable to all other studies done with 25 G and 23 G.

Mar 08, 2019 (Fri)  
09:00 - 10:30  
Venue: Boardroom 3

### Chronic Retinal Injury Induced by White Light-Emitting Diodes Light with Different Correlated Color Temperatures and Microarray Analysis of Genome-Wide Expression Pattern in Mice

First Author: Chen **XIE**

Co-Author(s): Ye **SHEN**, Jianping **TONG**

**Purpose:** The high intensity of blue component is the main source of concern about the health risks of LED with respect to their light-toxicity to the retina. This study analyzed the retinal injury and genome-wide expression changes induced by white LED light with different correlated color temperatures (CCT) in mice model.

**Methods:** White LED light with different CCT of 2954, 5624, and 7378K were used for exposure experiments. Hematoxylin and eosin (H&E) staining was used to observe the retinal morphology, TdT-mediated dUTP Nick end labeling (TUNEL) detecting the cell apoptosis and in outer nuclear layer (ONL). Retinal genome-wide expression patterns of control group, 2954K group and 7378K group were analyzed by Affymetrix GeneChip (Mouse Genome 430 2.0) to describe the overall difference of gene expression in mouse retina.

**Results:** H&E staining revealed that LED radiation damage mainly induced the declining number of ONL nuclei in mice. 7378K white LED light with 250lx for 28-day exposure resulted in significant reduction of ONL nuclei. Only after increasing the light intensity to 3000lx, 2954K white LED light led to a significant reduction in the number of ONL in mice. However, under the illuminance of 1000lux, no increased apoptotic nuclei were observed. Genome-wide expression analysis showed that more down-regulated genes were found in 7378K group, explaining the possible mechanism of chronic LED-retinal injury.

**Conclusions:** White LED light-induced mouse retinal injury was present in a CCT-dependent manner, significantly reducing the number of ONL nuclei. However, apoptosis pathway may not be the only mechanism.

Mar 08, 2019 (Fri)  
09:00 - 10:30  
Venue: Boardroom 3

### Clinical Presentations and Comparative Outcomes of Primary vs Deferred Intraocular Lens Implantation in Delayed-Onset Endophthalmitis

First Author: Vivek **DAVE**

**Purpose:** To describe clinical presentations and comparative outcomes of primary versus deferred intraocular lens (IOL) implantation in delayed-onset endophthalmitis.

**Methods:** Retrospective, interventional case series. Seventy-seven eyes of 77 patients that were diagnosed clinically as delayed-onset endophthalmitis and underwent IOL implantation were included from January 1990 to January 2018. Undiluted vitreous biopsy and IOL were subjected to microbiologic evaluation. Duration of symptoms, presenting visual acuity, organisms isolated, time to IOL implantation, time to endophthalmitis resolution after implantation, number of repeat intravitreal injections, and final visual acuity were compared in the primary and the deferred IOL implantation groups.

**Results:** There were primary and deferred IOL implantations. Interval between inciting event and endophthalmitis, between onset of symptoms to presentation, total follow-up, complication rate, and final visual acuity were comparable between the two groups. Median time to IOL implantation in the deferred group was 70 days. Between the primary and deferred IOL implantation groups, the number of repeat intravitreal injections were  $0.58 \pm 0.86$  and  $2.62 \pm 1.78$  respectively ( $P < 0.0001$ , 95% CI 2.00 to 2.22); the number of days to resolution after IOL implantation were  $35.16 \pm 14.26$  and  $55.5 \pm 8.24$  respectively ( $P < 0.0001$ , 95% C.I. 15.22 to 25.45).

**Conclusions:** Early IOL implantation in delayed-onset endophthalmitis causes faster clinical resolution and reduces the number of repeat intravitreal injections. Final visual improvement, however, is unaffected.

Mar 08, 2019 (Fri)  
09:00 - 10:30  
Venue: Boardroom 3

### Cystoid Macular Edema After Repair of Primary Retinal Detachment: Incidence, Predictors, and Outcomes

First Author: Yodpong **CHANTARASORN**

Co-Author(s): Dean **ELIOTT**

**Purpose:** To analyze the incidence, predictors, and outcomes of cystoid macular edema (CME) after surgery for primary rhegmatogenous retinal

detachment (RRD).

**Methods:** We performed retrospective cohort analysis of 124 eyes that had primary RRD without proliferative vitreoretinopathy. Patients were categorized into 3 groups based on the type of surgery: pars plana vitrectomy (PPV) (n = 97), scleral buckling surgery (SB) (n = 13), and vitrectomy combined with scleral buckle (PPV-SB) (n = 14). None of them received simultaneous cataract surgery. CME was defined as centrally intraretinal cysts with 1 mm central subfield thickness  $\geq 320$  microns and established after successful retinal reattachment. Data collected include baseline characteristics, macular status, intraoperative procedures, postoperative results, and time-to-event with censored observations. Predictors for CME were identified in the PPV group.

**Results:** The 1-year cumulative risks of CME were 15.4%, 12.5%, and 25.4%, in the PPV, SB, and PPV-SB group respectively (P = 0.58, log-rank test). Factors associated with post-vitrectomy CME included greater area of detached retina (adjusted hazards ratio (AHR), 1.53; 95% confidence interval (CI), 1.17 - 1.99), 360-degree endolaser (AHR, 3.33; 95% CI, 1.04 - 17.62), and postoperative asymptomatic intraretinal cysts (AHR, 3.33; 95% CI, 1.03 - 10.7). In group PPV, CME significantly correlated with decreased vision at 6 months postoperatively (14 ETDRS letters difference; 95% CI, 4-24; P = 0.006). However, this association did not remain significant at the final observation (26.7  $\pm$  19.9 months) (4 EDTRS letters difference; P = 0.27).

**Conclusions:** High-risk individuals should be closely monitored because of the relatively high incidence of CME. Care should be taken not to apply the endolaser to unnecessary areas, particularly in eyes with extensive RRD.

Mar 08, 2019 (Fri)

09:00 - 10:30

Venue: Boardroom 3

### Double Nonpeeling of Foveolar Posterior Hyaloid and Internal Limiting Membrane in Early Stage 2 Idiopathic Macular Hole Surgery

First Author: Tzyy-Chang **HO**

**Purpose:** To introduce and investigate the tomographic features of fovea after double nonpeeling of foveolar posterior hyaloid (PH) and foveolar internal limiting membrane (ILM) during surgery of early stage 2 idiopathic macular hole (MH).

**Methods:** Thirty-five patients (35 eyes) were divided into 3 groups by the extent of PH and ILM peeling over the foveola. Group 1: Double nonpeeling (PH and ILM) group, group 2: Single nonpeeling (ILM) group and group 3: Total peeling (PH and ILM) group.

**Results:** The mean follow-up periods were 12.5 months

in group 1, 13.5 months in group 2, and 12 months in group 3. There was more improvement of logMAR best corrected visual acuity in group 1 (0.58) than in group 2 (0.46) and group 3 (0.39). Regain of ellipsoid zone in all eyes in group 1 and 2 but in 55% of eyes in group 3. External limiting membrane lines recovered in all eyes in group 1 and 2 and in 64% of eyes in group 3. Restoration of umbo light reflex was found in 83% of eyes in group 1, 75% in group 2, but none in group 3. Group 1 and 2 eyes restored smooth umbo contour without dimpling. Deep inner retinal defects from nerve fiber layer to even outer nuclear layer were found in 82% of eyes in group 3 but none in group 1 and 2.

**Conclusions:** Tomographic analysis showed that double nonpeeling of the foveolar PH and ILM in early stage 2 idiopathic MH restored better foveolar microstructures and achieved the most visual acuity improvement.

Mar 08, 2019 (Fri)

09:00 - 10:30

Venue: Boardroom 3

### Endoscopic Vitrectomy in Endophthalmitis: Initial Experience of 33 Cases at a Tertiary Eye Care Center

First Author: Vivek **DAVE**

**Purpose:** To report the presentation and management outcomes of endophthalmitis with endoscopic vitrectomy.

**Methods:** Retrospective interventional case series at a tertiary eye care center in south India. Thirty-three eyes of 33 patients were included. The medical records of the patients who underwent endoscopic vitrectomy for endophthalmitis from April 2014 to March 2018 were reviewed. Data was collected including age, gender, etiology of endophthalmitis, corneal and retinal examination, type of intervention, final anatomic and visual outcome, and the total follow-up. The main outcome measures were the final visual acuity and evisceration rates.

**Results:** The mean age at presentation was 46.84  $\pm$  19.89 years, median age 50 years. Etiology-wise, 13 eyes (39.4%) were post trauma, 11 eyes (33.33%) were post cataract surgery, 3 eyes (9.09%) were endogenous, 3 eyes (9.09%) were post perforated corneal ulcer, 2 eyes (6.06%) post retinal surgery, and 1 eye (3.03%) was post combined cataract and corneal surgery. Twenty-four eyes (72.72%) had a favorable anatomic outcome at the last visit, and 5 eyes (15.15%) had a favorable visual outcome. Of those with unfavorable visual outcome, 10 eyes had further visual potential. Sixteen eyes (48.48%) showed a positive culture on microbiologic evaluation. The predominant organism isolated was *Pseudomonas aeruginosa*. Evisceration was required only in 1 eye (3.03%).

**Conclusions:** Endoscopic vitrectomy allows early management of endophthalmitis in spite of hazy media. This ensures a reasonable visual outcome, contains the infection, and reduces the incidence of evisceration in these eyes.

**Mar 08, 2019 (Fri)**

**09:00 - 10:30**

**Venue: Boardroom 3**

### **Result of Inverted ILM Peeling in Treatment for Large Macular Hole in Vietnam National Institute of Ophthalmology**

*First Author: Dang Tran **DAT***

*Co-Author(s): Hung **BUI**, Nguyen **THU TRANG***

**Purpose:** Report the anatomical and functional outcomes of inverted ILM peeling for large macular hole (MH) surgery.

**Methods:** Prospective study in 42 eyes of 42 patients with large macular hole ( $>400\ \mu\text{m}$ ) who underwent vitrectomy and inverted ILM peeling in VNIO from 2016 to 2017 in VNIO. All patients were recorded the preoperative parameters: visual acuity (VA), diameter of MH, MHI, duration of MH, and stage of MH. At the time of study (2017), all patients were evaluated in anatomical outcome: MH closure, type of closure, as well as functional outcome: VA.

**Results:** Patient characteristics: mean age: 64.4 (50 - 77 years); female: 95.2%. Mean preop VA: 20/380. Mean duration of MH: 8.1 months. Stage of MH: Stage 4: 69%. Mean diameter of MH is  $960\ \mu\text{m}$ , with MHI is 0.536. Anatomical outcome: 97.62% MH closure (95.2% type 1 closure). Functional outcome: mean VA postop: 20/90 with 91% patients improve more than 3 line VA.

**Conclusions:** Inverted ILM peeling in treatment for large MH have good anatomical and functional results. It would be a first line option for large MH management.

**Mar 08, 2019 (Fri)**

**09:00 - 10:30**

**Venue: Boardroom 3**

### **Stepwise Nonsclerotomy Approach to Prevent Inadvertent Perfusion in Eyes with Extensive Choroidal Detachment and Suprachoroidal Fluid During 25-Gauge Pars Plana Vitrectomy**

*First Author: Zhaotian **ZHANG***

*Co-Author(s): Shaochong **ZHANG***

**Purpose:** To introduce a stepwise approach without sclerotomy, to prevent inadvertent fluid/air perfusion during 25-gauge pars plana vitrectomy (PPV), in rhegmatogenous retinal-detachment eyes with extensive choroidal detachment and suprachoroidal fluid.

**Methods:** Prospective consecutive case series study. Consecutive patients who met the following inclusion criteria were recruited. Inclusion criteria: diagnosed with rhegmatogenous retinal detachment; with preoperative intraocular pressure (IOP)  $\leq 9.0\ \text{mm Hg}$ ; obvious existence of suprachoroidal fluid and ciliary/choroidal detachment. 25-gauge vitrectomy platform (Alcon's Constellation) was used for all the cases. The stepwise approach was performed in all subjects to prevent inadvertent perfusion. The main outcomes were success rate of complete penetration of trocar-cannulas, intraoperative and postoperative complications.

**Results:** Fifty patients (50 eyes; male/female = 22/28) were included, with the mean age of  $53.3 \pm 14.7$  years (28 - 74 years). The mean preoperative IOP was  $6.2 \pm 1.5\ \text{mm Hg}$  (4 - 9 mm Hg). The mean preoperative best corrected visual acuity (BCVA; logMAR unit) was  $1.713 \pm 0.473$  (Snellen FC-0.2). Mean logMAR BCVA at the final follow-up was  $0.812 \pm 0.514$  (Snellen 0.04-0.6), with statistically significant difference when compared with the preoperative one ( $P < 0.001$ ). The success rate of complete penetration of the infusion cannula was 100%, without any case undergone inadvertent perfusion of BSS/air during all the surgical procedure. The first-time and final retinal re-attachment rates were 94% (47/50) and 100% (50/50), respectively.

**Conclusions:** The stepwise approach without sclerotomy is effective and safe to prevent inadvertent fluid/air perfusion during pars plana vitrectomy (PPV) in retinal-detachment eyes with extensive choroidal detachment and obvious suprachoroidal fluid.

**Mar 08, 2019 (Fri)**

**09:00 - 10:30**

**Venue: Boardroom 3**

### **Visual Outcome and Complications of Diabetic Vitrectomy: Does It Vary with Preoperative Interventions?**

*First Author: Dipak **NAG***

*Co-Author(s): Afsana **HABIB**, Ava **HOSSAIN**, Rinku **PAUL**, Pankaj **ROY***

**Purpose:** To compare the visual outcome and complications of patients who underwent vitrectomy surgery for proliferative diabetic retinopathy without any prior intervention, with prophylactic intravitreal bevacizumab, or with prior laser photocoagulation.

**Methods:** We reviewed 31 consecutive diabetic vitrectomies performed by a single surgeon over a period of 6 months. The primary indications, preoperative measurements, postoperative complications, and visual acuity after 1 month of surgery was documented for each case.

**Results:** Tractional retinal detachment (TRD) was the most common indication in 38.7% of the patients,

whereas non-resolving vitreous hemorrhage (VH) was in 35.5% of the patients, TRD + rhagmatogenous retinal detachment (6.5%), and diabetic macular edema with taut posterior hyaloid 19.3%. The most postoperative complication was macular thinning (32.3%) and the others were ERM formation, VH, and re-retinal detachment. After surgery, in logMAR visual acuity improved significantly (mean =  $1.26 \pm 0.68$ ,  $P = 0.001$ ). Preoperative intravitreal bivacizumab (IVB) and laser photocoagulation (LP) were separately associated with postoperative improved visual outcome (in both cases,  $P \leq 0.001$ ). Postoperative complications were also less in those who had preoperative IVB or LP (in both situations  $P \leq 0.001$ ). Comparing preoperative IVB and LP, laser group was found significantly better in regard to improved visual acuity as well as less postoperative complications (in both situations  $P \leq 0.05$ ).

**Conclusions:** Overall, diabetic vitrectomy appears to have a good visual prognosis. Preoperative intravitreal bivacizumab (IVB) and laser photocoagulation (LP) were independently related to better vision as well as less postoperative complications. However, preoperative laser group did better than IVB group in these regards.

**Mar 09, 2019 (Sat)**

**11:00 - 12:30**

**Venue: Plenary Hall 3**

### The Impact of Extent of Internal Limiting Membrane Peeling on Anatomical Outcomes of Macular Hole Surgery: Results of a 54-Week Randomized Clinical Trial

*First Author: Yuou YAO*

*Co-Author(s): Jinfeng QU, Mingwei ZHAO*

**Purpose:** To compare the anatomical outcomes of different extents of internal limiting membrane (ILM) peeling in idiopathic macular hole surgery.

**Methods:** Prospective, parallel-group, randomized clinical trial. A total of 121 eyes of 121 patients with idiopathic macular hole underwent pars plana vitrectomy, and peeling of the ILM with a diameter of two disk diameters (DD) or 4DD based on randomization. The main outcome was the proportion of eyes with complete hole closure at 12 months. The second outcome was the hole closure grading stratified by macular hole closure index (MHCI) at each visit.

**Results:** At 12 months, there was no significant difference in anatomical outcomes with complete closure achieved in 52 (82.5%) of 63 eyes in the 2DD group and 53 (91.4%) of 58 eyes in the 4DD group ( $P = 0.15$ ). For subjects with MHCI  $\leq 0.5$  ( $n = 24$ ), complete closure rate was significantly lower in the 2DD group compared to the 4DD group ( $P = 0.012$ ; 18.2% versus 75.9%, respectively). Average BCVA was lower in 2DD group than 4DD group ( $P = 0.014$ ). By contrast, when MHCI was  $>0.5$ , the complete closure rate between the two groups showed no significant difference: 96.2% (50

patients) versus 95.6% (43 patients), respectively ( $P = 0.185$ ).

**Conclusions:** In patients with idiopathic full-thickness macular hole and MHCI  $\leq 0.5$ , a larger ILM peel of 4DD tends to achieve better anatomical outcomes than a more limited 2DD peel.

## Translational Research in Ophthalmology

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Boardroom 2**

### Enhancement of a Deep Learning System Using Newer Convolutional Neural Networks and Transfer Learning for Detection of Referable Diabetic Retinopathy

*First Author: Michelle YIP*

*Co-Author(s): Zhan Wei LIM, Gilbert LIM, Daniel TING, Tien-Yin WONG*

**Purpose:** To enhance the diagnostic performance of the current Deep Learning System (DLS) that utilizes VGGNet in detecting diabetic retinopathy (DR), with the use of newer convolutional neural networks (CNN) ResNet and Ensemble (combination of VGGNet and ResNet) and transfer learning.

**Methods:** The diagnostic performance of the CNNs was evaluated using retinal images from Singapore Integrated Diabetes Retinopathy Programme (SiDRP). The dataset from 2010 to 2013 (76,370 images) was used to train the DLS. Using transfer learning, these CNNs were pre-trained using the ImageNet database. Using the testing dataset of SiDRP 2014-15 (71,896 images), the primary outcome measures are area under the receiver operating characteristic curve (AUC), sensitivity, and specificity in detection of DR, with professional graders as reference standard.

**Results:** For referable DR, the AUC for VGGNet, ResNet and Ensemble were 0.936, 0.969, and 0.970 respectively. The corresponding sensitivities were 90.5%, 91.7%, and 92.2% respectively and the specificities were 91.0%, 93.1%, and 92.5% respectively. For vision-threatening DR, the AUC for VGGNet, ResNet, and Ensemble were 0.958, 0.994, and 0.987 respectively. The corresponding sensitivities were 100.0%, 96.2%, and 96.2% respectively and the specificities were 91.1%, 98.5%, and 98.9% respectively.

**Conclusions:** The DLS performance improved with the adoption of newer CNNs (ResNet and Ensemble). Future research is important to evaluate the use of these models in the prospective clinical trials.

Mar 09, 2019 (Sat)  
09:00 - 10:30  
Venue: Boardroom 2

### FitSight Watch: A Novel Approach to Measure Outdoor Light Patterns in 7-Year-Old Singaporean Children

First Author: Carla **LANCA**  
Co-Author(s): Yap Seng **CHONG**, Cheryl **NGO**, Seang Mei **SAW**, Lynette **SHEK**, Chuen-Seng **TAN**

**Purpose:** In view of the protective effect of outdoor time for myopia, we aimed to examine ambient light exposure and outdoor patterns in Singapore children from GUSTO birth cohort aged 7 years.

**Methods:** Children from a cohort examining light exposure and outdoor patterns had objective measures of visible light collected over a 1-week period, using a wrist-worn watch (FitSight). Measures of illuminance were captured every minute, 12 hours per day. Mean daily exposure (lux) and duration (min) for outdoor time (equal or above 1000 lux) were compared between weekdays and weekends. Different levels of bright light exposure (2000 lux; 3000 lux; 5000 lux) were analyzed. Median and interquartile range were reported (M;IQR).

**Results:** Among eligible, 407 children were included ( $7.01 \pm 0.12$  years); the majority were female (54%) and Chinese (60%). Children spent less than 1 hour per day (23.0; 31.0 min) outdoors, with longer duration ( $P = 0.010$ ) on weekends (26.0; 41.0 min) than weekdays (23.0; 29.0 min). The duration of outdoor time was higher for weekends for all levels of bright light exposure ( $P < 0.005$ ). Mean outdoor lux levels (2602.2; 2775.8 lux) were not significantly different ( $P = 0.210$ ) from weekends (2546.5; 2695.4 lux) to weekdays (2636; 2802.9 lux). Male (4728.6; 2524.7 lux) children had higher exposures ( $P = 0.030$ ) than females (4227.2; 1949.7 lux). Malay children (4736.5; 2632.8 lux) had higher exposures ( $P = 0.003$ ) than Chinese (4247.3; 2123.2 lux).

**Conclusions:** Singapore children spend about half an hour per day outdoors, with lesser time spent on weekdays. Gender and race contribute for different patterns of light exposure. Strategies to increase outdoor time, such as additional recess programs outside classroom during weekdays, are necessary to prevent the early onset of myopia.

Mar 09, 2019 (Sat)  
09:00 - 10:30  
Venue: Boardroom 2

### Regional Biomechanics and Its Correlation with Molecular Signatures in Keratoconus

First Author: Nikhil **BALAKRISHNAN**  
Co-Author(s): Mathew **FRANCIS**, Abhijit **SINHA ROY**, Rohit **SHETTY**

**Purpose:** To determine biomechanical alterations associated with the zonal tissue changes between ectatic cone and non-ectatic peripheral regions in keratoconus.

**Methods:** Zonal corneal stiffness was derived from prototype next-gen Corvis. Differential molecular expression was estimated by qPCR for 50 keratoconus (cone vs periphery) and 25 normal eyes undergoing crosslinking and photo refractive keratectomy (PRK) respectively.

**Results:** Keratoconus cones had higher TNF- $\alpha$ , IL-6, MMP-9 ( $P < 0.05$ ) but reduced LOX, and COL1A1 ( $P < 0.05$ ). CS correlated with ectatic zone specific TNF- $\alpha$  and LOX levels. Corneal stiffness values on multizone Corvis show statistically significant difference between superior (non-ectatic) and remaining (ectatic) zones in keratoconus ( $P = 0.01$ ), not seen in controls ( $P = 0.4$ ). Biomechanics correlated with molecular signature.

**Conclusions:** This study elucidates that keratoconus corneas are non-uniform at biomechanical and molecular levels, which could help plan future differential customized treatment and monitor disease progression beyond topographic indices.

Mar 09, 2019 (Sat)  
09:00 - 10:30  
Venue: Boardroom 2

### Simulation of Restored Accommodation After Scleral Therapies Using Finite Element Analysis

First Author: Annmarie **HIPSLEY**  
Co-Author(s): Silvia **BLEMKER**, Daniel **GOLDBERG**, Katie **KNAUS**

**Purpose:** To utilize a finite element model (FEM) to analyze the effects of a novel scleral therapy, Laser Scleral Microporation (LSM), on scleral stiffness (SS), ciliary muscle (CM) function, and the biomechanics of the accommodation mechanism (AM).

**Methods:** Geometric meshing and FEM analysis were performed using advanced multi-physics simulation (AMPS) technology on representative 3D models of ocular structures. These simulated zonular pre-tensioning of the lens to the unaccommodated state and CM contraction to the accommodated state were modeled and analyzed for a young (30-year-old) and

presbyopic eye. The effects of LSM therapy was also modelled and analyzed. LSM aims to restore the elastic modulus of the aging sclera to that of a young eye, in 5 critical zones overlying key anatomical landmarks of the CM. CM fiber groups were activated in isolation to quantify each's contribution to accommodation.

**Results:** The computational model predictions of lens deformation in normal accommodation compare favorably with experimental data from literature. Changing SS from 1.6 to 2.8 megapascals (MPa) (consistent with the difference in SS between young and presbyopic adults), reduces CM apex thickening by 6% and shortening by 22%. LSM reduced the SS from 2.8 MPa (presbyopic eye) to 1.8 MPa, and restored CM apex thickening and shortening by approximately 2% and 10% respectively.

**Conclusions:** Increasing SS impeded CM function, which is necessary for normal function of the AM. The FEM results suggest that LSM therapy decreases SS, improves CM dynamic forces, improves lens deformation, and could potentially restore normal function of the AM.

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: Boardroom 2

### Spatiotemporal Expression Changes of PACAP and Its Receptors in Retinal Ganglion Cells After Optic Nerve Crush

First Author: Dan YE

Co-Author(s): Jingjing HUANG, Yue XU

**Purpose:** Pituitary adenylate cyclase-activating polypeptide (PACAP) has been demonstrated to play a vital role in retinal ganglion cells apoptosis in various retinal injury animal models. This study analyzed the changes of PACAP and its receptors in the retina after optic nerve crush (ONC) in time and space.

**Methods:** Eyes of male Sprague–Dawley rats were enucleated 1, 3, 5, 7, and 14 days after the crush of the optic nerve. Changes of the protein and mRNA level of PACAP and its receptors, PAC1R, VPAC1R, and VPAC2R in the retina after ONC were examined by western blot analysis and real-time PCR analysis. Besides, immunofluorescent staining was performed to detect the localization of PACAP and its receptors.

**Results:** The expression of PACAP and PAC1R increased in a time manner in ONC group (\*P < 0.05, \*\*P < 0.01, \*\*\*P < 0.001), which reached a peak 5 days after the crush of the optic nerve. Moreover, double label immunofluorescent staining showed that PACAP and PAC1R located mainly in ganglion cell layer (GCL). Besides, both PACAP (+) cells and PAC1R (+) cells within GCL increased after ONC (PACAP positive cells, 10.7 folds, \*P < 0.05; PAC1R positive cells, 12.6 folds, \*\*P < 0.01).

**Conclusions:** Collectively, we first detected that the expression of PACAP and its high affinity receptor PAC1R were remarkably increased after ONC, and mainly expressed in GCL of the retina.

## Visual Sciences

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: Boardroom 2

### Casein Kinase-II Inhibition Promotes Retinal Ganglion Cell Survival and Axonal Regeneration

First Author: Tsz-Kin NG

Co-Author(s): Ling-Ping CEN, Yu-Fen LIU, Calvin PANG, Mingzhi ZHANG

**Purpose:** Neuron survival is critical for the maintenance of central nervous system physiology upon diseases or injury. We previously demonstrated that the blockage of phosphatidylinositol 3-kinase/Akt and Janus kinase/STAT3 pathways promotes retinal ganglion cell (RGC) survival and axonal regeneration via macrophage activation; yet, the complexity of the inflammatory regulation for neural repair indicates the involvement of additional unresolved signaling pathways. Here we reported the effects and underlying mechanism of casein kinase-II (CK2) inhibition on RGC survival and axonal regeneration in rats after optic nerve (ON) injury.

**Methods:** The ON of rats was transected at 1.5 mm behind the ON head, and a 1.5 cm peripheral nerve (PN) was grafted onto proximal end of the ON stump. CK2 inhibitors, TBB and DMAT, were intravitreally injected after ON transection and PN grafting. After 3 weeks, RGC survival were evaluated. Macrophage-dependent effect was confirmed by the in vivo removal of macrophages using clodronate liposome and the in vitro retinal explant culture.

**Results:** Intravitreal application of TBB and DAMT effectively suppressed the CK2 phosphorylation activity in the retina, and enhanced RGC survival and axonal regeneration in vivo. Meanwhile, the numbers of infiltrating macrophages were increased. Removal of macrophages by clodronate liposomes significantly abolished the CK2 inhibition-induced RGC survival and axonal regeneration. Clodronate liposomes also weakened the RGC protective effects by TBB and DMAT in vitro.

**Conclusions:** In summary, this study revealed that inhibition of CK2 enhances RGC survival and axonal regeneration via macrophage activation in rats. CK2 could be a therapeutic target for RGC protection after ON injury.

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: Boardroom 2

### Comparison of Amplitude of Accommodation Difference After Continuous Near Work and With Periodic Breaks Using Rule 20-20-20

First Author: Rahmat **FITRA**

Co-Author(s): Syumarti **MANSYUR**, Karmelita **SATARI**

**Purpose:** To compare amplitude of accommodation difference in individuals who do near work continuously and those with periodic breaks using rule 20-20-20.

**Methods:** Subjects were aged 16 - 24 years. Measurement of amplitude of accommodation was taken before and after using VDT device for 2 hours. The subjects were divided into 2 groups, those using the device continuously and those with periodic breaks using rule 20-20-20.

**Results:** There were 20 subjects (mean age  $20.85 \pm 0.73$  years). Mean amplitude of accommodation before continuous near work was  $9.81 \pm 0.35$  diopters (D) (median, 9.68 D). Mean amplitude of accommodation after continuous near work was  $6.14 \pm 1.25$  D. Mean amplitude of accommodation before near work with breaks was  $9.88 \pm 0.28$  D (median, 9.68 D). Mean amplitude of accommodation after near work with breaks was  $8.60 \pm 1.35$  D. Unpaired *t* test showed that the difference in the amplitude of accommodation after continuous near work ( $3.67 \pm 1.32$  D) was greater than those with periodic breaks ( $1.28 \pm 1.13$  D,  $P < 0.05$ ).

**Conclusions:** Near work with periodic breaks using rule 20-20-20 results in lower difference of amplitude of accommodation than continuous groups.

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: Boardroom 2

### Mathematical Modelling: A Novel Computational Method to Predict the Future of Refractive Surgery Using Corneal Biomechanics

First Author: Ann **KOSHY**

Co-Author(s): Mathew **FRANCIS**, Pooja **KHAMAR**, Abhijit **SINHA ROY**, Rohit **SHETTY**

**Purpose:** In-vivo corneal biomechanics is evaluated using air-puff applanation deformation amplitude waveform (DAW). This study aimed to predict post-surgery DAW and corneal stiffness (kc; unit = N/m) using preoperative (pre-op) biomechanics, pre-op corneal structure, and planned refractive correction using a finite element model (FEM) algorithm. It focused on small incision lenticule extraction (SMILE),

LASIK (laser-assisted in situ keratomileusis), and PRK (photorefractive keratectomy).

**Methods:** A total of 24 eyes (8/technique) underwent predictive modelling and validation using CorvisST and Pentacam HR. The model calculated pre-op material property of cornea using FEM approach, pre-op DAW (Corvis-ST), and pre-op custom-made mesh geometry (Pentacam HR). FEM calculated post-op DAW using altered mesh geometry based on planned refractive correction and pre-op material property. Predicted post-op DAW calculated kc and compared it to the in-vivo post-op measurement.

**Results:** SMILE post-op in-vivo and predicted kc values were  $91.42 \pm 1.59$  (mean  $\pm$  standard error) and  $90.26 \pm 1.68$  N/m respectively. LASIK and PRK values were  $93.99 \pm 3.65$  and  $92.71 \pm 4.04$  N/m and  $97.06 \pm 2.09$  and  $96.37 \pm 4.04$  N/m, respectively. The intra-class correlation coefficient (ICC) between predicted and in-vivo post-op corneal stiffness was 0.98, 0.96, and 0.85 for SMILE, LASIK, and PRK, respectively. Predicted peak deformation amplitude had an ICC greater than 0.95 ICC for all techniques.

**Conclusions:** The study predicted kc, DAW, and peak deformation amplitude for SMILE, LASIK, and PRK with high relative correlation to in-vivo data. This novel, clinically viable, highly accurate post-op refractive biomechanics prediction model provides foresight that could be a game changer in refractive surgery.

Mar 09, 2019 (Sat)

09:00 - 10:30

Venue: Boardroom 2

### New Era of Lens Biophysical Quantification with High-Speed Swept-Source OCT

First Author: Pooja **KHAMAR**

Co-Author(s): Zelda **DADACHANJI**, Pavitra **PATEL**, Rohit **SHETTY**

**Purpose:** To introduce and identify novel features of lenticular accommodation using high speed swept source optical coherence tomography (OCT), and to study real-time dynamic accommodation aberrometry with pyramidal aberrometry (Osiris-T<@C. S. O. Srl,Italy>).

**Methods:** Fifty patients were imaged on high-speed swept source OCT using an accommodative stimulus ranging from 0 to -4 diopters (D), and lens morphological changes were noted. Real-time dynamic accommodation aberrometry was recorded using Osiris-T in 50 patients undergoing refractive surgery and 25 patients of keratoconus (mild to moderate grade). Lens accommodation in relation to cornea astigmatism and aberration was analyzed.

**Results:** Anterior chamber depth (ACD) was measured on inducing accommodative stimulus. ACD increased from 3.39 mm to 3.51 mm from 0 to -1

D but normalized to 3.4 mm by -4 D stimulus. Lens thickness also increased from 3.78 mm to 3.93 mm by -4 D stimulus. In the dynamic aberrometry study group, in 60% of the eyes, the corneal cylinder was internally compensated for by the lens. However, in the remaining 40% of eyes, the lens did not show appropriate compensation, resulting in poor acceptance of the cylinder component of the refractive correction. Lens also showed compensation for the corneal coma and spherical aberration in keratoconic eyes.

**Conclusions:** OCT imaging and dynamic aberrometry using Osiris-T were extremely useful in understanding lens biophysics. This unique model helped us decode the interaction between the lens and the cornea. Comprehending these concepts will have a huge impact in the future planning of customized refractive treatments, ICL implantation, and developing a newer generation intraocular lens formula.

**Mar 09, 2019 (Sat)**

**09:00 - 10:30**

**Venue: Boardroom 2**

## **Role of Retinal Eccentricity in Dark Adaptation of the Eye**

*First Author: Akshay NARAYAN*

**Purpose:** The influence of retinal eccentricity on dark adaptation, recovery of visual sensitivity following bleaching, remains unknown. We conducted a theoretical, basic medical research project to learn about changes in the absolute dark adaptation threshold (A), rise in threshold (B), and time constant (C) at different retinal eccentricities.

**Methods:** Using a Maxwellian Optical System, the right eye of the subject was bleached for 10 seconds. The target light then flashed every 2 seconds and the subject could adjust the intensity of this target light with a keypad until the target light was just visible whilst focusing on a fixation light. Retinal eccentricities of 0, 7.5, 10, and 15 degrees were tested. MATLAB was used to plot threshold intensity for an observer to detect visual stimulus against time elapsed after bleach. Two non-linear regression lines for rods and cones were plotted and used to assess changes in A, B, and C.

**Results:** For cones: (1) A for 15° ( $5.88 \pm 0.09$ ) and 10° ( $6.06 \pm 0.07$ ) was significantly lower than 7.5° ( $6.38 \pm 0.03$ ) and 0° ( $6.4 \pm 0.05$ ), (2) No significant difference was observed in B and (3) 1/C observed for 15° ( $0.64 \pm 0.13$ ) was significantly lower than 7.5° ( $0.82 \pm 0.06$ ) and 0° ( $0.80 \pm 0.05$ ). For rods: (1) No significant difference was observed in A, (2) No significant difference was observed in B and (3) 1/C for 15° ( $0.15 \pm 0.01$ ) was significantly higher than 7.5° ( $0.1 \pm 0.01$ ).

**Conclusions:** The significant decrease in the A value of cones could have been due to the differential

distribution of L, M, and S cones. Variations in the C suggest that rods and cones have different pathways for photopigment regeneration. Invasive techniques should be used to investigate the exact molecular changes.

# POSTERS

## Academia, Research, Teaching and Education in Ophthalmology

Poster No.: EX1-004

Panel No.: 004

### A Review of Competency-Based Medical Education in Ophthalmology Residency Training

First Author: Danielle **WENTZELL**

Co-Author(s): Helen **CHUNG**, Patrick **GOOI**, Chris **HANSON**, Matt **SCHLENKER**, Kevin **WARRIAN**

**Purpose:** To review available literature on competency-based medical education (CBME) implementation in ophthalmology residency training programs in North America.

**Methods:** Four online databases, PubMed, Medline, Embase, and Google Scholar, were searched from 1995-2018 using key terminology related to CBME and ophthalmology residency training.

**Results:** CBME has become the new model for medical education, and implementation within ophthalmology training has seen development of objectives and milestones specific to ophthalmology residency within the last 4 years. Curricula blueprints, guidelines, and principles have been projected from several international sources, but have met with numerous common barriers. Evaluation modalities have seen the greatest development within ophthalmology, with particular focus on surgical skills. Although there has been some headway with competencies outside of the patient care and medical expert domains, more innovative methods of teaching and assessing are required to meet the CBME criteria within ophthalmology residency training.

**Conclusions:** With CBME becoming the new standard of training in ophthalmology, implementation will require considerable resources, encounter logistical barriers, and necessitate understanding and acceptance among involved educators. Collaborative efforts will be required to develop CBME curricula that can be individualized, and addresses implementation barriers and the shortcomings of resident evaluation modalities.

Poster No.: EX1-008

Panel No.: 008

### A Unique Education Program on Diabetic Retinopathy for Primary Care Physicians in India: An Eye Toward the Future

First Author: Sandeep **BHALLA**

Co-Author(s): Gudlavalleti Venkata Satyanarayana **MURTHY**, Dorairaj **PRABHAKARAN**, Ramachandran **RAJALAKSHMI**, Kim **RAMASAMY**, Ranjit **UNNIKRISHNAN**

**Purpose:** In India, less than a third of physicians treating patients with diabetes have basic vision charts in their clinics. This poses a risk of delay in detection of diabetic retinopathy (DR). With early management, it is possible to reduce risk of blindness from DR by 90%. There is an urgent need to create a trained cadre of primary care physicians (PCPs) to combat this increasing burden. A comprehensive Certificate Course in Evidence Based Management of Diabetic Retinopathy (CCDR) has been developed to enhance knowledge, skills, and core competencies of practicing PCPs.

**Methods:** CCDR is modeled on the framework of an interdisciplinary multi-partner collaboration and has trained over 445 PCPs in 18 regional centers across India. Training in DR is offered to PCPs on a modular basis, with a judicious mix of case studies, group discussions, instructive videos, hands-on training, and direct teaching by experts. The course content is delivered by diabetologists and retina specialists working together. The complete and comprehensive learning package includes printed modules developed by academic partners and contextualized by national experts, which is also provided in a pendrive. Robust quality assurance is an integral part of the program.

**Results:** The training facilitated early detection and better management of patients with eye complications/DR by PCPs. It has initiated timely referral of patients with eye complications/DR to retina specialists.

**Conclusions:** CCDR model has met with excellent response from physicians, which probably reflects the felt need of PCPs in India for skill improvement in DR management. An E-learning model is being developed for scalability.

**Poster No.: EX1-003**

**Panel No.: 003**

### Evaluation Tool for Resident Performance of Nd:YAG Laser Capsulotomy

*First Author: Danielle WENTZELL*

*Co-Author(s): Helen CHUNG, Patrick GOOI, Chris HANSON, Matt SCHLENKER*

**Purpose:** To produce an evaluation tool with face and content validity of residents performing Nd:YAG laser capsulotomy that can be utilized in competency-based medical education (CBME) curricula within ophthalmology residency programs.

**Methods:** A modified Delphi approach was used to evaluate the utility of a checklist and global rating scale (GRS) for resident performance of Nd:YAG laser capsulotomy on an inanimate SimuEYE training model. The assessment tool, a video recording of the tool being used, and a survey for feedback was distributed to content experts. The expert opinions helped to reformat the assessment tool, which was redistributed to the experts for further criticism. This process was repeated until consensus was reached.

**Results:** A checklist and GRS with face and content validity was established for resident performance of Nd:YAG laser capsulotomy.

**Conclusions:** With the movement towards implementing CBME in ophthalmology programs worldwide, this checklist and GRS addresses competency assessment in Nd:YAG laser capsulotomy, a commonly performed resident procedure. By using an inanimate model to practice and assess this competency, residents can develop their skills and obtain formative feedback before performing this procedure on real patients. Reliability and predictive validity are 2 measures that should be evaluated in the future.

**Poster No.: EX1-006**

**Panel No.: 006**

### Impact of Training Model for Primary Care Physicians in Reducing Diabetic Complications in India: A Systematic Review

*First Author: Pushkar KUMAR*

*Co-Author(s): Gudlavalleti Venkata Satyanarayana MURTHY, Dorairaj PRABHAKARAN, Ramachandran RAJALAKSHMI, Kim RAMASAMY, Ranjit UNNIKRISHNAN*

**Purpose:** The spiraling burden of diabetes, and the associated visual impairment and shortage of specialists in the periphery, necessitates the training of primary care physicians (PCPs) to combat the increasing diabetic retinopathy (DR) burden in India.

**Methods:** The Certificate Course in Evidence Based Management of Diabetic Retinopathy (CCDR) is a

4-module once a month contact teaching program conceptualized by academic partners, contextualized by renowned experts, delivered by specialists, and monitored by public health professionals. The robust curriculum is a judicious mix of case studies, pre-post tests, assignments, group activities, hands-on training, and strong monitoring and evaluation mechanisms. The success of CCDR has led to its adoption by various state governments in India and international organizations from Southeast Asian countries.

**Results:** A total of 445 PCPs from 18 districts were trained over 3 years. Pre-post test scores showed significant improvement [2-tailed Anova ( $P < 0.05$  t-test)] in knowledge regarding systemic management and prevention of DR. Baseline and end line survey of participants showed improvement of 23% in scores. Ninety-two percent of participants agreed that the case studies, videos, activities, and hands-on training provided were adequate for initiating discussions for replicating real-life case scenarios in DR management. More than 95% of the participants agreed that the training facilitated them to manage patients with DR and refer people with sight-threatening DR to the retina specialist.

**Conclusions:** CCDR is an effort to tackle a shortage of trained manpower and will positively set a trend in the field of DR education and help improve diabetes indices in India. To ensure scalability and sustainability, an e-learning module is being developed.

**Poster No.: EX1-005**

**Panel No.: 005**

### Medical Student Perception of Various Small Group Teaching and Learning Techniques During Ophthalmology Clinical Posting

*First Author: Prabhu VENKATESAN*

*Co-Author(s): Rajiv GUPTA, Soumendra SAHOO, Saurab SRIVATSAV*

**Purpose:** The purpose of this study was to investigate fourth year medical students' perceptions of various small group teaching effectiveness during clinical posting in ophthalmology.

**Methods:** A cross-sectional mixed method design where a descriptive survey was conducted for 61 4th year medical undergraduates during their clinical rotation in ophthalmology, followed by qualitative analysis of effectiveness of various techniques used in small group. A self-administered questionnaire was used to measure students' perception on various types of small group sessions during clinical postings. Open-ended question was given to derive qualitative data.

**Results:** The students' overall perceptions of small group teaching effectiveness showed that the clinical sessions involving real patients (mean,  $4.1 \pm 0.42$ ) were more beneficial in honing their examination and procedural skills. Also, the interactive PBL sessions

were beneficial to their learning process (mean,  $4.0 \pm 0.46$ ). Students have positive perceptions toward other small group activities, such as role play (mean,  $4 \pm 0.45$ ) and e-learning activities (mean,  $3.9 \pm 0.58$ ). However, they scored (mean,  $3.7 \pm 0.46$ ) for self-directed learning activities.

**Conclusions:** The students liked the interactive contact sessions more than self-directed learning. The clinical teaching involving patients and interactive problem-based learning sessions were highly scored by them. Further research should be done to find the way to enrich self-directed learning activities during clinical postings.

**Poster No.: EX1-001**

**Panel No.: 001**

### Multimodal Imaging of an Experimental Retinal Vein Occlusion Mouse Model

*First Author:* Norihiro **SUZUKI**

*Co-Author(s):* Yoshio **HIRANO**, Yuichiro **OGURA**, Tsutomu **YASUKAWA**, Munenori **YOSHIDA**

**Purpose:** To make an experimental retinal vein occlusion (RVO) model in mice and evaluate longitudinal analyses of microvascular abnormalities and cell behaviors using multimodal imaging technique.

**Methods:** Central retinal vein was experimentally occluded in C57BL6 mouse and Cx3cr1-GFP reporter mouse using laser photocoagulation (PC) after intraperitoneal administration of Rose Bengal, a photo-activator dye enhancing thrombus formation. Microvascular abnormalities and the migration of leukocytes were longitudinally evaluated by multimodal imaging technique including fundus photography, optical coherence tomography, fluorescein angiography, and acridine orange leukocyte fluorography for several weeks after experimental RVO onset. The behaviors of macrophages and microglia also were evaluated immunohistochemically with retinal whole mounts.

**Results:** All eyes demonstrated venous occlusion immediately after PC followed by retinal hemorrhages, retinal edema, microaneurysm, collateral vessels, and retinal neovascularization, which were consistent with clinical findings in RVO. Capillary nonperfusion areas (NPAs) were detected on Day 7 and gradually spread along the arterial side. In the acute phase (Day 3 and 7), the leukocyte migration increased in number compared with baseline and was mainly detected in the perfused area. After Day 7, the leukocytes were detected along the arterial walls and at the edges of the NPAs. GFP-positive cells with bigger soma and shorter protuberance indicating activated microglia were observed in the NPAs of Cx3cr1-GFP retinas.

**Conclusions:** The current technique can monitor the retinal microvascular abnormalities and the cell behaviors in experimental RVO and will open new avenues for the understanding of pathophysiology of

RVO, leading to potential therapeutic interventions.

**Poster No.: EX1-002**

**Panel No.: 002**

### Resident Assessment Tools for Nd:YAG Laser Peripheral Iridotomy and Selective Laser Trabeculoplasty

*First Author:* Danielle **WENTZELL**

*Co-Author(s):* Helen **CHUNG**, Patrick **GOOI**, Chris **HANSON**, Matt **SCHLENKER**

**Purpose:** To develop an assessment tool for residents performance in Nd:YAG laser peripheral iridotomy (LPI) and selective laser trabeculoplasty (SLT) on training models that can be used to meet requirements of competency-based medication education (CBME) in ophthalmology programs with established face and content validity.

**Methods:** Checklists and a global rating scale (GRS) were created to evaluate the technical skills necessary for resident performance in completing a Nd:YAG LPI and SLT. A modified Delphi method was administered by sending the checklists and GRS to content experts, along with videos of the assessment tools being used on a performance with inanimate SimuleYE LPI and SLT models and a survey to collect their opinions on the assessment tool. After each round of the Delphi process, the viewpoints of the experts were taken into consideration and a restructured assessment tool was redistributed to the content experts for further feedback, until consensus was reached.

**Results:** A checklist and GRS for assessing residents performance in both Nd:YAG LPI and SLT were created with both face and content validity.

**Conclusions:** These checklists and GRS can be used in ophthalmology resident training programs to help meet the accountability demands for proof of competency that competency-based medical education requires. This assessment method is demonstrated using an inanimate model, which is valuable for assisting residents' in skills development and feedback prior to engaging live patients. Predictive validity and reliability should be established in future studies.

**Poster No.: EX1-007**

**Panel No.: 007**

### The Use of an E-Learning Model to Enhance Skills of Primary Care Physicians in Diabetic Retinopathy Management at a Primary Care Level in India

*First Author:* Manoj **JOSHI**

*Co-Author(s):* Gudlavalleti Venkata Satyanarayana **MURTHY**, Dorairaj **PRABHAKARAN**, Ramachandran **RAJALAKSHMI**, Kim **RAMASAMY**, Ranjit **UNNIKRISHNAN**

**Purpose:** Diabetic retinopathy (DR) is a leading cause

of visual impairment in India, with 18% of people with diabetes suffering from DR. With early detection and treatment, it is possible to reduce the risk of blindness from DR by 90%. Therefore, training of primary care physicians (PCPs) in DR management is the need of the hour.

**Methods:** The Certificate Course in Evidence Based Management of Diabetic Retinopathy (CCDR) is a well-established program for training of PCPs in India for the last 3 years, and has trained 445 PCPs at 18 tertiary retina institutes. Due to increasing demand from PCPs from the rural and far-flung areas, and from the success of the contact-based trainings, an online/e-learning implementation module has been created by the renowned academic institutes and leaders in diabetology and ophthalmology, which aims to assist PCPs in enhancing their skills, knowledge, and core competencies in DR management at the primary care level. The online program, spread over 9 hours, addresses perspectives of patients and practitioners regarding optimal screening, prevention, and management of DR, and is suitable for urban and rural settings.

**Results:** The online training and self-test allows participants to be confident in the diagnosis of DR post-training at the primary care level. Hands-on training is an integral part of the program and is imparted by leading experts in the premier retina institutes.

**Conclusions:** Expansion of the CCDR online/e-Learning program will increase the reach to physicians across rural and hard to reach areas in India, as well as globally to other lower- and middle-income countries.

## Cataract

**Poster No.: EX1-013**

**Panel No.: 013**

### Assessment of Visual Acuity Using Tablet and Smartphone Applications

*First Author: Wimwipa **DIEOSUTHICHAT***

*Co-Author(s): Sarayut **NIJVIPAKUL**, Wichai **PRASARTRITHA***

**Purpose:** This study evaluated and compared the VA (visual acuity) measurement obtained from smartphone applications to the conventional standard method using ETDRS (Early Treatment of Diabetic Retinopathy Study) chart.

**Methods:** A total of 200 eyes from 100 participants were recruited and tested the VA by using the standard ETDRS light box chart and applications which contain "Eye Snellen", "Eye Chart" in iPad, and "Eye Chart" in iPhone. Agreement between the tests was assessed by Bland-Altman analysis and interclass correlation calculation.

**Results:** A total of 200 eyes were tested. By using Bland-Altman analysis, the mean difference in logMAR VA between ETDRS and Eye Snellen was 0.097 logMAR [95% LOA (limit of agreement) -0.067, 0.026], ETDRS and Eye Chart from iPad was 0.047 logMAR (95% LOA -0.124, 0.218), and ETDRS and Eye Chart from iPhone was 0.027 (95% LOA -0.157, 0.211). Interclass correlations between ETDRS and Eye Snellen, Eye Chart from iPad, and Eye Chart from iPhone were 0.638, 0.768, and 0.764 respectively.

**Conclusions:** The study showed an agreement between the applications and the standard ETDRS chart. Although the ETDRS chart is still the standard method of VA measurement, smartphone-based applications are also an alternative reliable method for visual function assessment which is more convenient, portable, and required less space distance.

**Poster No.: EX1-015**

**Panel No.: 015**

### Cataract in an Underdeveloped Region of Indonesia: Visual Outcome of Cataract Surgery and Influencing Factors

*First Author: Cynthia **VIRYAWAN***

*Co-Author(s): Michael **HARTONO**, Nur Azizah **JUZMI***

**Purpose:** This study was aimed to evaluate the visual outcomes of cataract surgery along with its influencing factors in Boalemo, Gorontalo, as one of the underdeveloped regions of Indonesia.

**Methods:** The data of this cross-sectional study was obtained from the medical record from January to December 2017, which was selected randomly. The postoperative visual acuity was PVA (present visual acuity) at the 4th week after surgery and categorized to 2 categories, good and poor. Visual acuity  $\geq 6/18$  was categorized as good.

**Results:** Among 103 subjects, 67% had good PVA after surgery, 40.8% were 60–69 years old, 62.1% were female, 51.5% were right operated eye, 63.1% were mature cataract, 50.5% had hypertension, 86.4% underwent phacoemulsification, 52.9% were blind before surgery, and 14.6% had complications after surgery. It was influenced by age [ $>70$ th OR = 4.58 (1.00-21.12)], surgery type [OR = 4.61 (1.41-15.10)], hypertension [OR = 2.38 (1.01-5.57)], and complications after surgery [OR = 7.77 (2.25-26.83)] ( $P < 0.05$ ).

**Conclusions:** Quality of cataract surgery in Boalemo, as one of underdeveloped region of Indonesia, is still below the WHO standard. Ages below 70 years, phacoemulsification, blood pressure control, and less complications need to be endeavored in order to achieve better postoperative visual acuity.

Poster No.: EX1-027

Panel No.: 027

### Comparative Analysis of Postoperative Optical Performance in Different Pupil Diameters with 3 Intraocular Lenses: Bifocal, Trifocal, and Extended Range of Vision

First Author: Yong **WANG**

Co-Author(s): Bichao **CHEN**, Xueting **LI**, Tan **QIAN**

**Purpose:** To compare optical performance after implantation of 3 intraocular lens (IOLs) in different pupil diameters (PD).

**Methods:** This retrospective study included patients who had cataract surgery with the implantation of 1 of 3 IOLs: ReSTOR +3.0 D (bifocal), Lisa tri.839MP (trifocal), and Symphony (extended-range-of-vision, ERV). The follow-ups were 3 months. Preoperative characteristics (including sex, age, eye, visual acuity, axial length, corneal meridian, IOL power, and spherical equivalent), and corneal, intraocular, and total aberration, PSF at 3 and 5 mm PD with OPD-SCAN III were evaluated.

**Results:** No statistically significant difference was found in the preoperative characteristics and aberration, PSF preoperatively at 3 and 5 mm PD. At 3 mm PD, corneal high-order aberration was significantly lower in trifocal than bifocal group, intra-coma aberration was higher in bifocal than trifocal and ERV group. At 5 mm PD, corneal high-order and intra-trefoil aberration was significantly lower in trifocal than bifocal group, intra-spherical and total spherical aberration was higher in ERV than trifocal and bifocal group. Intra-spherical and total aberration was significantly lower in trifocal than ERV group, and intraocular, intra-high-order, intra-coma, total trefoil aberration was significantly lower in trifocal than bifocal and ERV group at 3 or 5 mm PD. No statistically significant difference was found in PSF at 3 or 5 mm PD.

**Conclusions:** At 3 or 5 mm PD, trifocal group tended to have lower aberration than the other 2 groups, but at 5 mm the ERV group had higher intraocular and total spherical aberration. However, PSF with no significant difference showed that 3 groups had the same optical performance.

Poster No.: EX1-018

Panel No.: 018

### Comparison of Anterior Chamber Depth, Axial Length, and Keratometry Using 5 Biometric Measurements

First Author: Yong **WANG**

Co-Author(s): Bichao **CHEN**, Xueting **LI**, Huang En **LI**

**Purpose:** To evaluate the reliability and agreement of anterior chamber depth (ACD), axial length (AL), and keratometry (K) measurements with 5 devices. To give a helpful reference to eye doctors for clinic studies.

**Methods:** In this prospective clinical study, we measured ACD, AL, and K in one eye of 130 patients with optical low coherence reflectometry devices: Lenstar, partial coherence interferometry devices: IOLMaster500 and AL-Scan, as well as swept OCT devices: IOLMaster700 and OA2000.

**Results:** With the Lenstar, IOLMaster500, IOLMaster700, AL-Scan, and OA2000, mean values for AL were, respectively,  $23.93 \pm 0.70$  mm,  $23.91 \pm 0.71$  mm,  $23.91 \pm 0.70$  mm,  $23.89 \pm 0.68$  mm,  $23.91 \pm 0.71$  mm; the value for ACD were  $2.98 \pm 0.43$  mm,  $2.94 \pm 0.45$  mm,  $2.95 \pm 0.43$  mm,  $2.95 \pm 0.46$  mm,  $3 \pm 0.41$  mm; Kf were  $43.75 \pm 1.36$  diopters (D),  $43.67 \pm 1.44$  D,  $43.67 \pm 1.40$  D,  $43.76 \pm 1.42$  D,  $43.75 \pm 1.34$  D; Ks were  $44.59 \pm 1.51$  D,  $44.77 \pm 1.53$  D,  $44.62 \pm 1.45$  D,  $44.77 \pm 1.45$  D,  $44.70 \pm 1.44$  D. The differences were not significant (all  $P > 0.05$ ). As for AL, the agreement was good; the consistency of OA2000, IOLMaster700, and Lenstar were good. As for K, the agreement between IOLMaster500 and IOLMaster700 was good.

**Conclusions:** In clinical practice, IOLMaster500 and IOLMaster700 can be used interchangeably. There is no gold standard, it is not currently possible to make a definitive statement of which instrument yields the best results.

Poster No.: EX1-020

Panel No.: 020

### Comparison of the Accuracy of Barrett Universal II and 4 Intraocular Lens Formulas Optimized by Wang-Koch Formula in Eyes Above 25mm with a Trifocal IOL

First Author: Yong **WANG**

Co-Author(s): Bichao **CHEN**, Xueting **LI**, Tan **QIAN**

**Purpose:** To evaluate the accuracy of refractive prediction of Barrett universal II formula and 4 intraocular lens (IOL) formulas optimized by Wang-Koch formula with a trifocal diffractive IOL in long eyes with axial length (AL) above 25 mm.

**Methods:** This was a retrospective study enrolling 35 long eyes with AL longer than 25 mm, with implantation of LISA tri. 839MP. Wang-Koch formula was used to optimize AL for the 4 formulas. Then the IOL power was recalculated with Barrett universal II formula and the 4 IOL formulas optimized in LS900. The refractive prediction error was evaluated and compared.

**Results:** The MAE with Barrett II and the 4 formulas optimized by Wang-Koch formula was similar, and the statistically significant higher MAE were seen with the 4 formulas without Wang-Koch optimization. The MNE with Barrett universal II formula was 0.245 diopters (D), and the 4 optimized formulas were -0.244 D, -0.225 D, -0.381 D, and -0.259 D respectively. They were statistically significantly lower than the MNE with the 4 formulas without optimization. The Barrett universal

II formula, the four formulas optimized and Haigis, SRK-T show the similar percentage of eyes within  $\pm 0.5$  D of the target refraction, but within  $\pm 1.0$  D. Barrett universal II formula and the 4 formulas optimized show higher percentage than the 4 formulas without optimization.

**Conclusions:** Barrett II and the 4 formulas optimized by Wang-Koch formula in long eyes above 25 mm with Lisa tri.839MP shows more accurately than the 4 formulas without optimization. And the Wang-Koch optimization significantly reduced the percentage of long eyes with a hyperopic outcome statistically but tended to be over-corrected in this study.

**Poster No.: EX1-022**

**Panel No.: 022**

### **Efficacy and Safety of Ketorolac Tromethamine 0.45% for Treatment of Anterior Segment Inflammation and Pain After Phacoemulsification in Type 2 Diabetic Patients**

*First Author: Ainal NAFFI*

*Co-Author(s): Jemaima CHE HAMZAH, Norshamsiah MD DIN, Safinaz MOHD KHALDIN, Othmaliza OTHMAN*

**Purpose:** To determine the efficacy and safety of ketorolac tromethamine 0.45% (Acuvail) in anterior segment inflammation and pain after phacoemulsification in diabetic patients.

**Methods:** This was a double-blind comparative cross-sectional study involving 83 diabetic patients undergoing phacoemulsification with intraocular lens implantation. Patients were randomized into Acuvail ( $n = 42$ ) and dexamethasone 0.1% (Maxidex) groups ( $n = 41$ ). Primary outcome measure was cleared ocular inflammation on day 15 post-phacoemulsification. Secondary outcome measure was resolution of ocular pain on day 1 post-phacoemulsification. Safety is determined by the occurrence of adverse events throughout study period.

**Results:** A total of 63 patients completed the study, 31 and 32 patients in Acuvail and Maxidex group, respectively. Demographic characteristics were comparable in both groups for age, race, gender, grade of DR, eye laterality, and first or second eye at operation. There was no significant difference in the number of patients achieving cleared ocular inflammation by day 5 post-phacoemulsification in Acuvail group (16.13%) and Maxidex group (25%) ( $P = 0.384$ ). Both groups showed increased proportion of patients with clearance of ocular inflammation by day 15 post-phacoemulsification, (54.83% vs 75%) in Acuvail and Maxidex group, respectively ( $P = 0.093$ ). Resolution of pain on day 1 post-phacoemulsification is seen in (67.7% vs 62.5%) in Acuvail and Maxidex group, respectively ( $P = 0.663$ ). The most common adverse

event was itchiness, reported by 3 patients (9.7%) from Acuvail group and none in Maxidex group.

**Conclusions:** Efficacy of Acuvail is comparable to Maxidex in reducing anterior segment inflammation and pain post-phacoemulsification in diabetic patients. Acuvail was shown to be tolerable with good safety profile.

**Poster No.: EX1-026**

**Panel No.: 026**

### **Evaluation of the Effect of Higher-Order Aberrations on Visual Performance in Patients Implanted with Rotationally Asymmetric Multifocal Intraocular Lens**

*First Author: Yong WANG*

*Co-Author(s): Xiao WANG*

**Purpose:** To compare different ocular aberrations in pseudophakic eye with rotationally asymmetric multifocal intraocular lens (IOL) implantation and determine the visual performance of rotationally asymmetric multifocal IOL by correlating the defocus curve of the IOL-implanted eye with visual acuity and high-order aberrations (HOAs).

**Methods:** A total of 25 eyes of 19 patients aged between 48 and 76 years (mean:  $58.28 \pm 7.72$  years) underwent cataract surgery with implantation of rotationally asymmetric multifocal IOL. UDVA, CDVA, postoperative manifest refraction, and defocus curve were evaluated 3 months postoperatively. Aberrometry was performed by the OPD Scan-III (Nidek, Japan) on the undilated pupil under mesopic conditions at 3 months after surgery.

**Results:** A significant improvement in distance visual acuity was achieved ( $P < 0.01$ ). The root mean square (RMS) of HOAs was total aberration ( $1.004 \pm 0.560$ ), coma aberration ( $0.311 \pm 0.325$ ), trefoil aberration ( $0.859 \pm 0.316$ ), and spherical aberration (SA) ( $0.142 \pm 0.442$ ). The defocus curve showed 2 peaks of the maximum visual acuity (0 and -3.00 D of the defocus), with an acceptable range of intermediated vision. logMAR visual corresponding to near defocus was directly correlated with some HOAs, trefoil aberration ( $r = 0.572$ ,  $P < 0.05$ ), and spherical aberration ( $r = 0.544$ ,  $P < 0.05$ ).

**Conclusions:** The rotationally asymmetric multifocal IOL provides good distance, intermediated and near visual outcomes. Trefoil and spherical aberration had a significant effect on visual function after cataract surgery combined with SBL-3 multifocal IOL implantation, which may limit the potential visual benefit.

**Poster No.: EX1-012**

**Panel No.: 012**

### Final Visual Outcomes Following Cataract Surgery at Outreach Camps in Remote Areas in Timor-Leste

*First Author: Frenky DE JESUS*

**Purpose:** To determine the final visual outcomes of patients who underwent cataract surgery through outreach services in Timor-Leste.

**Methods:** The study began with a week of cataract surgical outreach in a remote area in Timor-Leste. Data were collected from all patients who had cataract surgery during the program from July 2017 to June 2018. Patients were identified by the surgery sheets.

**Results:** A total of 412 cataract surgeries were performed in 10 different locations in Timor-Leste. Of these, 56% were right eye and 44% left eye. Of the total, 396 had uncomplicated cataract surgery, while 16 required anterior vitrectomy and anterior chamber intraocular lens insertion. For accuracy of interpretation of the visual outcomes, patients were divided into 3 groups depending on the first postoperative day. Vision of 6/18 or better was used to define acceptable postoperative vision. This group consisted of 189 (46%) patients, regular (6/24-6/60) and poor vision (<1/60) were 146 (35%) and 77 (19%) patients, respectively. From 146 patients with regular outcomes, 124 (60%) were due to corneal edema, 58 (28%) were intraocular pressure high, air bubble in 17 (8%), and the rest retained lens material, hyphema, and aphakia were 1% each, respectively. However, the reason for poor visual outcomes secondary to comorbidities associated such as macular degeneration was 51%, glaucoma 22%, pterygium 21%, and previous trauma 6%.

**Conclusions:** Cataract surgery outreach was successful and improved the vision of patients in a remote area in Timor-Leste.

**Poster No.: EX1-010**

**Panel No.: 010**

### IOL Opacification Years After Uncomplicated Cataract Surgery: An Upcoming Challenge

*First Author: Remya PAULOSE*

*Co-Author(s): Jyotirmay BISWAS, Thomas Cherian CHERIAN, Reesha KARINGATTIL*

**Purpose:** (1) To investigate clinical features, initial diagnosis, and surgical outcome in intraocular lens (IOL) opacification. (2) To propose a grading for IOL opacification. (3) To report histopathology results of the explanted IOL- capsule complex and vitreous and aqueous aspirate.

**Methods:** Patients with IOL opacification following uncomplicated phacoemulsification with foldable IOL were included in the study. Patients were graded in to

3 groups with regard to severity of opacification, visual acuity, and fundus view. Cases where fundus view was precluded, ultrasound was performed. All patients of group 1 and 2 were observed, while grade 3 cases were taken up for surgery. Aqueous and vitreous sample, along with the IOL- capsule complex, was sent for histopathological examination.

**Results:** Of 8 eyes of 8 patients with IOL opacification, 62.5% were women (mean age, 66.8 years). Mean interval from cataract surgery to onset of symptom was 22.5 months (range, 11- 50 months). IOL opacification grade 1 and 2 included 3 patients each, and 2 eyes were in grade 3. These 2 patients underwent IOL explantation. The IOL was fibrosed to the capsular bag in both cases and hence had to be removed en masse. Multiple epithelial cells were seen on the surface of the IOL optic and haptic region o HPE. No intralenticular opacification or calcification was found.

**Conclusions:** Although rare, IOL opacification is highly relevant because it is often misdiagnosed as posterior capsule opacity, vitreous hemorrhage, or endophthalmitis. The study emphasizes the need for a high index of suspicion in post cataract surgery patients presenting with visual problems. A simple and practical grading system has been proposed which will aid in the optimum management of these cases.

**Poster No.: EX1-011**

**Panel No.: 011**

### IOL Scaffold in Phacoemulsification to Prevent Posterior Capsule Tear

*First Author: Ashraful RIDOY*

*Co-Author(s): Niaz ABDUR RAHMAN, Mahbubur Rahman CHOWDHURY, Mahziba CHOWDHURY, Syeed KADIR*

**Purpose:** To prevent posterior capsule tear and evaluate the postoperative outcomes of phacoemulsification with intraocular lens (IOL) scaffold technique.

**Methods:** A total of 17 eyes of 17 patients with morgagnian (04 eyes) and hard (nuclear sclerosis grade – IV of 13 eyes) cataracts who had undergone phacoemulsification with IOL scaffold technique to prevent posterior capsule tear in a tertiary clinic. All surgeries were performed by a single surgeon. 6.0 mm optic, acrylic, foldable IOL was implanted in all eyes. The preoperative and postoperative parameters evaluated were uncorrected distance visual acuity (UDVA), corrected distance visual acuity, cornea status, intraocular pressure (IOP), and anterior segment inflammation.

**Results:** Posterior capsule tear was prevented in all eyes. At 1-month follow-up, a significant improvement was noted in UDVA postoperatively ( $P < 0.0001$ ) and 6/6 visual acuity achieved in 71% of eyes. Corrected visual acuity 6/6 achieved in 18% of eyes. Mean postoperative IOP at 1-day and 1-month follow-up

without any medication were 12.79 mm Hg and 13.06 mm Hg, respectively. Immediate postoperative grade-2 anterior segment reaction (02 eyes) and minimal corneal edema (03 eyes) noted which were resolved by 1 month.

**Conclusions:** IOL scaffold provides a safe and effective way to prevent posterior capsule tear in phacoemulsification of Morgagnian and hard cataracts, with a good visual outcome.

**Poster No.: EX1-025**

**Panel No.: 025**

### Intraoperative Difficulties, Complications, and Patient-Reported Visual Function in Cataract Surgery

*First Author: Magnus GRIMFORS*

*Co-Author(s): Jonas HÖJER, Maria KUGELBERG, Mats LUNDSTRÖM*

**Purpose:** To study associations between intraoperative difficulties, changes in patient-perceived and postoperative visual function, and visual satisfaction after cataract surgery.

**Methods:** Swedish multicenter, prospective, cross-sectional, nonrandomized, National Cataract Register study. A total of 10,979 patients ( $n = 10,979$ ) who underwent cataract surgery from 2008 to 2011 completed the Catquest-9SF questionnaire before and 3 months postoperatively. Using Rasch analysis, we converted the nonparametric grading of the answers to parametric data and performed parametric statistical analyses. Multiple regression models were used to examine possible predictors associated with self-assessed visual function after cataract surgery.

**Results:** Greater improvement in patient-reported visual function was seen in patients in whom trypan blue dye was used; those without a posterior capsular tear or an ocular comorbidity; and those who were younger, female, and had low preoperative corrected distance visual acuity (CDVA) or high postoperative CDVA compared with their counterparts. Significantly higher patient reported postoperative visual function was seen in patients in whom trypan blue dye was used, and those with no posterior capsular tear or ocular comorbidity and no use of capsular hooks; and those who were younger and had low preoperative or high postoperative CDVA compared with their counterparts. The risk of general dissatisfaction after cataract surgery was significantly greater in patients with a posterior capsule tear, ocular comorbidity, or low postoperative CDVA, and those in whom mechanical pupillary stretching was performed.

**Conclusions:** Several intraoperative difficulties, posterior capsular tear, ocular comorbidity, age, gender, and preoperative and postoperative CDVAs affect patient improvement and patient reported visual function after cataract surgery.

**Poster No.: EX1-024**

**Panel No.: 024**

### Modified Iris Repair in Traumatic Iris

*First Author: Siska SUMANJAYA*

*Co-Author(s): Ariesanti HANDAYANI, Gede JAYANEGARA, Gita SARASWATI*

**Purpose:** To describe management of traumatic iris-based on iris wound defect.

**Methods:** Four cases underwent iris repair by the McCannel and sewing machine suture. There are 4 cases with traumatic iris. Case 1: Male, 13-year-old with corneoscleral rupture and iris sphincter rupture at 4 o'clock caused by sharp trauma on left eye. Case 2: Male, 51-year-old with corneal rupture, iris sphincter rupture at 7 o'clock, vitreous prolapse, and traumatic cataract caused by blunt trauma on right eye. Case 3: Male, 57-year-old with limbus rupture, hyphema, and iridodialysis 270 degree, intraocular lens dislocation. Case 4: Female, 22-year-old with iris prolapse and iridodialysis at 4-6 o'clock.

**Results:** Iris was sutured in McCannel technique (Case 1 and 2) and sewing machine technique (Case 3 and 4). The defect of sphincter iris could be fixed with McCannel suture. Large defect iridodialysis might be suitable for sewing machine technique. All of the cases have shown a good restoration of iris morphology after surgery.

**Conclusions:** Different iris wound morphology might own different iris technique suture. These cases describe iris defect done with McCannel and sewing machine. These techniques show ease and simplicity of minimally invasive iris repair.

**Poster No.: EX1-017**

**Panel No.: 017**

### Multimodal Imaging in an Idiopathic Spontaneously Absorbed Cataractous Lens

*First Author: Saurabh DESHMUKH*

*Co-Author(s): Harsha BHATTACHARJEE, Krati GUPTA, Diva MISRA*

**Purpose:** To report an unusual and rare case of idiopathic spontaneous absorption of the cataractous lens and its multimodal imaging features.

**Methods:** A 56-year-old female presented with a complaint of diminution of vision in both eyes. Slit lamp examination OD revealed Morgagnian cataract with a normal anterior segment. Slit lamp examination OS revealed absorbed cataractous lens with intact lens capsule with clear visual axis. Fundus examination of the left eye was unremarkable. No history of trauma, past ocular surgery, or any ocular or systemic disease. Ultrasonography B-scan of both eyes was unremarkable. Her blood examination was normal. Anterior segment optical coherence tomography (AS-OCT) showed increased anterior chamber depth OS. It

also showed Morgagnian cataractous lens with nucleus in the bag OD and absorbed cataractous lens with thin adhered capsular bag OS. Scheimpflug imaging also decreased densitometry OS. She underwent successful phacoemulsification in the right eye with in the bag placement of intraocular lens (IOL). For the left eye with absorbed lens, she underwent phacoemulsification with anterior circular curvilinear capsulorhexis using a capsulotomy forceps. The cortical matter in the bag area was aspirated with implantation of IOL in the ciliary sulcus over the intact capsule rim.

**Results:** The patient underwent phacoemulsification with anterior continuous curvilinear capsulorhexis with IOL placement in the ciliary sulcus over the anterior capsule in the left eye.

**Conclusions:** This case is the first of its kind in the literature. The role of ultrasound B-scan, AS-OCT, and Scheimpflug imaging in the preoperative evaluation of capsulolenticular status and subsequent successful management is discussed.

**Poster No.: EX1-016**

**Panel No.: 016**

### Outcome of Scleral Fixation Intraocular Lens in Absent Posterior Capsule Support

*First Author: Arjun SHRESTHA*

**Purpose:** To evaluate the outcome of scleral fixation intraocular lens (SF IOL) in absent posterior capsule support.

**Methods:** This was a retrospective study enrolling 40 eyes of SF IOL from January 2016 to June 2018 in BP Eye Foundation and Geta Eye Hospital in Nepal. Patients' demographic data, indication for surgery, postoperative complications, and postoperative best corrected visual acuity (BCVA) were analyzed. All patients had mandatory anterior vitrectomy or pars plana vitrectomy followed by Ab-external scleral fixated posterior chamber intraocular lens implantation. 10-0 Prolene sutures were used for trans-scleral fixation of lens haptics at 2 and 8 o'clock meridian of sclera, 1 mm from limbus under sclera flap.

**Results:** Mean age of the patients was 50.5 years (range 14 to 70 years). Indications for surgery were intraocular lens drop (IOL) in vitreous (30%), aphakia due to previous surgeries (55%), and aphakia due to dislocated nucleus in vitreous (15%). Haptic broke in 7.5% of eyes, and suture knot slipped 7.5% of eyes intraoperatively. Striate keratopathy, IOL decentration, and IOL drop was seen in 10%, 5%, and 2.5% of eyes respectively in first postoperative day. BCVA was 6/6-6/18, 6/24-6/60, and worse than 6/60 in 62.5%, 32.5%, and 5% of eyes respectively in first postoperative day, and 82.5%, 12.5%, and 5% of eyes respectively in 3 months.

**Conclusions:** Ab-Externo SFIOL was found to have a favorable visual outcome in a majority of cases and a

low intra and postoperative risk profile.

**Poster No.: EX1-023**

**Panel No.: 023**

### Preliminary Clinical Observation on Vision Quality of Implantation with Refractive Rotationally Asymmetric Multifocal Intraocular Lens

*First Author: Yong WANG*

*Co-Author(s): Xiao WANG*

**Purpose:** To observe the early vision quality of phacoemulsification cataract surgery with implantation of refractive rotationally asymmetric multifocal intraocular lens (IOL).

**Methods:** A self-controlled, before-after trial in which 36 patients (40 eyes) underwent phacoemulsification cataract surgery combined with the refractive rotationally asymmetric multifocal IOL implantation. UDVA, uncorrected intermediate visual acuity (UIVA), uncorrected near visual acuity (UNVA) and CDVA, the postoperative spherical equivalent (SE), defocus curve and transfer modulation function (MTF), intraocular high-order aberrations, visual function index of life quality, and the rate of spectacle independence were evaluated 3 months postoperatively.

**Results:** At 3 months, significant improvement in UDVA, CDVA, UIVA, and UNVA were found postoperatively ( $P < 0.05$ ), 97.5% of postoperative CDVA were better than 0.1 logMAR; 35 eyes (87.5%) were within  $\pm 1.00$  diopter (D) of emmetropia. The defocus curve showed two peaks of maximum visual acuity (0 and -2.5 D of defocus), and the visual acuity of +1.0 D - 4.0 D defocus were better than 0.25 logMAR. The MTF was significantly improved compared with preoperative examination ( $P < 0.05$ ); improvement in total intraocular aberrations, vertical coma, and vertical trefoil were observed ( $P < 0.05$ ). The median score of Chinese version visual function index-12 (VF-12-CN) was 1.0 (0.0, 2.0) at 3 months. 92.5% of the patients were completely spectacle-independent for far and near vision.

**Conclusions:** Refractive rotationally asymmetric multifocal intraocular IOL provided satisfying visual acuity for far and near with a good range of intermediate vision. Patients had good visual quality and high quality of life.

**Poster No.: EX1-009**

**Panel No.: 009**

### Prevalence of Corneal Astigmatism Before Cataract Surgery in Cambodian Population

*First Author: Vinh SUN*

*Co-Author(s): Ponndara ITH, Piseth KONG, Bunsocheat MAM, Amarin MAR, Meng NGY*

**Purpose:** To assess the demographics and distribution

of corneal astigmatism before cataract surgery in Cambodian patients.

**Methods:** Clinic-based cross-sectional study. From January 2016 to December 2016, preoperative bilateral partial coherence interferometry (NIDEK AL Scan) was performed in consecutive patients having cataract surgery. Patient demographics and keratometric data were recorded.

**Results:** The mean age of the 455 patients (790 eyes) was  $62.18 \pm 12.00$  (SD); there was a predominance of women patients (53.4%). The mean axial length was  $23.51 \pm 1.17$  mm. The mean corneal astigmatism in this cohort was 1.02 diopters (D) (range 0.02 to 7.24 D) with median 0.80 D. Corneal astigmatism was less than 1.00 D in 63.8% of eyes, between 1 D to 1.49 D in 16.46% of eyes, and 1.50 D or higher in 19.74% of eyes. Astigmatism was with the rule in 32.3% of eyes, against the rule (ATR) in 51.8% of eyes, and oblique in 15.9% of eyes. The average keratometry measurement was  $43.99 \pm 1.52$  D. Female has steeper cornea than male ( $P < 0.001$ ). Against-the-rule astigmatism increased significantly with older age.

**Conclusions:** A majority of patients for cataract surgery have astigmatism between 0.25 D to 1.50 D. Astigmatism of  $>1.00$  D was presented in one third of the cases. These findings will help the surgeons to manage preoperative astigmatism during cataract surgery accordingly in order that patients can achieve better visual outcomes after the operation.

**Poster No.: EX1-014**

**Panel No.: 014**

### Repair of Corneal Laceration with Removal of Traumatic Cataract and Subsequent Posterior Chamber Intraocular Lens Implantation and Membranectomy in a 15-Year-Old Female: A Case Report

*First Author: Cristina TAN*

*Co-Author(s): Victor CAPARAS, Corinna Elise SAMANIEGO*

**Purpose:** To present a case of complicated, prolonged open globe injury with repair and removal of traumatic cataract and later PCIOL implantation with subsequent removal of membranes in a pediatric patient.

**Methods:** We presented a case of a 15-year-old female who presented at our emergency room due to sudden blurring of vision of the left eye. The patient sustained a superior corneal perforation with jagged edges and shelving sustained 3 days prior, measuring 6.0 mm superotemporally, 5.0 mm superonasally, and 2.0 mm vertically near the center, from an explosion of a glass bottle. No glass shards were noted upon examination. On slit lamp examination, disruption of the anterior lens capsule was noted with the presence of a traumatic cataract. Repair of corneal laceration with removal of traumatic cataract was done. Subsequent

PCIOL implantation was then performed with the aid of corneal topography using the Pentacam AXL. Subsequent formation of a membrane behind the intraocular lens (IOL) at the visual axis obscuring the patient's vision prompted additional YAG-capsulotomy and later membranectomy to be performed.

**Results:** Visual acuity improved from hand movement with good light projection to 20/50 BCVA. Proper and timely management resulted in desirable visual outcomes, despite the length and shelving of the corneal laceration and the duration that the eye was left unrepaired prior to management.

**Conclusions:** Early cataract extraction with PCIOL implantation provides suitable results in our patient presenting with a corneal laceration and traumatic cataract. Use of corneal topography was important in predicting IOL power. Development of membranes was a complication that delays visual rehabilitation.

**Poster No.: EX1-021**

**Panel No.: 021**

### Soft Shell Technique: Outcome of Phacoemulsification Surgery for Hard Cataract

*First Author: Sharifa MITU*

*Co-Author(s): Rahima BHUIYA, Ahsanul HUQ, Syeed KADIR, Zahangir MUKUT*

**Purpose:** To evaluate the protective effect of 1.4% sodium hyaluronate combined with 2% hydroxypropyl methylcellulose (HPMC) on the corneal endothelial cells in phacoemulsification of hard cataract surgery.

**Methods:** A randomized, clinical trial was done that included 60 eyes of 60 patients undergoing phacoemulsification of hard cataracts. They were randomly and equally divided into 2 groups, group A (Control group) (2% HPMC alone) and group B (2% HPMC with 1.4% sodium hyaluronate). Corneal endothelial cell count (ECC), intraocular pressure (IOP), and visual acuity (VA) were measured preoperatively and on 1st POD, 1 month, and 3 months postoperatively.

**Results:** In Group A, ECC/mm<sup>2</sup> preoperatively, on 1st POD, after 1 month and 3 months were 2432.36, 2219.30, 2189.33, and 2164.16 and in Group B, they were 2409.10, 2309.10, 2272.63, and 2251.16 respectively. Baseline IOP in two groups were 12.23 and 12.13 mm Hg. In 1st POD, it was 15.20 and 13.96 mm Hg, 12.10 and 12.03 mm Hg after 1 month and 11.82 and 11.96 mm Hg after 3 months. In Group A, VA in baseline period, on 1st POD, after 1 month and 3 months were 1.15, 0.58, 0.08, and 0.07 respectively. In Group B, VA in baseline period, on 1st POD, after 1 month and 3 months were 1.12, 0.41, 0.07, and 0.06 respectively.

**Conclusions:** Combined use of 2% HPMC and 1.4% sodium hyaluronate is better than 2% HPMC alone as

it protects corneal endothelium more efficiently, hence causes less endothelial cell loss and thus secures better postoperative vision.

**Poster No.: EX1-019**

**Panel No.: 019**

### **Surgical Outcomes of Cataract Surgery in Very Elderly Patients**

*First Author: Yusuke KOGA*

*Co-Author(s): Koji KITAZAWA, Kentaro KOJIMA, Natsuki KUSADA, Chie SOTOZONO, Kazuhito YONEDA*

**Purpose:** To investigate cataract surgery outcomes in very elderly patients age 90 years or older, in comparison with elderly patients in their 70s and 80s.

**Methods:** This retrospective, comparative study involved 212 eyes of 127 patients aged 90 years or older (38 males, 89 females; mean age:  $92.2 \pm 2.1$  years) (very elderly group) and 222 eyes of 133 patients age 70 - 89 years (39 males, 94 females; mean age:  $78.4 \pm 5.0$  years) (control group). Patient background, pre- and postoperative best corrected visual acuity (BCVA), refractive outcome, intraoperative complications, and 'in-the-bag' intraocular lens (IOL) fixation rate were compared between the 2 groups.

**Results:** The prevalence of dementia and pseudoexfoliation syndrome was significantly higher in the very elderly group than in the control group (dementia: 7.8% and 2.3%, respectively; pseudoexfoliation: 16% and 5.9%, respectively). The mean preoperative BCVA (logMAR) was significantly worse in the very elderly group than in the control group ( $0.69 \pm 0.54$  and  $0.4 \pm 0.41$ , respectively;  $P < 0.0001$ ). The mean improvement of visual acuity post-surgery was significantly greater in the very elderly group than in the control group ( $0.41 \pm 0.57$  and  $0.30 \pm 0.38$ , respectively;  $P < 0.01$ ). No significant difference in refractive outcome was found between the 2 groups. The incidence of intraoperative complications was significantly higher in the very elderly group (13.7% and 4.5%, respectively;  $P = 0.014$ ), and the 'in-the-bag' IOL fixation rate was significantly lower in the very elderly group (91.5% and 97.8%, respectively;  $P = 0.0046$ ).

**Conclusions:** Our findings revealed that cataract surgery in very elderly patients resulted in good visual outcomes, despite a higher incidence of intraoperative complications.

## **Cornea, External Eye Diseases & Eye Bank**

**Poster No.: EX1-053**

**Panel No.: 053**

### **Accuracy and Reliability of the Ocular Surface Index in Thai for Identifying Dry Eyes Among the Thai Population**

*First Author: Prodpran RIJANA*

*Co-Author(s): Narisara KLANARONGRAN, Manapon LEKSKUL, Wiwan SANSANAYUDH, Theeratep TANTAVAKOM*

**Purpose:** To evaluate the validity and reliability of the Ocular Surface Disease Index (OSDI) questionnaire in Thai version.

**Methods:** We recruited 380 subjects (253 patients with dry eye and 127 non-dry eye), completed the OSDI in Thai version, and then underwent ophthalmic examination including tear breakup time and fluorescein staining. Physician's assessment is considered a gold standard for dry eye disease diagnosis and its severity. We evaluated sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and area under the receiver-operating characteristic curve (AUC) to determine the accuracy of the OSDI in Thai version for diagnosing dry eye.

**Results:** Of all the subjects included in the study, sensitivity, specificity, PPV, and NPV were 85.1, 54.1, 79.3, and 64.4, respectively. AUC was 0.783 with a 95% CI (0.734, 0.831). The OSDI in Thai version was valid, effectively discriminating between normal, mild, moderate, and severe dry eye disease.

**Conclusions:** The OSDI in Thai version is a valid and reliable instrument for diagnosing and measuring the severity of dry eye disease among the Thai population. It has the potential to provide an assessment of the impact of dry eye on patient dry eye-related quality of life, and may aid in treatment effectiveness evaluation.

**Poster No.: EX1-049**

**Panel No.: 049**

### **Allergic Conjunctivitis in Children of Hong Kong: Association with Environmental and Socioeconomic Factors**

*First Author: Mei Kwan YIU*

*Co-Author(s): Arnold Shau Hei CHEE, Ka Wai KAM, Calvin PANG, Jason YAM, Alvin YOUNG*

**Purpose:** To study the epidemiology and association of environmental and socio-economic factors with allergic conjunctivitis in Hong Kong children.

**Methods:** This study belongs to a part of the Hong

Kong Children Eye Study which recruited children and their parents residing in Hong Kong during July 2015 to December 2017. A Chinese questionnaire modified from the International Study of Asthma and Allergies in Childhood was completed by parents with assistance. Current allergic conjunctivitis was defined as a positive answer to the question 'has your child ever had itchy and/or watery eyes, without coexisting common cold or flu, during the past 12 months?' Univariate and multiple logistic regressions were performed to examine environmental and socio-economic factors associated with allergic conjunctivitis.

**Results:** A total of 3489 children aged  $7.6 \pm 1.01$  years were analyzed. Prevalence of current allergic conjunctivitis was 42.9%. Males had higher prevalence than females generally. 46.9% of children with current allergic conjunctivitis had concurrent symptoms of allergic rhinitis. Factors associated with current allergic conjunctivitis identified in the multiple logistic regression after adjusting for age and sex of children included family income (adjusted OR = 1.04, 95% CI 1.02-1.06), positive family history of atopy (adjusted OR = 2.25, 95% CI 1.95-2.59), and presence of mold at home (adjusted OR = 1.45, 95% CI 1.25-1.68).

**Conclusions:** Allergic conjunctivitis is prevalent among children in Hong Kong. Higher family income, positive family history of atopy, and presence of mold in household were risk factors associated with allergic conjunctivitis.

**Poster No.: EX1-044**

**Panel No.: 044**

### Alteration of Ocular Higher-Order Aberrations After Orthokeratology Lens Wear

*First Author: Jae Yong KIM*

*Co-Author(s): In Kyun HAHN, Dong Ho LEE, Hungwon TCHAH*

**Purpose:** To investigate the alterations in ocular higher-order aberrations (HOAs) after wearing orthokeratology (OK) lenses in myopic patients.

**Methods:** The study included 15 eyes from 10 myopic patients, whose refractive error was equal or higher than -4.5 diopters (D). Uncorrected visual acuity (UCVA) and best corrected visual acuity (BCVA) were measured, and auto-refraction, topography, and Zywave aberrometry were performed at baseline and at 1, 3, and 6 months following OK lens wear.

**Results:** The mean age was 11.5 years (range: 9 – 15 years), and the OK lenses were well-tolerated in all subjects. There was a significant improvement in UCVA ( $P < 0.001$ ) and decrease in spherical equivalent measured with auto-refraction at 6 months ( $P < 0.001$ ). Total HOAs significantly increased after OK lens wear ( $P < 0.001$ ), with spherical aberration increasing approximately 3.9-fold ( $P = 0.05$ ). Defocus and  $0^\circ$  astigmatism significantly decreased ( $P < 0.001$  and  $P$

$= 0.008$ , respectively). Vertical coma and quadrafoil significantly increased in the negative direction at 1 month, and then stabilized at 3 months ( $P = 0.01$  and  $P = 0.03$ , respectively). No statistically significant changes were found in  $45^\circ$  astigmatism, horizontal coma, trefoil, and secondary astigmatism.

**Conclusions:** After wearing properly prescribed OK lens, all subjects had significantly improved UCVA and decreased myopic spherical equivalent, with increased total HOAs and positive spherical aberration at 1 month, and the changes were maintained at 6 months.

**Poster No.: EX1-031**

**Panel No.: 031**

### Annular Conjunctival Autograft: A Novel Approach for Ocular Surface Reconstruction

*First Author: Sujit BISWAS*

*Co-Author(s): Soma ROY*

**Purpose:** To observe the effects of annular conjunctival auto graft (ACAU) from fellow eye in unilateral lime burn [ $\text{Ca}(\text{OH})_2$ ] with total limbal stem cell deficiency (TLSCD) and symblepharon.

**Methods:** This was a prospective, observational case series study of 15 patients from January 2015 to December 2016. Patients with secondary glaucoma, posterior segment pathology, and dry eye were excluded from this study. Conjunctival peritomy was done and all scar tissues were removed from cornea and adjacent sclera. Annular conjunctival autograft was taken from healthy fellow eye, including part of palisades of Vogt. The graft was then repositioned to affected eye with fibrin glue and bandage contact lens was applied. Patients were treated with topical steroid, antibiotics, and artificial tear and later tapering according to response. Patients were reviewed at 1 week and at 1, 3, 6, and 12 months.

**Results:** Among 15 patients, 8 patients were male and 7 were female. The mean age was  $17.6 \pm 1.23$  years. Mean time gap between occurrence of burn and surgery was  $64.27 \pm 4.8$  months. All patients showed no recurrence of symblepharon and conjunctivalization of cornea in 12 months follow-up period, though visual acuity in affected eyes did not improve much but improved cosmetically. Fellow eyes showed no vision deterioration, no sign of limbal stem cell deficiency, no corneal vascularization, and no symblepharon formation. Around 93% of patients were satisfied with their surgery.

**Conclusions:** Annular conjunctival auto graft could be a good option for reconstruction of ocular surface in unilateral chemical burn with total limbal stem cell deficiency and symblepharon.

Poster No.: EX1-041

Panel No.: 041

### Anti-Inflammatory Effects of Flavones-Derived Material Isolated from *Glycyrrhiza uralensis* in Dry Eye Diseases

First Author: Hong **KIM**

Co-Author(s): Dongju **KIM**, Jeongho **KIM**

**Purpose:** Extracts from *Glycyrrhiza uralensis* are known to have anti-inflammatory effects. However, it has not been used in ophthalmologic inflammation disease as well as dry eye disease. We studied the effects of flavones-derived material (FDM) isolated from *Glycyrrhiza uralensis* on in vivo and in vitro dry eye models.

**Methods:** The anti-inflammatory effect of FDM in vitro was evaluated by mRNA expression in conjunctival epithelial cells in hyperosmotic environment using 70 mM NaCl. Dry eye disease was induced in mice by controlled environmental chamber and injected intraperitoneally scopolamine. To observe the tear production and degree of dry eye disease, phenol-red thread test and corneal staining score were measured in mouse model.

**Results:** The effects of corneal conjunctivitis and mRNA levels were evaluated in a dry eye mouse model. IL-1 $\beta$  and IL-6 mRNA levels were decreased by FDM in conjunctival epithelial cells and mouse corneal epithelial cells. FDM showed increased goblet cells in the conjunctiva in the mouse eye dry model. Tear production and corneal staining score values were increased by FDM in dry eye mouse model.

**Conclusions:** FDM has inhibitory properties against inflammation in vitro and in vivo and can be used as a treatment for dry eye disease and eye inflammation.

Poster No.: EX1-042

Panel No.: 042

### Bilateral Pthiriasis Palpebrarum: A Case Report

First Author: Kristine **PORMIDA**

Co-Author(s): Pia Regina **GALVANTE**, Richard **NEPOMUCENO**, Reynaldo **SANTOS**

**Purpose:** To present a 75-year-old Filipino with bilateral pthiriasis pubis eyelash infestation.

**Methods:** Case report.

**Results:** A 75-year-old male sought consult due to 1-year history of severe itchiness and irritation of both eyes. On examination, there were multiple red pinpoint excretions on the periorbital area, and multiple oval-shape brown ovaescent nits anchoring both the upper eyelashes with blood crusts. Translucent-colored parasites were observed to be moving and burrowing deep into the follicles and sucking blood from its host. Other slit lamp examination findings were essentially

normal. Manual removal of nits and ectoparasites was done. The patient was advised to apply erythromycin ointment 3 times a day and pilocarpine 2% drops once a day at night. Patient was referred to dermatology and urology services for further evaluation. Two weeks later, no lice or eggs were seen on the eyelashes, and patient was asymptomatic.

**Conclusions:** Pthiriasis pubis infestation is a rare type of eyelash infestation that is commonly misdiagnosed and mistreated, hence careful slit lamp examination is necessary to visualize the translucent ectoparasites and nits. Poor hygiene and sexual intercourse are its usual mode of transmission. Therefore, family members and sexual contacts should be examined and treated as well. Emphasizing proper hygiene is essential to prevent its spread.

Poster No.: EX1-217

Panel No.: 217

### Clinical Characteristics and Associated Risk Factors of Mycotic Keratitis Resulting in Evisceration and Enucleation

First Author: Wanpiya **SRIPATTHANGKURA**

Co-Author(s): Orapin **ANUTARAPONGPAN**, Olan **SUWAN-APICHON**, Onsiri **THANATHANEE**, Jittraporn **WORRAWITCHAWONG**, Patanaree **LUANRATANAKORN**

**Purpose:** To study clinical characteristics and associated risk factors of mycotic keratitis that result in evisceration or enucleation.

**Methods:** A prospective study was performed in patients who were diagnosed with mycotic keratitis and who underwent evisceration or enucleation from April 2015 to May 2018. Data recorded included demographic data, details relating to possible risk factors, results of microbiological studies, clinical findings at presentation, and clinical outcomes.

**Results:** A total of 129 patients were admitted with a diagnosis of mycotic keratitis during the study period. Seventy-five patients were cured by antifungal therapy only or combined with therapeutic penetrating keratoplasty. Fifty-four patients underwent evisceration or enucleation. Thirty-nine (72%) patients were males and fifteen (27%) were females. The mean age was 57.9 years. A history of recent injury was obtained in forty-two eyes (77%); vegetative material was the first rank of injury material. Mean duration from onset of symptoms to presentation was 10.2 days (range 1- 60 days). The most common causative fungal organisms were *Fusarium* species (23/54). *Trichophyton rubrum* that resulted in enucleation was significantly more than other fungal species ( $P = 0.006$ , 95% CI 29.03-100). The cured and evisceration groups of the analytic study in *Fusarium* keratitis, revealed that infiltration size larger than 4 mm was significantly associated with evisceration or enucleation.

**Conclusions:** *Fusarium* species was the most common

cause of mycotic keratitis that resulted in evisceration/enucleation, whereas *Trichophyton rubrum* was significantly associated with enucleation. Corneal infiltration size was a significant risk factor, resulting in loss of the eye in *Fusarium* keratitis patients.

**Poster No.: EX1-035**

**Panel No.: 035**

### Clinical Evaluation of a New Enhanced Viscosity Eye Drop for Moderate to Severe Dry Eye Disease: A Multicenter, Double-Masked, Randomized 30-Day Study

*First Author: Sameena HAQUE*

*Co-Author(s): David DOUGLASS, Christopher LIEVENS, Peter SIMMONS, Joseph VEHIGE*

**Purpose:** Investigational lubricant eye drops with enhanced viscosity containing carboxymethylcellulose 1.0%/glycerin 0.9% (OGD, Optive Gel Drops) were compared to carboxymethylcellulose 1% alone (CMC, Refresh Liquigel) in a randomized, controlled clinical trial.

**Methods:** This double-masked study recruited patients with moderate-to-severe dry eye at 10 US centers. After a 7-day run-in with Refresh Tears, patients were randomized to use OGD or CMC as needed, but at least twice daily for 30 days. Patients were stratified by Ocular Surface Disease Index (OSDI) score (moderate = 23-32; severe = 33-65). OSDI (primary efficacy variable), corneal and conjunctival staining, tear break-up time (TBUT), symptom surveys, and safety variables were assessed. Study visits were days 1 (baseline/randomization), 7, and 30.

**Results:** A total of 188 patients (94 OGD, 94 CMC) were enrolled. The severe subgroup had 67 OGD and 65 CMC patients. OSDI scores progressively improved and were similar at day 30 between treatment groups. At day 7, only the OGD group demonstrated significant improvements from baseline in OSDI score (all patients  $P < 0.001$ , severe  $P < 0.001$ ), corneal staining ( $P = 0.004$ ), and TBUT ( $P < 0.001$ ). Other efficacy results were similar between groups. The most commonly reported adverse event in both groups was blurred vision.

**Conclusions:** Overall, OGD was as effective as CMC eye drops. OGD demonstrated improvements at an earlier stage (Day 7). Both drops were safe and well-tolerated, with no treatment-related serious adverse events. These results support the use of OGD as an effective treatment to reduce the symptoms and signs of dry eye disease.

**Poster No.: EX1-036**

**Panel No.: 036**

### Clinical Evaluation of a Novel Lipid-Containing Lubricant Eye Drop with Omega-3 Oil and Trehalose

*First Author: Sameena HAQUE*

*Co-Author(s): Cindy CARLISLE-WILCOX, Haixia LIU, Peter SIMMONS, Joseph VEHIGE*

**Purpose:** Assess the clinical performance of a novel preservative-free eye drop (OM3) containing lubricant polymers, osmoprotectants including trehalose, and emulsified flaxseed oil.

**Methods:** A total of 242 subjects with dry eye enrolled in a multi-center, randomized, double-masked study. Subjects used OM3 or lipid-containing eye drops (Refresh Optive Advanced Unit Dose, ROA) as needed, but at least twice daily, for 90 days, following 1-week run-in with an aqueous tear (Refresh Plus). Primary efficacy, change in Ocular Surface Disease Index (OSDI) score, was measured from baseline to Day 90. Secondary efficacy variables examined were tear break-up time (TBUT), ocular surface staining, Schirmer test, dry eye symptoms survey, and ocular safety.

**Results:** A total of 230 subjects (95%) completed the study. OSDI scores improved in both groups:  $15.61 \pm 16.52$  (mean  $\pm$  SD) in the OM3 and  $13.16 \pm 17.71$  in ROA at Day 90. OM3 was non-inferior to ROA based on the pre-set non-inferiority margin of 7.3. OM3 led to significantly greater improvements in combined corneal and conjunctival staining than ROA at all follow-up visits ( $P < 0.03$ ). There was a trend for greater improvements in dry eye symptoms with OM3. In both groups, there was a  $>1$  sec improvement in TBUT and  $>1$  mm improvement in Schirmer scores with no significant difference between groups. Treatment-related adverse events were numerically less for OM3 (8) than for ROA (12).

**Conclusions:** OM3 was safe and effective for improving signs and symptoms of dry eye. Overall, this data indicates that the novel formulation may be a useful treatment for dry eye patients.

**Poster No.: EX1-054**

**Panel No.: 054**

### Comparative Study of Culture of Mammalian Corneal Epithelial Cells on Indigenously Developed Biodegradable Polymer Membrane vs Human Amniotic Membrane

*First Author: Tushar AGARWAL*

**Purpose:** To assess growth of mammalian corneal epithelial cells on polymer scaffold membrane, and compare it with growth on human amniotic membrane by qualitative and quantitative methods.

**Methods:** A biodegradable scaffold membrane was

developed by fusing polymer particles of poly-D-L-lactic acid (PDLLA) with methanol. Corneal epithelial cells (CECs) were obtained from mouse corneal explants and rabbit corneal epithelial cell line. Parallel cultures of CECs were done on polymer scaffold membrane and human amniotic membrane (HAM) and observed on days 1, 3, 5, and 7. Qualitative assessment of cell growth done by Rhodamine-Phalloidin (RP) staining, followed by confocal microscopy. Quantitative analysis done by MTT [3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide] assay. Comparison of growth on 2 membranes was done using 2-way ANOVA test.

**Results:** RP staining and absorbance values of MTT assay showed sequential increase in cell numbers on consecutive days, with a comparable growth on both the membranes (P value was found to be insignificant).

**Conclusions:** Scaffolds made from PDLLA polymer are conducive for growth of corneal epithelial cells, with a growth comparable to that on human amniotic membrane. They have good mechanical stability; however, they are brittle in nature and non-transparent. They can be optimized for enhanced seeding efficiency and physical properties in compliance to transplantation applications. Polymer scaffolds provide an easy alternative to HAM for ex-vivo culture of corneal epithelial cells.

**Poster No.: EX1-030**

**Panel No.: 030**

### Continuous Exposure of Nicotine and Cotinine Retards Human Primary Pterygium Cell Proliferation and Migration

*First Author: Tsz-Kin NG*

*Co-Author(s): Vishal JHANJI, Calvin PANG, Qichen YANG*

**Purpose:** Pterygium is a triangular-shaped hyperplastic growth, characterized by conjunctivalization, inflammation, and connective tissue remodeling. Our previous meta-analysis found that cigarette smoking is associated with a reduced risk of pterygium. Yet, the biological effect of cigarette smoke components on pterygium has not been studied. Here we reported the proliferation and migration properties of human primary pterygium cells with continuous exposure to nicotine and cotinine.

**Methods:** Cell proliferation and migration properties of human primary pterygium cells were evaluated under continuous exposure to 0.08-0.15  $\mu$ M nicotine, 1-2  $\mu$ M cotinine, or their mixture for 7 days. Their effect on epithelial-to-mesenchymal transition (EMT) marker and matrix metalloproteinase (MMP) expression were also determined.

**Results:** Human primary pterygium cells predominantly expressed the  $\alpha 5$ ,  $\beta 1$  and  $\gamma$  subunits of nicotinic acetylcholine receptor. Continuous exposure to the mixture of 0.15  $\mu$ M nicotine and 2  $\mu$ M cotinine retarded pterygium cell proliferation by 16.04% (P

= 0.009) and hindered their migration by 11.93% (P = 0.039), without affecting cell apoptosis. SNAIL and  $\alpha$ -SMA protein expression was significantly downregulated in pterygium cells treated with 0.15  $\mu$ M nicotine-2  $\mu$ M cotinine mixture by 1.33 (P = 0.036) and 1.31 folds (P = 0.001), respectively. Besides, the 0.15  $\mu$ M nicotine-2  $\mu$ M cotinine mixture also reduced MMP-1 and MMP-9 expressions in pterygium cells by 1.56 (P = 0.043) and 1.27 folds (P = 0.012) respectively.

**Conclusions:** In summary, this study revealed that continuous exposure of nicotine and cotinine inhibited human primary pterygium cell proliferation and migration in vitro by reducing epithelial-to-mesenchymal transition and MMP protein expression, partially explaining the lower incidence of pterygium in cigarette smokers.

**Poster No.: EX1-037**

**Panel No.: 037**

### Effect of 3 Common Ophthalmic Solutions on Silicone Hydrogel Lens Material Senofilcon A Investigated In Vivo and In Vitro

*First Author: Sara DE LIMA*

**Purpose:** Senofilcon A bandage lenses (Acuvue Oasys) are often combined with ophthalmic solutions in treatment of ocular diseases. The purpose of the study was to investigate the effect of ophthalmic solutions on Senofilcon A lenses in vitro and in vivo.

**Methods:** The effect of ophthalmic solutions Isopto-Maxidex, Timosan, and Oftaquix on Senofilcon A lenses was evaluated. In an in vitro model, the drug uptake was monitored with Ultraviolet-Visible Spectroscopy (UV-Vis) and Laser Desorption Ionization Mass Spectrometry (LDI-MS). Surface morphology changes were evaluated using Scanning Electron Microscopy (SEM). The method was then implemented for the in vivo study evaluating bandage lenses worn by patients (n = 11).

**Results:** The in vitro study showed that the active ingredients from all the eye drops together with preservatives were taken up by the lenses in significant amounts and the surface changed remarkably. However, in the in vivo study of the worn and treated lenses, no traces of active ingredients or preservatives could be found. The surface morphology changes were minor regardless of the time the lenses were worn or the frequency of medication. The results suggest that insignificant amounts of drugs were taken up and they were probably mostly removed by tear drainage.

**Conclusions:** Senofilcon A silicone hydrogel contact lenses are used as bandage lenses and often combined with ophthalmic solutions in the treatment of ocular diseases. How the eye drop solutions affect the bandage lenses is not fully understood. These findings are thus encouraging for the use of bandage lenses in combination with ophthalmic solutions.

**Poster No.: EX1-032**

**Panel No.: 032**

### Effect of Outdoor Environmental Pollution on the Ocular Surface

*First Author: Tripti JOHRI*

*Co-Author(s): Varun SAINI, Narinder SINGH*

**Purpose:** To study the effect of outdoor environmental pollution on ocular surface, and to analyze the correlation between subjective symptoms and objective tests.

**Methods:** A total of 108 eyes of apparently healthy volunteers were taken and divided into Group 1 (indoor occupation) and Group 2 (outdoor occupation). All subjects underwent detailed history and examination, Ocular Surface Disease Index (OSDI) questionnaire, tear film break-up time (TBUT), Schirmer's test-1 (ST-1), conjunctival scraping cytology (SC), tear ferning test (TFT), and conjunctival impression cytology (CIC) for goblet cell density (GCD).

**Results:** The mean OSDI in Group 2 ( $20.99 \pm 5.63$ ) was significantly higher than Group 1 ( $14.05 \pm 6.89$ ) ( $P < 0.001$ ). The mean TBUT was significantly lower in Group 2 ( $6.84 \pm 3.71$  seconds) as compared to Group 1 ( $12.44 \pm 5.33$  seconds) ( $P = 0.010$ ). The mean ST-1 was also significantly lower in Group 2 ( $14.24 \pm 5.58$  mm) than Group 1 ( $17.90 \pm 8.43$  mm) ( $P = 0.008$ ). There was no significant difference in scraping cytology among the 2 groups. The mean TFT grade was significantly higher in Group 2 ( $1.86 \pm 0.93$ ) than Group 1 ( $1.46 \pm 0.65$ ) ( $P = 0.011$ ). The mean average GCD in Group 2 ( $464.40 \pm 65.50$  cells/mm<sup>2</sup>) was significantly lower as compared to Group 1 ( $523.80 \pm 122.76$  cells/mm<sup>2</sup>) ( $P = 0.003$ ). The correlation coefficient between OSDI and TBUT in Group 1 was  $-0.625$  ( $P < 0.001$ ) and in Group 2 was  $-0.389$  ( $P = 0.003$ ). The correlation coefficient between ST-1 and OSDI was  $-0.636$  in Group 1 ( $P < 0.001$ ) and  $-0.332$  in Group 2 ( $P = 0.011$ ).

**Conclusions:** Exposure to outdoor environmental pollution adversely affects the tear film and ocular surface. A significant correlation exists between subjective symptoms and objective tests. Our study signifies the urgent need for eye health education and legislative norms to control environmental pollution in the society.

**Poster No.: EX1-048**

**Panel No.: 048**

### Effectiveness of Topical Olopatadine 0.1% and Sodium Cromoglycate 2% in Vernal Keratoconjunctivitis

*First Author: Sabina BIJUKACHHE*

*Co-Author(s): Amrit ACHARYA, Aparajita MANORANJAN*

**Purpose:** To compare the effectiveness of topical olopatadine 0.1% and sodium cromoglycate 2% in

vernal keratoconjunctivitis (VKC).

**Methods:** This prospective, interventional, hospital-based study was done in Nepal Eye Hospital from June 2016 to January 2018. All diagnosed cases of VKC, not responding to nonsteroidal anti-inflammatory drugs (NSAID) and tear supplements were included, while those VKC with superadded infection or previously treated with steroids were excluded. A total of 96 patients with VKC were divided into 2 patient groups, 48 each for sodium cromoglycate and olopatadine. Signs and symptoms were graded from 1 - 3 for itching, watering, discomfort, discharge, and photophobia.

**Results:** VKC was most common in the age group 9-12 years with male preponderance (M:F-4:1). Systemic association was present in 3% of cases. 20% of patients gave a history of a similar episode in the family. In 31.25% of cases, duration of disease was more than 23 months. The most common symptom was itching (100%), followed by watering (96.8%), discomfort (89.6%), discharge (79.1%), and photophobia (66.66%). The most common signs were palpebral conjunctival hyperemia (100%), tarsal papillary hypertrophy (97.9%), limbal hypertrophy (93.7%), superficial punctate keratitis (45.8%), corneal neovascularization (9.4%), blepharitis (3.5%), and cicatricial conjunctivitis (2.1%). The difference in reduction in total sign score was 42.6%, with olopatadine having a better effect than sodium cromoglycate (62.32% vs 19.72%). Most individual sign scores improved more in olopatadine group than in sodium cromoglycate group.

**Conclusions:** The study demonstrated that beneficial effects were seen with both drugs. However, those with olopatadine group had a better reduction in the signs and symptoms score than did the sodium cromoglycate group.

**Poster No.: EX1-034**

**Panel No.: 034**

### Femtosecond Laser-Assisted Conjunctival Autograft Preparation for Pterygium Surgery

*First Author: Yu-Chi LIU*

*Co-Author(s): Kavya DEVARAJAN, Jodhbir MEHTA*

**Purpose:** Conjunctival autografting (CAG) after pterygium resection is the gold standard treatment. Thinner CAGs without Tenon tissue provide better results, but are technically difficult to achieve. We reported a new technique on the use of femtosecond laser (FSL) to prepare CAGs.

**Methods:** Thirty patients who underwent pterygium excision and femtosecond laser-assisted conjunctival graft (CAG) transplantation were prospectively included. The Ziemer LDV Z8 was programmed to harvest an ellipsoid CAG of 7 x 10 mm diameter (55.0 mm<sup>2</sup>) and 60  $\mu$ m depth using the lamellar keratoplasty module, at the superior bulbar conjunctiva. The CAG was then glued onto the area of conjunctival defect

with fibrin glue. Clinical examinations, including slit lamp, optical coherence tomography (OCT), and anterior segment OCT angiography (OCTA), were performed at 1 week and at 1, 3, 6, and 12 months.

**Results:** The CAGs were cut in uniform thickness (central and peripheral thickness:  $75.6 \pm 13.7$  and  $77.7 \pm 13.2$   $\mu\text{m}$ ;  $P = 0.38$ ). One CAG buttonhole occurred and there were no other intraoperative or postoperative complications. The conjunctival epithelium had healed at the CAG harvested site within 1 week with no evidence of scarring. The OCTA results showed the CAG re-vascularization completed by 3 months. No recurrence was observed during the 1-year follow-up.

**Conclusions:** The FSL allowed reliable preparation of thin CAGs with favorable clinical outcomes. It may represent a valuable tool in pterygium surgery.

**Poster No.: EX1-045**

**Panel No.: 045**

### HSV-1 Detection in Primary Keratoplasty and Failed Graft Corneal Buttons

*First Author:* Shahzan **ANJUM**

*Co-Author(s):* Seema **KASHYAP**, Anjana **SHARMA**, Namrata **SHARMA**, Seema **SEN**

**Purpose:** Herpes simplex virus 1 (HSV-1) presence was analyzed in corneal buttons obtained after primary keratoplasty from clinically suspected herpetic keratitis and failed graft patients and correlated with clinicopathological features.

**Methods:** Of the 81 cases included in the study, there were 30 clinically suspected herpetic keratitis, 21 corneal failed graft, and 30 control corneal buttons. All of the 81 primary keratoplasty corneal buttons were subjected to immunohistochemical detection of HSV-1 antigen. Polymerase chain reaction was used for the detection of HSV-1 DNA (pol gene).

**Results:** HSV-1 antigen was detected in 9/30 (30%) suspected herpetic keratitis cases and 4/21 (19%) of failed graft by immunohistochemistry. No HSV-1 antigen was detected in control corneal buttons. HSV-1 DNA was present in 3/51 (5.88%) cases, of which suspected herpetic keratitis included 2/30 (6.7%) and failed graft buttons 1/21 (4.8%). No HSV-1 DNA was detected in control corneal buttons by PCR.

**Conclusions:** HSV-1 DNA was present only in 5.8% of primary keratoplasty patients. PCR is a sensitive technique for the detection of HSV-1 DNA. Immunohistochemistry is a nonspecific technique and should not be used for the detection of HSV-1 antigen.

**Poster No.: EX1-039**

**Panel No.: 039**

### Keratoconus in Down Syndrome: More Common Than Anticipated

*First Author:* Joyce **MATHAN**

*Co-Author(s):* Akilesh **GOKUL**, Charles **McGHEE**, Jay **MEYER**, Dipika **PATEL**, Samantha **SIMKIN**

**Purpose:** Keratoconus is a vision disabling, progressive disease of the cornea, affecting approximately 0.05% of the general population. Limited studies suggest a greater prevalence, between 0.5 and 71%, in Down Syndrome (DS). This study aimed to investigate the prevalence of keratoconus in athletes with DS at the 2017 New Zealand Special Olympics National Summer Games.

**Methods:** Participants were screened for keratoconus using corneal topography (TMS-4, Tomey, USA). Two independent quantitative criteria and qualitative assessment by 3 ophthalmologists were utilized to diagnose keratoconus, the prevalence of confirmed cases identified by each method were compared. Additional parameters assessed include: age, gender, ethnicity, mean corneal power (Kmean), maximum corneal power (Kmax), and keratoconus prediction index (KPI).

**Results:** Of 110 participants screened, 98 were included with mean age of  $30.0 \pm 9.7$  years. Twelve met quantitative criteria 1, a diagnosis was confirmed by qualitative review in 10 of these participants (10%). Keratoconus was indicated in 63 participants by quantitative criteria 2 and was confirmed by qualitative review in 38 (39%). Among affected individuals, most were male, and most were NZ European. Topography parameters of the keratoconus cases in the worse eye (in bilateral cases) and the affected eye (in unilateral cases) detected by each method were Kmean (D)  $51.0 \pm 4.1$ ,  $48.2 \pm 2.9$ ; Kmax (D)  $56.8 \pm 5.2$ ,  $51.5 \pm 4.3$ , and KPI  $0.4 \pm 0.1$ ,  $0.3 \pm 0.1$  respectively.

**Conclusions:** This pilot study indicates a prevalence of keratoconus of 10 - 39% in DS, up to 700x higher than estimates for general populations. Screening is needed for early detection and timely management to preserve vision in a population with multiple disabilities.

**Poster No.: EX1-040**

**Panel No.: 040**

### Long-Term Outcomes of the Combined Therapy of COMET and Keratoplasty

*First Author:* Seitaro **KOMAI**

*Co-Author(s):* Tsutomu **INATOMI**, Shigeru **KINOSHITA**, Noriko **KOIZUMI**, Takahiro **NAKAMURA**, Chie **SOTOZONO**

**Purpose:** In cases of severe ocular surface disease, cultivated oral mucosal epithelial transplantation (COMET) is effective for reconstruction of the ocular

surface, and keratoplasty post-COMET is effective for reducing complications in cases with corneal opacity. The purpose of this study was to investigate the long-term efficacy and clinical course of the combined therapy of COMET followed by keratoplasty.

**Methods:** This study involved 8 eyes of 8 patients (7 males and 1 female) treated with COMET followed by penetrating or lamellar keratoplasty. In all treated eyes, visual acuity (VA), ocular-surface stability, graft survival rate, and complications were analyzed.

**Results:** The mean follow-up period was  $117.4 \pm 35.5$  months (range, 39 – 169). Mean time of keratoplasty was  $6.25 \pm 2.6$  months (range, 3 - 11) post-COMET. Post-surgery, best corrected VA (BCVA) improved by more than 2-steps in 7 of the 8 eyes (87.5%). Over the 10-year postoperative period, a more than 2-step improvement of VA was maintained in 4 of the 8 eyes (50%), while a better than 20/200 VA was obtained and maintained in the other 4 eyes (50%). Two of 8 eyes (25%) required re-grafting. In all eyes, no notable recurrence of conjunctival cicatrization was observed, yet persistent epithelial defect (PED) and secondary glaucoma (SG) occurred in 2 eyes.

**Conclusions:** Our findings show that in cases of severe ocular-surface disease, the combined therapy of COMET and keratoplasty can result in long-term ocular surface stability and improved VA.

**Poster No.: EX1-043**

**Panel No.: 043**

### Medical Management of Extraocular Cysticercosis: Promising Results of Topical Cyclosporine. A Case Report

*First Author: Manmeet SINGH*

*Co-Author(s): Dr.akhil AGARWAL, Dr.Amrita BAJPAI, Dr.neelima MEHROTRA*

**Purpose:** To study the role of medical management and their outcome in extra-ocular cysticercosis with the role of additional use topical cyclosporine.

**Methods:** It was a case report of a 7-year-old female with extra-ocular cysticercosis coming to the outpatient Department of Ophthalmology, at Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly was the case for study, thorough ophthalmological examination with slit lamp biomicroscopy was done, in addition to routine blood investigations and ultrasonography for both eyes and whole abdomen. Computed tomography was done to rule out neuro-cysticercosis, orbital and intraocular cysticercosis.

**Results:** The promising results showed resolution of extra-ocular cysticercosis with this medical management given for 4 weeks. Treatment regimen given in this case study was oral Albendazole in the dosage of 15-20 mg/kg/day, oral Prednisolone acetate (1-1.5 mg/kg body wt.), in addition to which topical corticosteroids and topical cyclosporine were also

added to control the inflammatory response.

**Conclusions:** Thereof, it was found that the inflammatory response was better controlled with topical use of cyclosporine drops when given in addition to the routine medical regimen.

**Poster No.: EX1-038**

**Panel No.: 038**

### Minor Ipsilateral Simple Limbal Epithelial Transplantation Technique for Pterygium

*First Author: Karan BHATIA*

*Co-Author(s): Shilpa MALED, Ruchita MANAKTALA, Aniket SHASTRI, Ronak SOLANKI, Keerti WALI*

**Purpose:** To assess clinical outcomes of Mini-SLET as a surgical technique for management of pterygium.

**Methods:** A total of 34 consecutive patients with primary pterygium underwent surgery with Mini-SLET technique, where after resection of pterygium, ipsilateral epithelial limbal stem cells were sandwiched in between 2 layers of amniotic membrane and adhered using fibrin glue, in batches of 3-4, at a tertiary level teaching hospital in India. Primary outcome was recurrence rate. Secondary outcomes were cosmetic appearance and complications. These were evaluated on slit lamp photographs. Recurrence was defined as any fibrovascular growth beyond limbus. A 'clinically acceptable cosmetic outcome' was defined as either no difference in postoperative result from normal appearance or presence of thin episcleral vessels in the excised area extending but not passing the limbus, with an absence of fibrous tissue. A 'clinically unacceptable cosmetic outcome' was defined by presence of fibrous tissue either invading or not invading cornea.

**Results:** Preoperatively, 41%, 47%, and 12% eyes had grades 1, 2, and 3 pterygia based on Tan et al grading. At 6 months, 1 patient (3%) had recurrence. Cosmetic outcome was clinically acceptable in almost all eyes (97%). One eye each had graft displacement, glue cyst, and dellen at the donor site. Two eyes benefitted more from procedure as they underwent combined trabeculectomy and cataract surgery at a later date.

**Conclusions:** Mini-SLET is an easy and reproducible technique for pterygium management, having an acceptable recurrence rate, cosmesis, and minimal complications. It has an added advantage where one needs to preserve the superior conjunctiva.

**Poster No.: EX1-051**

**Panel No.: 051**

### Outcome of Deep Anterior Lamellar Keratoplasty for Infectious Keratitis

*First Author: Pham NGOC DONG*

*Co-Author(s): Nguyen Xuan HIEP, Nguyen THE HONG, Le XUAN CUNG*

**Purpose:** To evaluate the outcome of deep anterior

lamellar keratoplasty (DALK) with anterior flap of pre-cut cornea in treatment descemetocoele due to infectious keratitis.

**Methods:** Prospective study on infections keratitis due to bacteria and fungus that were not cured with medical treatment. With the best treatment, infection still existed or descemetocoele was formed due to stroma melting. Manual DALK was done with the anterior flap of pre-cut cornea. Infected cornea was dissected as much as possible, starting from periphery to center. Antibiotic was continued until there was no more sign of infection, and then prednisolone acetate 1% was started, 4 times/day. The rate of eradicated infection, corneal integrity preservation, and visual acuity were recorded.

**Results:** Fifteen descemetocoele eyes (15 patients) with 12 fungal and 3 bacterial keratitis were treated. The average length of medical treatment was 45.4 days. Visual acuity before surgery less than count finger at 1 m. All 15 eyes were successfully treated with DALK: no recurrent infection, with 9 clear grafts and 6 mild opaque grafts. Postop visual acuity ranged from 20/100 to 20/60. Surgical complication was descemet membrane rupture (3 eyes), but DALK was continued. Double anterior chamber was seen in 2 eyes. Hypopyon and exudate disappeared 5 days after DALK. The anterior flap was suitable only for the corneal lesion less than 8 mm of diameter.

**Conclusions:** DALK was effective to eradicate infection and preserve integrity of the eyeball of infectious keratitis. Anterior flap of pre-cut cornea was a choice to overcome the shortage of donated cornea.

**Poster No.: EX1-050**

**Panel No.: 050**

### Peripheral Ulcerative Keratitis Caused by Suspected Relapsing Polychondritis

*First Author: Aryatika ALAM*

**Purpose:** To report the diagnosis and management of peripheral ulcerative keratitis (PUK) with underlying disease suspect relapsing polychondritis (RP).

**Methods:** This is a case report of a 44-year-old man who came to Cicendo National Eye Hospital with a chief complaint of redness of his left eye since 1 month ago, accompanied by blurred vision, pain, secrete, photophobia, and lacrimation. The complaint of his left eye was accompanied by his nose deformity since 1 year ago. On physical examination, there was saddle nose. His visual acuity of his left is closed count finger counting and on the anterior segment examination of the left eye, there was ciliary injection on conjunctiva, and fluorescein test positive on his left cornea with wide corneal ulceration, thinning on the peripheral cornea, prolapse iris on the nasal side, and lens opacity. Patient was diagnosed as peripheral ulcerative keratitis on his left eye with suspect relapsing polychondritis.

The patient was planned to do corneoscleral patch graft.

**Results:** From physical examination on left eye, visual acuity was closed face finger counting. Graft was intact, and the anterior chamber was formed.

**Conclusions:** PUK needs an aggressive treatment before corneal perforation occurs. When corneal perforation has occurred, surgical treatment was needed. Working up a diagnosis for the underlying disease is also an important factor for treating a patient with PUK.

**Poster No.: EX1-029**

**Panel No.: 029**

### Prognosis and Risk Factors for Treatment Failure of Secondary Infectious Keratitis in Patients with Herpetic Keratitis

*First Author: Kyung Chul YOON*

*Co-Author(s): Won CHOI, Rujun JIN, Dong Kyu LEE, Ying LI*

**Purpose:** To investigate the prognosis and risk factors for treatment failure of secondary infectious keratitis in patients with herpes simplex keratitis (HSK).

**Methods:** Forty-four patients who have treated with secondary infectious keratitis after herpetic keratitis were enrolled in this study. Treatment success was defined as complete healing of the epithelial defect within 6 weeks of start of treatment, otherwise defined as treatment failure. Age, sex, duration of symptoms, trauma, ulcer size, depth of infiltrates, hypopyon, recent corticosteroid or antibiotics use, and herpetic recurrence were compared between the treatment success and failure groups. Multiple regression analysis was used to estimate the risk factors for treatment failure in secondary infectious keratitis after HSK.

**Results:** The mean age was  $61.75 \pm 10.24$  years. The male was 24 and female was 20. Among 44 patients, 24 (54.5%) were identified as treatment success, and 20 (45.5%) as treatment failure. Significant differences in age, ulcer size, fungal infection, and previous recurrence of HSK were found between the treatment success and failure groups. The multivariate analysis identified that large ulcer size ( $P = 0.039$ ), fungal infection ( $P = 0.011$ ), and multiple recurrence of HSK ( $P = 0.048$ ) were risk factors for treatment failure.

**Conclusions:** Infectious keratitis after herpetic keratitis has a poor prognosis. Large ulcer size, fungal infection, and multiple recurrence of HSK are associated with treatment failure for secondary infectious keratitis.

**Poster No.: EX1-028**

**Panel No.: 028**

### Screening for MIR184 Mutations in Iranian Patients with Keratoconus

*First Author: Nader **NASSIRI***

*Co-Author(s): Kourosh **SHEIBANI***

**Purpose:** To investigate whether microRNA (MIR)-184 mutations make a substantial contribution to keratoconus (KCN) among affected Iranian patients.

**Methods:** A total of 47 Iranian KCN patients, diagnosed based on family history, clinical examinations using slit lamp biomicroscopy, refraction, and corneal topography were enrolled in this study. The pri-miR-184 encoding gene obtained from the DNA of all participants was amplified using polymerase chain reaction and subsequently sequenced by the Sanger dideoxynucleotide protocol. The sequences were compared to MIR184 reference sequence in order to identify sequence variations. The potential effects of a single variation observed on RNA structure was predicted.

**Results:** Only 1 sequence variation, +39G >T, was observed within the pri-miR-184 encoding sequence in one proband. The patient's KCN-affected sister harbored the same variation. The variation was not novel and was recently shown to be present at similar frequencies among large cohorts of KCN patients and control individuals.

**Conclusions:** Mutations in MIR-184 are not a major cause of keratoconus among Iranian patients. The pri-miR-184 sequence needs to be screened in larger cohorts in order to establish whether mutations in the gene are present at low frequencies among Iranian patients.

**Poster No.: EX1-047**

**Panel No.: 047**

### Tenon Patch Graft: An Eye-Saving Procedure

*First Author: Muhammad **RAHMAN***

**Purpose:** To save the eye in acute case for delayed keratoplasty when there is scarcity of cornea.

**Methods:** Often, we deal with patients with large perforated infectious keratitis where situation demands immediate therapeutic penetrating keratoplasty. But due to lack of cornea, financial crisis we could not proceed. In these cases, we do Tenon patch graft along with conjunctival flap surgery for the time being to create a platform for future optical or therapeutic penetrating keratoplasty. So far, I have done about 20 such cases over the last 2 years. After this initial procedure we gave time for the infectious condition to subside by medication for about 3 to 6 months, and then the second surgery was done.

**Results:** Among the 20 cases of mine, to date 7 cases

have undergone optical keratoplasty and now they have vision ranging from 6/12 to 6/36. Two cases underwent evisceration despite all effort. Other cases are awaiting the second surgery.

**Conclusions:** Tenon patch graft is a very good alternative for the time being to therapeutic keratoplasty in perforated large infectious keratitis when there is a crisis of cornea. Its main advantage is it has less chance of rejection as it is host tissue. Wherever there is a scarcity of cornea due to any cause, it can be done immediately to save the eye and create a platform for future keratoplasty.

**Poster No.: EX1-046**

**Panel No.: 046**

### The Role of Rigid Gas Permeable Contact Lens in Improving Visual Acuity in a Patient with Bilateral Corneal Scars

*First Author: Veda **PUTRI***

*Co-Author(s): Tri **RAHAYU***

**Purpose:** To demonstrate that rigid gas permeable (RGP) contact lens can improve vision in patients with widespread and dense corneal scars.

**Methods:** A case report.

**Results:** A 40-year-old female presented with blurred vision of both eyes since a year earlier with a history of keratitis. Her best corrected visual acuity in the right eye was 6/30 and 6/15 in the left eye. There were multiple widespread and dense scars with neovascularization on bilateral corneas without any active signs of inflammation. Keratometry readings showed distorted mires, and corneal topography revealed irregular patterns. She was given tisi-focon A contact lenses with base curve 8.40 mm for the right eye and 7.60 mm for the left eye, power S-4.00D and diameter 9.20 mm for both eyes. The contact lenses were slightly inferior decentered due to displacement of corneal apexes, but the pupils were well covered. The movement on blink was adequate. The fluorescein application showed irregular patterns with relatively good central alignment. The final visual acuity in the right eye with the RGP contact lenses improved to 6/15 and 6/7.5 in the left eye. The patient was satisfied with the result.

**Conclusions:** RGP contact lens can be a treatment option for improving the visual acuity of patients with corneal scars.

**Poster No.: EX1-052**

**Panel No.: 052**

### The Use of Bandage Contact Lens for Epithelial Healing in Corneal Epithelial Defect: Literature Review

*First Author: Miratasya KASIM*

*Co-Author(s): Umar MARDIANTO*

**Purpose:** To evaluate the efficacy of bandage contact lens (BCL) in epithelial healing and pain relief in patients with corneal epithelial defect due to both trauma and ocular surface-related surgery.

**Methods:** Seven articles collected from Pubmed and Clinical Key. Five studies focused on traumatic corneal abrasion, and 2 studies focused on corneal erosion after ocular surface-related surgery. The BCL that was being used in these studies varied, including Balafilcon A, Senofilcon A, Etafilcon A, and Oculofilcon D. The controlled arm was pressure patching with topical antibiotic. The measured variable was the size of the epithelial defect, the reepithelization time, the average days to heal, the size reduction of the epithelial defect, the pain scale, and the pain reduction after the usage of BCL.

**Results:** Six out of 7 studies favored the usage of BCL, as it was proven to enhance epithelial healing and pain relief. Pain was the chief complaint of most of the patients, and the immediate relief and epithelial healing was achieved faster in BCL group. Infection complication was found in 2 articles, while the control group had none.

**Conclusions:** The BCL is superior in treating corneal abrasion in general compared to the pressure patch. The downside is the possibility of complications and the price of the BCL. The best option for therapy is very much dependent on the compliance of the patient. Comprehensive education is crucial to treat corneal abrasion.

**Poster No.: EX1-033**

**Panel No.: 033**

### Upregulation of Teneurin-2 Transcript in the Conjunctival Epithelium of Stevens-Johnson Syndrome Patients in the Chronic Stage

*First Author: Mayumi UETA*

*Co-Author(s): Shigeru KINOSHITA, Hiromi NISHIGAKI, Suzuko OHSAKO, Chie SOTOZONO, Norihiko YOKOI*

**Purpose:** To investigate the pathology of ocular surface complications of Stevens-Johnson (SJS) in the chronic stage.

**Methods:** In this study, we performed comprehensive gene expression analysis of conjunctival epithelium of SJS in the chronic stage using oligonucleotide microarrays, GeneChip. Moreover, we confirmed the up-regulation of the transcripts of interest by

quantitative real-time polymerase chain reaction (RT-PCR) and investigated the expression of the protein in the ocular surface, which transcript was significantly upregulated, was investigated immune-histologically.

**Results:** We performed gene expression analysis of conjunctival epithelium from each 3 individuals of SJS patients and conjunctival chalasis patients as controls using the microarray and found that the 14 transcripts (SERPINB4, KRT1, KRTDAP, S100A7, SBSN, KLK6, SERPINB12, PNLIPRP3, CASP14, ODZ2, CA2, CRCT1, CWH43, FLG) were up-regulated more than 50-fold. Furthermore, we performed quantitative RT-PCR to confirm the up-regulation of the 14 transcripts using the conjunctival epithelium from 11 individuals of SJS patients and 26 conjunctival chalasis patients as controls and found that the gene expression of Teneurin-2 was significantly upregulated in the conjunctival epithelium more than controls. We also found that Teneurin-2 protein could be expressed in the conjunctival epithelium.

**Conclusions:** Our results show that upregulated Teneurin-2 expression might contribute the pathology of ocular surface of SJS in the chronic stage.

## Glaucoma

**Poster No.: EX1-066**

**Panel No.: 066**

### A New Outlook in Detection of Glaucoma Progression: RNFL in Trend-Based Progression Analysis of Glaucoma

*First Author: Leo Ka Yu CHAN*

*Co-Author(s): Ka Ngai Alexander LAM, Christopher LEUNG, Ken WU*

**Purpose:** To evaluate progressive parapapillary retinal nerve fiber layer (RNFL) thinning over the 12 x 9 mm wide-field map covering the optic nerve head (ONH) region and the macula using trend-based progression analysis (TPA) in eyes with glaucoma.

**Methods:** This is a prospective study examining 200 eyes of patients with glaucoma followed up regularly at 4-month intervals for at least 2 years with swept source optical coherence tomography (SS-OCT) imaging. Horizontal wide 3D images encompassing both the optic disc and macula on 1 single image, were captured using Triton OCT. We self-developed an algorithm using MATLAB to decipher the captured images into color-coded thickness maps. At least 20 red superpixels in the largest continuous pixel group in every visit were regarded as positive for thinning. Progressive RNFL was then determined using TPA of serial RNFL thickness maps. Results were analyzed with a false discovery rate (FDR) set at 0.05.

**Results:** TPA detected 86 eyes (43.0%) with progressive

RNFL thinning, when FDR was 0.05. Eight eyes (4.0%) showed progressive RNFL thinning when FDR was 0.01. Data are also presented in terms of area, peak rate and mean rate of progressive RNFL thinning.

**Conclusions:** Evaluation of serial 12 x 9 mm RNFL thickness maps with TPA is informative to detect progressive RNFL thinning. Our study is expected to shed light on a novel perspective in detection of glaucoma progression with an emphasis on a TPA-based approach for analysis.

**Poster No.: EX1-072**

**Panel No.: 072**

### **A Phase IV, Randomized Study to Evaluate the Additive IOP-Lowering Effect of Brinzolamide 1%/Brimonidine 0.2% Fixed-Dose Combination as an Adjunct to Prostaglandin Analog in Open-Angle Glaucoma or Ocular Hypertension**

*First Author: Doug HUBATSCH*

*Co-Author(s): Ivan GOLDBERG, Fabian LERNER, Marcelo NICOLELA, Antonia RIDOLFI, Fotis TOPOUZIS*

**Purpose:** To determine the additive intraocular pressure (IOP)-lowering effect of twice-daily brinzolamide 1%/brimonidine 0.2% fixed-dose combination (BBFC) as an adjunct to a prostaglandin analog (PGA) in patients with open-angle glaucoma (OAG) or ocular hypertension (OHT) insufficiently controlled with PGA monotherapy.

**Methods:** Patients with a mean IOP of  $\geq 19$  and  $< 32$  mm Hg were randomized to receive BBFC+PGA (n = 96) or vehicle + PGA (n = 92) for 6 weeks. The primary endpoint was the mean change in diurnal IOP from baseline (BL; averaged over 9:00h and 11:00h) at Week (W) 6.

**Results:** The mean diurnal IOP at BL in the BBFC + PGA (22.8 mm Hg) and vehicle + PGA (22.9 mm Hg) groups was similar. At W6, the mean change in diurnal IOP from BL was greater with BBFC + PGA than vehicle + PGA ( $-5.59$  mm Hg vs  $-2.15$  mm Hg;  $P < 0.001$ ). At W6, BBFC + PGA showed a greater mean change in IOP from BL than vehicle + PGA at both peak (09:00 h:  $-4.83$  mm Hg vs  $-2.50$  mm Hg; treatment difference [TD]  $-2.34$  mm Hg;  $P < 0.001$ ) and trough (11:00 h:  $-7.02$  mm Hg vs  $-2.42$  mm Hg; TD  $-4.60$  mm Hg;  $P < 0.001$ ) points. There was a notable decrease in mean diurnal IOP and mean % change in diurnal IOP from BL at W2 with BBFC + PGA ( $-5.2$  mm Hg;  $-22.8\%$ ) versus vehicle + PGA ( $-1.3$  mm Hg;  $-5.9\%$ ). Ocular adverse events (AEs) were reported in 21.1% and 8.7% of patients in the BBFC + PGA and vehicle + PGA groups, respectively.

**Conclusions:** BBFC + PGA significantly reduced mean diurnal IOP than PGA alone in patients with OAG/OHT. The AEs with BBFC + PGA were consistent with the known safety profile of the individual medications.

**Poster No.: EX1-055**

**Panel No.: 055**

### **Anterior and Posterior Segment Structural Features of Acute Primary Angle-Closure Eyes**

*First Author: Wenbin HUANG*

*Co-Author(s): Fei LI, Xiulan ZHANG*

**Purpose:** To measure the anterior and posterior segment structural features of acute primary angle-closure (APAC) eyes.

**Methods:** A total of 36 subjects with unilateral APAC were enrolled in this study. The anterior and posterior of ocular biometric characteristics were measured by anterior segment optical coherence tomography (AS-OCT) and swept source optical coherence tomography (SS-OCT), respectively at baseline, 2 weeks, and 1 month after surgical intervention.

**Results:** At baseline, when compared with the fellow eyes, APAC-affected eyes showed significantly greater corneal thickness ( $P = 0.004$ ), shallower anterior chamber depth (ACD) ( $P < 0.001$ ), smaller anterior chamber area (ACA) ( $P = 0.013$ ), angle opening distance at 750  $\mu$ m from the scleral spur (AOD750) ( $P = 0.002$ ), trabecular-iris space area at 750  $\mu$ m from the scleral spur (TISA750) ( $P = 0.033$ ), angle recess area (ARA) ( $P = 0.014$ ), and iris area (IARE) ( $P = 0.003$ ), less iris curvature (ICURVE) ( $P = 0.003$ ), and larger lens vault (LV) ( $P = 0.030$ ). After iridectomy, the corneal thickness was significantly decreased at 1 month ( $P < 0.001$ ), while ACD, ACA, and AOD750 were significantly increased at 2 weeks and 1 month (all  $P < 0.017$ ). Changes in ACD were correlated with decreasing LV ( $P < 0.05$ ). The posterior segment parameters did not change over the 4-week period.

**Conclusions:** When compared with the fellow eyes, APAC-affected eyes had greater corneal thickness, shallower anterior chamber, narrower angle, less ICURVE, and larger LV. After iridectomy, the corneal thickness was decreased, while the shallower anterior chamber was relieved to some extent.

**Poster No.: EX1-060**

**Panel No.: 060**

### **Automatic Differentiation of Glaucoma Visual Field from Nonglaucoma Visual Field Using Deep Convolutional Neural Network**

*First Author: Fei LI*

*Co-Author(s): Wenbin HUANG, Xiulan ZHANG*

**Purpose:** To develop a deep neural network able to differentiate glaucoma from non-glaucoma visual fields based on visual field (VF) test results.

**Methods:** Visual fields obtained by both Humphrey 30-2 and 24-2 tests were collected. Reliability criteria were established as fixation losses less than 2/13, false

positive, and false negative rates of less than 15%.

**Results:** We split a total of 4012 PD images from 1352 patients into 2 sets, 3712 for training and another 300 for validation. There is no significant difference between left to right ratio ( $P = 0.6211$ ), while age ( $P = 0.0022$ ), VFI ( $P = 0.0001$ ), MD ( $P = 0.0039$ ), and PSD ( $P = 0.0001$ ) exhibited obvious statistical differences. On the validation set of 300 VFs, CNN achieves the accuracy of 0.876, while the specificity and sensitivity are 0.826 and 0.932, respectively. For ophthalmologists, the average accuracies are 0.607, 0.585, and 0.626 for resident ophthalmologists, attending ophthalmologists and glaucoma experts, respectively. AGIS and GSS2 achieved accuracy of 0.459 and 0.523, respectively. Three traditional machine learning algorithms, namely support vector machine (SVM), random forest (RF), and k-nearest neighbor (k-NN) were also implemented and evaluated in the experiments, which achieved accuracy of 0.670, 0.644, and 0.591 respectively.

**Conclusions:** Our algorithm based on CNN has achieved higher accuracy compared to human ophthalmologists and traditional rules (AGIS and GSS2) in differentiation of glaucoma and non-glaucoma VFs.

**Poster No.: EX1-058**

**Panel No.: 058**

### Central Retinal Venous Pressure in Asymmetric Primary Open Angle Glaucoma

*First Author: Lutz PILLUNAT*

*Co-Author(s): Clemens CARL, Karin PILLUNAT*

**Purpose:** Elevated central retinal venous pressure (CRVP) leads to reduced ocular perfusion pressures, which might be responsible for further progression in glaucoma. Aim of the present study was to evaluate whether an elevated CRVP is associated with visual field damage in asymmetric glaucoma.

**Methods:** A total of 21 patients suffering from POAG were included. Asymmetric glaucoma damage was defined as a difference of  $>5$  dB mean deviation (MD) in Humphrey 30-2 visual fields comparing both eyes of 1 patient. CRVP was measured by contact lens dynamometry (Imedos, Jena, Germany). Furthermore, intraocular pressure (IOP) and retinal nerve fiber layer thickness (Spectralis OCT, Heidelberg Engineering) were evaluated. Elevated CRVP was defined as  $>5$  mm Hg higher compared to IOP. For statistical analysis the Mann-Whitney-U test and the Spearman Correlation were applied.

**Results:** The mean visual field defect was  $-5.03 \pm 4.58$  dB in less affected eyes and respectively  $-16.91 \pm 7.41$  dB in more affected eyes ( $P < 0.001$ ). IOP showed no significant differences between more or less affected eyes ( $12.83 \pm 2.39$  mm Hg/ $12.57 \pm 2.31$  mm Hg). CRVP showed also no significant differences between eyes suffering from early or advanced visual field damage ( $20.54 \pm 5.61$  mm Hg/ $19.83 \pm 4.88$  mm Hg). Elevated

CRVP was, however, significantly correlated with structural damage. Retinal nerve fiber layer thickness was found to be significantly lower in eyes with elevated CRVP ( $66.52 \pm 22.05$   $\mu$ m/ $81.31 \pm 25.79$   $\mu$ m/ $P = 0.049$ ).

**Conclusions:** The results of the present study show that elevated CRVP is not necessarily correlated with functional glaucoma damage (visual field). Structural damage, however, might be a reason for an elevated CRVP and therefore the cause of reduced perfusion pressures in some POAG patients.

**Poster No.: EX1-070**

**Panel No.: 070**

### Correlation Analysis Between Acute Primary Angle-Closure Attack and Meteorological Factors

*First Author: Yuqiang HUANG*

*Co-Author(s): Chor Kai HUANG, Yan LI, Mingzhi ZHANG, Xin ZHONG*

**Purpose:** To explore the seasonal variations of acute primary angle-closure (APAC) and correlation between attack of APAC and meteorological factors.

**Methods:** Data from 1210 patients diagnosed first attack APAC were collected. Meteorological data, including average monthly air temperature, air pressure, surface temperature, precipitation, relative humidity, and sunshine hours, were obtained from Meteorological Bureau. The peak range of APAC admission rate was calculated by circular distribution. The APAC admission rate was defined as the number of APAC patients per month divided by the total number of the same year. Pearson's correlation was used to analyze the correlation between meteorological factors and the admission rate. Multivariate linear regression was used to evaluate the impact of meteorological factors on the attack of APAC.

**Results:** Among 1210 patients with APAC, there were 921 females. The mean age of participants was  $64.64 \pm 9.245$  years old. The highest APAC admission rate was observed in summer and was correlated with the mean air pressure, mean air temperature, relative humidity, mean surface temperature, and precipitation ( $P < 0.001$ ). Multivariate analysis showed mean air pressure was significantly correlated with the attack of APAC ( $B = -0.025$ ,  $P < 0.001$ ).

**Conclusions:** The peak APAC admission rate was shown in summer, and the attack of APAC may be correlated with lower mean air pressure.

**Poster No.: EX1-056**

**Panel No.: 056**

### Decreased Orbital Fat and Enophthalmos Due to Bimatoprost: Quantitative Analysis Using Magnetic Resonance Imaging

*First Author: Tomoaki HIGASHIYAMA*

*Co-Author(s): Masashi KAKINOKI, Takayuki*

*MINAMIKAWA, Masahito OHJI, Osamu SAWADA*

**Purpose:** To determine the relation between the decrease in orbital fat and enophthalmos due to bimatoprost using magnetic resonance imaging (MRI).

**Methods:** Nine orbits of 9 patients who were unilaterally treated with bimatoprost for glaucoma or ocular hypertension were studied. Fellow orbits of the patients were used as controls.

**Results:** The volumes of the orbital tissues and the enophthalmos were measured using MRI. The mean volumes on the treated and untreated sides were, respectively,  $14.6 \pm 2.1$  and  $17.0 \pm 4.3$  cm<sup>3</sup> for orbital fat, and  $3.4 \pm 0.5$  and  $3.3 \pm 0.5$  cm<sup>3</sup> for total extraocular muscles. The mean volume of orbital fat on the treated side was significantly smaller than that on the untreated side ( $P = 0.04$ ), whereas there was no significant difference in the mean volumes of total extraocular muscles in the 2 orbits ( $P = 0.85$ ). The mean enophthalmos values were  $14.7 \pm 2.5$  and  $16.0 \pm 2.3$  mm on the treated and untreated sides, respectively. The mean enophthalmos value on the treated side was significantly smaller than that on the untreated side in all patients ( $P = 0.002$ ).

**Conclusions:** The volume of orbital fat and enophthalmos might be reduced by bimatoprost administration. The enophthalmos could be caused by the bimatoprost-induced decrease in orbital fat.

**Poster No.: EX1-064**

**Panel No.: 064**

### Effect of Phacoemulsification with Intraocular Lens Implantation on Long-Term Intraocular Pressure Fluctuation in Patients with and without Glaucoma

*First Author: Yarnarin PAPASSORNISIRI*

*Co-Author(s): Anita MANASSAKORN, Prin*

*ROJANAPONGPUN, Visanee TANTISEVI*

**Purpose:** To evaluate long-term intraocular pressure (IOP) fluctuation before and after phacoemulsification with intraocular lens implantation (P+I) in patients with and without primary glaucoma.

**Methods:** A retrospective chart review was conducted on patients who had undergone P+I between January 2014 and March 2017. In this study, 107 eyes of 107 patients were divided into 5 groups: primary angle closure glaucoma (PACG), primary open angle glaucoma, normal-tension glaucoma, primary angle

closure or primary angle closure glaucoma suspected, and non-glaucomatous group. Data were collected on patient demographics, type of glaucoma or non-glaucoma, intraocular pressure (IOP) over 1-year period both before and after P+I, anterior chamber depth (ACD), axial length, maximum IOP, number of glaucoma medications, previous treatment, intraocular lens (IOL) designs, IOL power, postoperative inflammation degree, level of surgeon, and combined procedures with P+I. Long-term IOP fluctuation before and after P+I and the associations between the change of IOP fluctuation and preoperative factors were evaluated.

**Results:** Long-term IOP fluctuation was decreased significantly from  $12.48 \pm 13.95$  mm Hg to  $5.09 \pm 4.51$  mm Hg in PACG group ( $P = 0.007$ ). However, the reduction of long-term IOP fluctuation in other groups were not statistically significant. The decrease in mean IOP were statistically significant in all groups. In multiple linear regression analyses, preoperative maximum IOP ( $r = 0.815$ ,  $P = 0.00$ ), number of glaucoma medications ( $r = 0.53$ ,  $P = 0.00$ ), and ACD ( $r = 0.246$ ,  $P = 0.011$ ) predicted a greater change in long-term IOP fluctuation.

**Conclusions:** Phacoemulsification with IOL implantation can result in a significant long-term IOP fluctuation reduction in PACG patients. Preoperative maximum IOP, number of glaucoma medications, and ACD can predict long-term IOP fluctuation reduction.

**Poster No.: EX1-061**

**Panel No.: 061**

### Evaluation of the iPad "Visual Fields Easy" as Mobile Visual Field Test for Glaucoma Patients

*First Author: Jingjing HUANG*

*Co-Author(s): Miaomiao DAI, Jianan XU*

**Purpose:** To explore the reproducibility of the "Visual Fields Easy" program on iPad testing central visual field in glaucoma patients, and the correlation between iPad and Humphrey perimetry.

**Methods:** Two kinds of visual field tests were performed in 44 normal subjects and 351 glaucoma patients. All the participants were examined twice by iPad and once by Humphrey perimetry. The intraclass correlation coefficients (ICCs) of the 2 iPad visual field tests were calculated. Spearman correlation analysis was used to determine the relationship between the number of missing points in the iPad and the SITA Fast mean deviation (MD), pattern standard deviation (PSD), visual field index (VFI), the number of locations outside normal limits for the SITA Fast 30-2 Total Deviation (TD), and Pattern Deviation (PD) probability plots.

**Results:** ICCs of all quadrants are more than 0.8 ( $P < 0.05$ ) for all the participants. The correlation coefficient between the number of missing points in the iPad test and the SITA Fast MD, PSD, VFI  $> 0.558$  ( $P < 0.05$ ) in

glaucoma group. The correlation coefficient between the number of missing points in the iPad test and the number of locations outside normal limits for the SITA Fast 30-2 TD probability plots (beyond the normal age-adjusted 0.5% probability level)  $>0.636$  ( $P < 0.05$ ).

**Conclusions:** Central visual field could be examined by iPad tablet in glaucoma patients with good reproducibility. There was good correlation between iPad and the Humphrey perimetry.

**Poster No.: EX1-063**

**Panel No.: 063**

### Factors Associated with the Risk of Obstructive Sleep Apnea in Patients with Open-Angle Glaucoma

*First Author:* Dhashani **SIVARATNAM**

*Co-Author(s):* Nur Fattin **ABDUL KHANI**, Vanessa Mei Yi **CHEN**, Alistair Chen Yin **CHEW**, Navin Kumar **DEVARAJ**, A.r **ROSNIZA**

**Purpose:** To determine the factors associated with the risk of obstructive sleep apnea (OSA) among patients with open angle glaucoma (OAG).

**Methods:** This cross-sectional study was carried out in a tertiary hospital in the suburb of Kuala Lumpur. Sixty-six consecutive primary open angle glaucoma and normotensive glaucoma patients participated in this study. Eligible participants completed a self-administered questionnaire on sociodemographic and medical risk factors and were assessed for the risk of sleep apnea based on the STOP-Bang questionnaire (score ranges 0-8 points). Patients were considered at risk if they scored 3 points or more in the questionnaire.

**Results:** There was a significant difference in the proportion of OAG subjects, of which 74.24% were at risk for OSA, and only 25.76% were low risk ( $P < 0.001$ ). Hypertension, stroke, BMI, diabetes mellitus, gender, and ethnicity had a significant association with being at risk for OSA. Factors which were found to be significant predictors of a higher risk for OSA among the glaucoma patients were diabetes mellitus (OR = 16.414, 95% CI = 3.026 - 89.031,  $P = 0.001$ ), Chinese ethnicity (OR = 4.974, 95% CI = 1.042 - 23.737,  $P = 0.044$ ), and absence of previous stroke (OR = 0.046, 95% CI = 0.003 - 0.775,  $P = 0.033$ ).

**Conclusions:** The pathophysiological changes seen in the supine position while sleeping, such as increased intraocular pressure and reduction of blood flow to the optic disc, is aggravated among OSA patients. Our study supports this hypothesis and recommends that all OAG patients be screened for OSA, especially those with diabetes mellitus, Chinese ethnicity, or no history of stroke.

**Poster No.: EX1-059**

**Panel No.: 059**

### Incidence of Glaucoma Among Healthy People in Lampang Province (Northern Thailand)

*First Author:* Lerprat **MANGKORNKANOKPONG**

**Purpose:** To estimate the glaucoma incidence among healthy people who had not known glaucoma before in Lampang province.

**Methods:** A population-based, descriptive, analytic study in all population from 36 communities of Lampang province was conducted between January 2017 and July 2018. The healthy people ages ranged between 40 and 70 years and was not known glaucoma before were included. Factors associated with glaucoma, such as glaucoma family history, underlying disease, and myopia were collected. The data was analyzed by 2 glaucoma specialists (LM and IT). If we found any glaucoma suspected persons, they were sent to a glaucoma specialist in Fort Surasakmontri Hospital for further investigation (Slit lamp examination, GAT, CTVF 24-2, OCT(RNFL), gonioscopy).

**Results:** A total of 1980 healthy people, 443 were excluded, finally 1492 were included. Glaucoma incidence rate was 1.74% (POAG  $n = 11$ , NTG  $n = 14$ , PACG  $n = 1$ ). Glaucoma suspected by disc (cup to disc ratio  $\geq 0.5$ ), primary angle closure suspect (PACS), and ocular hypertension (OHT) were found in 8.31%, 2.21%, and 0.27%, respectively. We also found another disease, such as dry age-related macular degeneration (stage 1-2) 1.14%, (stage 3-4) 1.21%, wet AMD 0.07%, epiretinal membrane (ERM) 0.8%, cystoid macular edema (CME) 0.2%, moderate diabetic retinopathy (DR) 0.2%, optic atrophy 0.07%, macular scar 0.07%, and macular hole 0.07%.

**Conclusions:** The incidence rate of newly diagnosed glaucoma in urban areas of Lampang province (Northern of Thailand) was 1.74%. Glaucoma suspected by disc, PACS, and OHT were found in 8.31%, 2.21%, and 0.27% respectively. These estimates are important in the future designs of glaucoma screening, treatment, and public health strategies.

**Poster No.: EX1-069**

**Panel No.: 069**

### Juvenile Open Angle Glaucoma: The Clinical Profile and Success Rate of Trabeculectomy in 2 Major Eye Hospitals in Yogyakarta

*First Author:* Theresia **SIDABUTAR**

*Co-Author(s):* Retno **EKANTINI**, Widya **RAMANIA**, Tatang **TALKA GANI**, Krisna **PURNOMO JATI**

**Purpose:** The leading cause of blindness in young age is juvenile open angle glaucoma (JOAG). This study aimed to demonstrate the clinical characteristics and assess the success rate of trabeculectomy in JOAG patients.

**Methods:** A total of 84 eyes were enrolled in a cross-sectional study. Only 33 eyes which underwent fornix-based trabeculectomy were assessed for success rate of trabeculectomy. Data were taken from the medical records of 42 patients diagnosed with JOAG from 2012 to 2017.

**Results:** The mean age was  $15.99 \pm 6.54$  years. Only 19 (23%) patients came with normal visual acuity, while 21 other patients came with mild (25%), 18 with moderate-severe (21%), and 26 with blind (31%). Most patients came with mild symptoms such as eye discomfort 31 (37%) and visual defect 33 (39%). Severe elevation of intraocular pressure (IOP) was reported with mean IOP 33.80 mm Hg ( $\pm 15.54$ ). The mean percentage of presenting CD ratio was 0.69 ( $\pm 0.22$ ). Mean IOP was reduced from 40.45 mm Hg ( $\pm 15.54$ ) to 11.17 mm Hg ( $\pm 5.12$ ) on first day after trabeculectomy, 10.9 mm Hg ( $\pm 6.77$ ) at 1st week, 15.1 mm Hg ( $\pm 10.05$ ) at 1st month, 16.5 mm Hg ( $\pm 10.78$ ) at 3rd month, and 15.5 mm Hg ( $\pm 10.06$ ) at 6th month.

**Conclusions:** Most patients came with mild symptoms and visual acuity range from moderate-severe to blindness, and trabeculectomy was shown to be efficient for lowering IOP in patients with JOAG. Educations and screenings at primary health care are needed for better diagnosis and prognosis.

**Poster No.:** EX1-065

**Panel No.:** 065

### Optic Disc Pit Presenting as Visual Field Scotoma and Macular Retinoschisis

*First Author:* Ju **CHENG**

**Purpose:** Interventional case series.

**Methods:** We present two cases of optic disc pit with different courses.

**Results:** A 73-year-old male presented with decreased vision, with central scotoma in his right eye. His vision was decreased to 20/50. Fundoscopy of the right eye showed a temporal grey oval optic disc pit. Ishihara plate testing revealed color deficiency. Visual field testing demonstrated a corresponding nasal step scotoma. After 2 repeated examinations of visual field, which showed a corresponding nasal step scotoma, a topical alpha-agonist was administered to the patient. An 82-year-old male experienced progressive deterioration of his left visual acuity in the past month. His visual acuity was 20/50 in the right eye and counting fingers in the left eye. Intraocular pressure was 14 mm Hg in both eyes. He had no relative afferent pupillary defect and full color vision on Ishihara plate testing. Fundoscopy and color photography demonstrated a tilted glaucomatous disc with optic disc pit inferotemporally. Optical coherence tomography (OCT) scans through the macula showed macular retinoschisis.

**Conclusions:** Optic disc pits appear as crater-like

indentations of the surface of the optic nerve head. About 70% of the pits are on the temporal side of the disc, and about 20% are situated centrally. Diagnosis of optic pit maculopathy is quite challenging in the absence of a clinically visible or OCT-proven pit. The lesions might be associated with visual field defects, which corresponds to the optic nerve defect, and similar to those seen in glaucoma patients. Approximately 50% of patients with optic pits have serous retinal detachment (SRD), usually in the macular area.

**Poster No.:** EX1-062

**Panel No.:** 062

### Prediction for Effectiveness of Unilateral Selective Laser Trabeculoplasty for the Untreated Fellow Eye of Primary Open-Angle Glaucoma Patients

*First Author:* Xiang **FAN**

*Co-Author(s):* Ling-Ling **WU**

**Purpose:** To explore correlative factors for predicting effectiveness of unilateral selective laser trabeculoplasty (SLT) for untreated eyes of open-angle glaucoma (OAG) patients.

**Methods:** This was a self-controlled, prospective study. Thirty OAG patients under same anti-glaucoma medications for both eyes were included. SLT was performed for the poorly controlled eye for each patient. Intraocular pressure (IOP) was followed-up for 6 months with all medications remained unchanged. Success rates were calculated with the criteria of IOP reduction  $\geq 20\%$ . Correlative factors were analyzed between successful and unsuccessful untreated eyes at the end of follow-up.

**Results:** For untreated eyes, preoperative mean IOP was  $17.4 \pm 2.4$  mm Hg, and 33.3% of these eyes had an elevated IOP at 1 hour post SLT; mean percentage of IOP reductions for 1 week, 1 month, 3 months, and 6 months after SLT was  $6 \pm 12\%$ ,  $5 \pm 17\%$ ,  $14 \pm 13\%$ ,  $14 \pm 12\%$ ; success rates were 10.0%, 16.7%, 33.3%, and 30.0% respectively. Treated eyes were similar with untreated eyes in preoperative mean IOP and IOP reductions ( $P > 0.05$ ), whereas with higher rate of elevated IOP at 1 hour post SLT (56.7%,  $P < 0.05$ ). Untreated eyes whose IOP reduction  $\geq 20\%$  at 6 months after SLT had higher preoperative IOP, energy of SLT, and rate of elevated IOP at 1 hour post SLT and success rate in treated eyes ( $P < 0.05$ ).

**Conclusions:** In poorly controlled OAG eyes under anti-glaucoma medications, unilateral SLT created continuous IOP reduction effects for such untreated eyes. Preoperative IOP, energy of SLT, rate of elevated IOP at 1 hour post SLT, and success rate in treated eyes were correlative factors for predicting success rate of untreated eyes at 6 months after SLT.

Poster No.: EX1-057

Panel No.: 057

### Progression of Primary Glaucoma in Malays: Survival Analysis Outcome

First Author: Diana Toh **SHI JIN**

Co-Author(s): Liza Sharmini **AHMAD TAJUDIN**, Yaakub **NAJIB MAJDI**, Bachok **NOR SA'ADAH**, Wan Masri **WAN EZATUL ARISHA**

**Purpose:** Identification of progression and factors affecting progression is important in prevention of blindness in glaucoma. This study aimed to determine the visual field progression and its prognostic factors among Malay patients with primary glaucoma.

**Methods:** A retrospective cohort record review study was conducted involving 222 (222 eyes) Malay patients with primary open angle glaucoma (POAG) and primary angle closure glaucoma (PACG) who were on regular follow-up in a tertiary center in Malaysia between January 1, 2009 and December 31, 2014. Data from patients with 6 reliable reproducible Humphrey visual fields at the initial presentation and at minimum 6 months follow-up were included in this study. Visual field progression was based on agreement of Hodapp-Parrish-Anderson criteria and Advanced Glaucoma Intervention Study (AGIS) score. Other data, such as ocular pain, disc hemorrhage, and systemic diseases were included. Kaplan Meier survival analysis and multiple Cox regression analysis were used.

**Results:** A total of 110 (49.6%) POAG and 112 (50.5%) PACG were included, with the mean age of 63 (SD 19.8) years. Only 63 eyes fulfilled the criteria of progression. Estimated 5-year progression was 31.2% (95% CI 24.9, 38.6). There was no significant difference in progression between POAG [32.6% (95% CI 23.9, 43.30)] and PACG [29.8% (95% CI 21.2, 40.7)] ( $P = 0.3260$ ). Presence of disc hemorrhage and ocular pain increased the risk of progression by 2.8 folds (95% CI 1.73, 5.08;  $P < 0.001$ ) and 2.5 folds (95% CI 1.51, 4.85;  $P = 0.001$ ), respectively.

**Conclusions:** The visual field progression in Malays is almost similar to Chinese. Aggressive management is recommended for patients with disc hemorrhage and presented with ocular pain.

Poster No.: EX1-075

Panel No.: 075

### Quality of Life and Related Factors in Glaucoma Patients in the Glaucoma Department at Vietnam National Institute of Ophthalmology

First Author: Le **THAO**

**Purpose:** To evaluate the quality of life (QOL) of glaucoma patients who are following up in glaucoma department at Vietnam National Institute of Ophthalmology (VNIO), and to detect some factors

affecting the QOL of glaucoma patients.

**Methods:** Descriptive study.

**Results:** The mean score of NEI VFQ 25 was  $58.43 \pm 17.42$ , in which the mean score in the group of monitored patients was  $55.11 \pm 18.55$ , lower than the group of new patients with a mean score of  $61.79 \pm 15.60$ . The mean score of the VAS measure was  $62.03 \pm 16.41$ . The mean score in the group of monitored patients was  $58.51 \pm 17.44$ , and on the group of new patients was  $65.60 \pm 14.54$ . Multivariate linear regression model after eliminating multicollinearity factors, the remaining factors affecting the life quality of the subjects in the NEI VFQ-25 measure were: Educational attainment ( $B = 3.09$ ; 95% CI: 0.13 - 6.07;  $P < 0.05$ ); eyesight status ( $B = -6.13$ ; 95% CI: -10.65 - 1.61;  $P < 0.05$ ); Eye-tension condition ( $B = 6.31$ ; 95% CI: -11.30 - 1.34;  $P < 0.05$ ).

**Conclusions:** This study confirms the accuracy of 2 questionnaires, NEI VFQ-2 and VAS.

Poster No.: EX1-067

Panel No.: 067

### Safety and Efficacy of Combined iStent Trabecular Microbypass Stent Implantation and Cataract Surgery in Eyes with Primary Angle Closure Glaucoma: 12-Month Results

First Author: David **HERNSTADT**

Co-Author(s): Jason **CHENG**, Tiakumzuk **SANGTAM**, Chelvin **SNG**, Anoop **THOMAS**

**Purpose:** To evaluate the safety and efficacy of combined iStent trabecular micro-bypass device (Glaukos, Laguna Hills, CA) in eyes with primary angle closure disease.

**Methods:** A multi-center, prospective, interventional case series of consecutive patients with primary angle closure (PAC) or primary angle closure glaucoma (PACG) who underwent iStent implantation with cataract surgery and required at least 1 glaucoma medication before the surgery. Postoperatively, patients were assessed on days 1 and 7, and months 1, 3, 6, and 12. The intraocular pressure (IOP), glaucoma medication use, visual acuity, iStent patency, and the presence of complications were assessed at each visit. Complete success was defined as intraocular pressure (IOP) reduction  $\geq 20\%$  without the use of glaucoma medications.

**Results:** Thirty-seven eyes of 31 patients were included in this study, with 2 iStents implanted in 16 eyes and 1 iStent implanted in 21 eyes. At 1 year, postoperative IOP ( $14.8 \pm 3.94$  mm Hg) was significantly decreased compared with preoperative medicated ( $17.5 \pm 3.82$  mm Hg,  $P = 0.01$ ) and unmedicated ( $24.6 \pm 3.41$  mm Hg,  $P < 0.01$ ) IOP. 89.2% of the eyes achieved complete success. Preoperative medicated IOP was a risk factor for failure (Hazard Ratio 3.45, 95% confidence interval 1.52-7.85,  $P < 0.01$ ), after adjustment for age, gender

and race. iStent occlusion occurred in 10 eyes (27.0%). The most common postoperative complication was hyphema, which occurred in 7 eyes (18.9%), and there were no sight-threatening complications.

**Conclusions:** Combined iStent implantation with cataract surgery was effective in lowering the IOP and the number of glaucoma medications for at least 12 months, with a favorable safety profile.

**Poster No.: EX1-068**

**Panel No.: 068**

### Structural and Functional Evaluation of Normal Tension Glaucoma in Obstructive Sleep Apnea Syndrome

*First Author: Lan-Hsin CHUANG*

**Purpose:** To explore ocular microcirculation by optical coherence tomography angiography (OCTA) and visual function by visual field examination in obstructive sleep apnea syndrome (OSAS).

**Methods:** A retrospective, cross-sectional study was conducted. Participants had been examined polysomnography (PSG) in the same sleep center were enrolled and ocular examination in the chart was reviewed. OCTA (AngioVue) measuring blood flow by using the split-spectrum amplitude-decorrelation angiography (SSADA) was performed. The standard automated perimetry was documented. Exclusion criteria were ocular hypertensive history, diabetic retinopathy, hypertensive retinopathy, or other maculopathy. Low reliability of VF exam and signal strength index <50 of OCTA were also excluded.

**Results:** In total, 53 cases enrolled. There were 27 cases in perimetric group with glaucomatous change, and 26 cases in control group. The apnea-hypopnea index (AHI) of perimetric group was significantly higher than control group (31.554 vs 45.389  $P < 0.001$ ,  $t$ -test) and demonstrated more severe OSAS in perimetric group. In perimetric group, the parameter for superficial layer retinal layer (VD RPC) (56.06 vs 59.72%,  $P = 0.01$ ) illustrated peripapillary capillary dropout severe than control group. Peripapillary RNFL thickness and GCC thickness also demonstrated significant thinning in comparison ( $P < 0.001$ ,  $P = 0.001$  respectively). Among OSAS, VFPSD negatively correlated to VD RPC ( $r = -0.331$ ,  $P = 0.015$ ) by analysis with Pearson correlation.

**Conclusions:** Preliminarily, high AHI regarding to severity of sleep apnea is the predisposing factor of NTG among OSAS. The correlation of OCTA parameters and visual field defect shows that the OCTA is the option for OSAS to evaluate the morphological and functional change of ocular microcirculation.

**Poster No.: EX1-073**

**Panel No.: 073**

### Subluxation of an Acrylic Intraocular Lens During Nd:YAG Laser Capsulotomy on an Eye with Congenital Glaucoma

*First Author: Corrina AZARCON*

**Purpose:** We reported a rare case of immediate intraocular lens subluxation during Neodymium-doped:Yttrium Aluminum Garnet (Nd:YAG) capsulotomy on a pseudophakic eye with congenital glaucoma.

**Methods:** An 18-year-old female diagnosed with congenital glaucoma was advised to undergo Nd:YAG capsulotomy after developing posterior capsular opacities on both eyes within 2 years after phacoemulsification with in-the-bag acrylic intraocular lens (IOL) implantation. Prior to lens extraction, the patient already underwent bilateral trabeculectomy and glaucoma drainage device implantation. Nd:YAG capsulotomy was initially attempted on the right eye. After 2 millijoule laser shots were administered from the 11 o'clock up to 4 o'clock position behind the optic, the IOL was noted to have subluxated inferiorly. Visual acuity of the eye decreased from a baseline of 6/30 to 6/60.

**Results:** Ultrasound biomicroscopy revealed zonulysis on the right eye and zonular stretching on the left eye. The sulcus on the right eye was no longer intact.

**Conclusions:** This case highlights the value of careful evaluation and ancillary testing prior to Nd:YAG capsulotomy in eyes suspected to have underlying zonular weakness. Ultrasound biomicroscopy may play a role in weighing the risks and benefits of Nd:YAG capsulotomy in pseudophakic patients with congenital glaucoma.

**Poster No.: EX1-071**

**Panel No.: 071**

### The Effects of Pirfenidone on the Expression of Genes in Human Tenon Fibroblasts

*First Author: Yangfan YANG*

*Co-Author(s): Caiqing WU, Minbin YU*

**Purpose:** To explore differentially expressed gene in human tenon's fibroblasts (HTFs) treated by Pirfenidone (PFD) in vitro using gene chips, and to detect the key regulatory genes.

**Methods:** Primary HTFs from one healthy donor were collected and divided into experimental group and blank control group. RNA was collected after 0.6 mg/mL PFD was added to the experimental groups 24 hours, marked with cyanine-3 - uridine triphosphate, then hybridized with Agilent human whole genome microarray. Agilent DNA Microarray Scanner, Agilent Feature Extraction, and other software were used to screen and analyze differentially expressed genes.

**Results:** There were 381 differentially expressed genes that had been screened, including 129 up-regulated genes and 252 down-regulated genes. The results of Genebank, differentially expressed genes analysis, GO analysis, and Pathway analysis indicated 49 genes may be key controlled genes related to HTFs treated by PFD, including 11 up-regulated genes (CYP19A1, AKR1B10, ID2, CYP1B1, PGF, LPCAT2, COL6A3, ITGA11, HSD11B1, LIPC, IRS1) and 38 down-regulated genes (TYMS, UBE2T, EXO1, POLA2, BIRC5, PTTG2, E2F2, CYCS, CXCL1, KRT18, MCM7, KRT18, RFC2, SMC1A, MCM3, MAD2L1, TK1, FANCD2, PRIM2, AURKA, MCM5, LIG1, FANCA, RAD51, RMI2, FEN1, TUBA1C, PTTG1, MCM5, BLM, FANCB, DHFR, CDC45, CCNB2, RAD51C, MCM6, RFC4, SMC1A) which primarily control biological processes such as cell cycle, DNA replication, and glycerolipid metabolism.

**Conclusions:** PFD suppress conjunctival scarring is a complicated process, involving multiple genes and pathways in HTFs. Global gene expression profile analysis showed that PFD may prevent HTFs proliferation by inhibiting cell cycle. PTTG2 and MCM family may be potential targets.

**Poster No.: EX1-074**  
**Panel No.: 074**

### Volumetric Parameter-Based Differentiation of Narrow Angle from Open Angle: An SS-OCT Study

*First Author: Fei LI*  
*Co-Author(s): Xiulan ZHANG*

**Purpose:** To evaluate the diagnostic ability of volumetric parameters of anterior chamber in differentiation of narrow angle from open angle and distinguish different configurations of narrow angle.

**Methods:** Subjects older than 18 years were included. One eye was considered as having narrow angle when posterior pigmented trabecular meshwork was not visible in more than 180 degrees without indentation in primary position. With gonioscopy as reference standard, we first determined cutoff value of each parameter in the training set and then verified the efficacy of each parameter in detection of narrow angle in the validation set.

**Results:** The training set was composed of 117 eyes with narrow angle and 60 with open angle, and validation set included 40 eyes with narrow angle and 35 eyes with open angle. ACV had the highest AUC among all the parameters. Most parameters, except for IV and AOD500 at temporal quadrant (tAOD500), had a mean AUC greater than 0.95. The Youden ACV cutoff value for distinguishing open and narrow angle was  $98.1 \text{ mm}^3$ . Thirty-eight eyes of 36 individuals with closed angle and 37 eyes of 37 subjects with open angle were included in the validation set. The kappa values of thresholds of ACV and other angle parameters were compared in the validation set. ACV

with  $98.1 \text{ mm}^3$  was found to have the best agreement ( $\kappa = 0.89$ ).

**Conclusions:** ACV automatically measured by SS-OCT is a faster and easier way to differentiate narrow angle from open angle than AOD and ACD with excellent sensitivity and specificity.

## Intraocular Inflammation, Uveitis & Scleritis

**Poster No.: EX1-076**  
**Panel No.: 076**

### An Unusual Case of Varicella Zoster Virus Retinitis After Herpes Zoster Infection in an Immune-Competent Patient

*First Author: Caius GOH*

**Purpose:** To report a case of VZV retinitis after herpes zoster infection in an immune-competent patient.

**Methods:** Case report.

**Results:** A 71-year-old patient presented with painless blurring of vision in the left eye for 1 week. He has a history of herpes zoster infection at T5 dermatome inferior to the right scapula 2 weeks ago. On examination, his visual acuity was 6/7.5-2 in the right eye and 6/45 in the left eye. The intraocular pressure was normal in the right eye and raised in the left eye at 28.3 mm Hg. On slit-lens examination, the left eye was mildly injected with 2+ cells in the anterior chamber and keratic precipitates. There was a left RAPD. The right eye was normal. Binocular indirect ophthalmoscopy showed moderately severe vitritis with a nasal retinal exudate and retinal vasculitis. Anterior chamber paracentesis was done and sent for tetraplex PCR testing which was positive for VZV. Patient was started on oral Valacyclovir 2g tds with a slow taper. In addition, topical antibiotics and steroid eye drops were also started.

**Conclusions:** VZV retinitis in an immune-competent patient is a rare complication of herpes zoster skin infection.

**Poster No.: EX1-082**  
**Panel No.: 082**

### Clinical Profile of Bilateral Acute Retinal Necrosis: 20 Years' Consecutive Data

*First Author: Parthoprati DUTTA MAJUMDER*  
*Co-Author(s): Jyotirmay BISWAS, Sudha GANESH, Kowsigan MAGESAN*

**Purpose:** To describe the clinical profile of patients with bilateral acute retinal necrosis (BARN) at a tertiary care eye hospital over a period of 20 years.

**Methods:** The medical records of 50 eyes of 25 patients of BARN were included in this retrospective analysis.

**Results:** Mean age at presentation was  $35.1 \pm 15.7$  years, and 64% of the patients were male. Ten patients presented with simultaneous bilateral involvement and median time interval between involvement of second eye in rest 15 patients was 180 days (12-6935 days). A viral prodrome was observed in 4 patients, and 2 patients had history of viral encephalitis. Varicella zoster virus (36%) was detected as the most common causative organism by polymerase chain reaction. All patients received systemic antiviral therapy, and 26 (52%) of the eyes developed retinal detachment. Other causes of complications included optic atrophy (22%), proliferative vitreoretinopathy (16%), and phthisis bulbi (8%). Twenty-two eyes underwent surgical intervention and 10 of them required multiple surgeries. Visual acuity improved in 13 (26%) eyes, worsened in 17 (34%), and remained stable in 20 (40%).

**Conclusions:** BARN is a rare but devastating cause of viral retinopathy, associated with higher ocular complications.

**Poster No.: EX1-077**

**Panel No.: 077**

### Inflammatory Choroidal Neovascular Membrane Associated with Vogt-Koyanagi-Harada Disease in Active and Chronic Stage: A Retrospective Study

*First Author: Hitesh AGRAWAL*

*Co-Author(s): Rajeev REDDY, Mudit TYAGI*

**Purpose:** To study clinical findings, management, and long-term follow-up of inflammatory choroidal neovascular membrane in VKH patients.

**Methods:** In this retrospective study, we went through all the folders diagnosed as VKH and inflammatory CNVM and collected the data related to demographics, diagnosis, and modes of treatment with its response. Most the patients underwent ocular coherence tomography (OCT), fundus fluorescein angiography, and OCT angiography.

**Results:** We found 10 patients with active inflammatory CNVM associated with VKH. Seven patients had peripapillary CNVM, 2 had sub-foveal, and one had juxta foveal CNV. Nine patients were treated with only intravitreal Bevacizumab injection. One patient treated with intravitreal Ranibizumab injection. Recurrence of CNVM noted in 2 patients (after 1.5 and 2 years respectively). Five patients had improved vision, 2 had no change, and 3 patients had decreased vision after healing of CNVM. Three patients who have decreased vision had sub-foveal and juxta-foveal CNVM.

**Conclusions:** Peripapillary location of CNV is more common in inflammatory CNVM with VKH. Most of these patients respond well with intravitreal anti-VEGF injection.

**Poster No.: EX1-080**

**Panel No.: 080**

### Ocular Morbidity with the Help of CD4 Cell Count in HIV Patients

*First Author: Vinod SINGH*

*Co-Author(s): Basant KUMAR SINGH, Arun SINGH, Satya SINGH*

**Purpose:** To study ocular morbidity and correlation with the CD4 cell count in HIV patients.

**Methods:** All HIV patients with known CD4 cell count were retained in the study. Each patient had exhaustive ocular examination through slit lamp, direct ophthalmoscopy, indirect ophthalmoscopy, and fundus photograph.

**Results:** In this study, all 387 HIV patients were on HAART. Of these patients, 17.30% (67) had ocular complications. Out of 67 patients, 44 (68.7%) had ocular manifestations, among which HIV microangiopathy 18 (26.9%), CMV retinitis 17 (25.4%), uveitis 3 (4.5%), HZO 2 (3.0%), active tuberculoma 2 (3.0%), complicated cataract and corneal opacity 1 (1.5%) each. The median CD4 T-cell in symptomatic group was cells/ $\mu$ L significantly different from the asymptomatic group 278 cells/ $\mu$ L. In our study, most of the ophthalmic manifestations were associated with  $<100$  cells/ $\mu$ L CD4 cell count.

**Conclusions:** We concluded that ocular complications were strongly associated with low CD4 cell counts.

**Poster No.: EX1-079**

**Panel No.: 079**

### Overlap Syndrome as a Cause of Posterior Uveitis: A Rare Case Presentation

*First Author: Krishnima RAGHU*

*Co-Author(s): Radha K. Annamalai ANNAMALAI, Debolina DEB, Ansu JOHN, Meera MOHANAKUMAR, M MUTHIAH*

**Purpose:** To report a case of uveitis and retinal vasculitis in latent tuberculosis (TB) with dual autoimmune connective tissue disease in a young lady with systemic lupus erythematosus (SLE) and systemic sclerosis (SS) on hydroxychloroquine and steroids.

**Methods:** A 23-year-old young lady presented with ocular pain in both eyes and visual acuity of 6/6, N6 in both eyes. Examination showed anterior chamber cells and flare, vitritis, pale disc, macular hyperpigmentation, and retinal vasculitis. Systemic examination revealed alopecia, facial hyperpigmentation, Jaccoud arthropathy, and joint swelling. Laboratory investigations showed positive ANA, Anti Sm, Anti centromere, and Anti U1 RNP positivity. CT thorax showed centrilobular nodular opacities, lower lobe patchy consolidation due to TB as an infective etiology. Mantoux test was positive.

**Results:** Clinical response was seen after anti-tubercular treatment. Optic atrophy was secondary to healed vasculitis. There were no side effects of steroid use. Color vision and visual fields were normal, but there was evidence of macular involvement following hydroxychloroquine use.

**Conclusions:** This case is being reported because concurrent evolution of TB with both SLE and SS as a cause of uveitis has not been reported till now. Response to treatment was good with final visual acuity stable at 6/6, N6.

**Poster No.: EX1-078**

**Panel No.: 078**

### Reactivation of Bilateral Acute Retinal Necrosis on Systemic Antiviral Therapy in a Post Kidney Transplant Patient

*First Author: Natcha JINTAGANON*

*Co-Author(s): Thanapong SOMKIJRUNGROJ, Budsarat SULEESATHIRA*

**Purpose:** Acute retinal necrosis (ARN) in immunocompromise is relatively uncommon. We presented a case of a post-kidney transplanted woman who had recurrent bilateral ARN after treatment.

**Methods:** Reported a case of severe reactivation of ARN who was treated and maintain with systemic antiviral, renal adjusted dose (RAD).

**Results:** A 62-year-old post kidney transplant woman with 2 months of progressive blurred vision. The previously diagnosed was CMV retinitis, treated with RAD of oral Valgancyclovir 450 mg every other day. Her visual acuity is hand motion and 20/32 in right and left. Right eye shown 1+ anterior chamber cells, pigment keratic precipitate, 3+ vitreous haze, arteritis, intraretinal hemorrhage, disc swelling, and diffuse multifocal retinitis. Diagnostic/therapeutic vitrectomy with intravitreal Gancyclovir injection was done and got positive PCR result for Varicella Zoster Virus. She was treated with systemic Valacyclovir 1 gm/day. After 9 weeks, nephrologist decreased Valacyclovir to 500 mg/day due to risk of renal toxicity and causing the severe relapse of bilateral disease. She underwent second vitrectomy surgery and full dose of Acyclovir 800 mg IV q 12 hrs for 7 days. Her disease is controlled and maintained with oral Acyclovir 800 mg/day.

**Conclusions:** Diagnosis and management of ARN in post-kidney transplant can be challenging. Diagnostic/therapeutic vitrectomy is effective in uncertain diagnosis case. Considering drug dosage in renal compromised patient is crucial due to narrow therapeutic window. RAD concentration might not be enough to surpass blood ocular barrier, causing an uncontrolled ocular disease. Local therapy and lifelong antiviral maintenance in post renal transplant is recommended.

**Poster No.: EX1-081**

**Panel No.: 081**

### Vasculitic Vein Occlusion with Central Serous Chorioretinopathy

*First Author: Awaneesh UPADHYAY*

*Co-Author(s): Pritam BAWANKAR, Dipankar DAS, Chintan DESAI, Diva MISRA, Ronel SOIBAM*

**Purpose:** Presentation, investigations, and management of a case of vasculitic vein occlusion with central serous chorioretinopathy.

**Methods:** Case report.

**Results:** A 51-year-old gentleman, who was non-hypertensive and non-diabetic, came with complaints of sudden onset, painless, profound loss of vision in OS for 20 days. On examination, his best corrected visual acuity was 6/6 in right eye (OD), hand movement (HM) in left eye (OS). Anterior segment was normal in OU. Indirect ophthalmoscopy was normal for OD, and OS showed vitreous hemorrhage which was confirmed by ultrasound. Blood examination was normal, mantoux positive, HIV negative, X-ray chest normal, HR-CT normal, quanteferon TB negative. He underwent pars plana vitrectomy with endolaser in OS. Intraoperative fundus revealed hard exudates in a star pattern over fovea, with areas of hemorrhages along inferotemporal arcade with sheathing of vessels and exudation. In view of the exudation and sheathing, patient was discharged with topical antibiotics and oral steroids in tapering doses. At 1 month, his vision was 3 meters in OS. Optical coherence tomography (OCT) showed subfoveal detachment with fluid. Fundus fluorescein angiography (FFA) showed delayed A-V transit time, blocked fluorescence due to hemorrhages, a late parafoveal leakage superiorly in an "ink blot" pattern in the macular area, suggesting central serous chorioretinopathy, and capillary non-perfusion were seen in the inferior quadrants with late-staining of the venous architecture suggestive of vasculitic occlusion. Oral steroids were stopped, with focal laser given to the area of leak. One month later, he had a visual acuity of 6/36 in OS. Fundus showed few hard exudates, resolving hemorrhages. OCT showed resolved subfoveal fluid.

**Conclusions:** Vasculitis patients should be treated with caution in dome-shaped macula, OCT showing subfoveal fluid. FFA is warranted to confirm and provide proper treatment.

# Neuro-Ophthalmology

**Poster No.: EX1-088**

**Panel No.: 088**

## A Clinical Study of Various Ocular Manifestations and Their Co-Relation in Intracranial Space Occupying Lesions

*First Author: Deepa MUGALI*

*Co-Author(s): Kavita Salagar SALAGAR*

**Purpose:** 1. To study the incidence of various ophthalmic manifestations in ICSOL (intracranial space occupying lesions). 2. To correlate the ocular manifestations and the type of the ICSOL. 3. To study the importance of ophthalmic evaluation in ICSOL.

**Methods:** The cross-sectional study (March 2015 - Sept 2015) included 50 CT/MRI proven cases of ICSOL, among whom 23 were referred to ophthalmology department and underwent detailed ocular, neurological, and systemic examination. The study excluded patients who were uncooperative. After a thorough history-taking, a complete clinical evaluation including routine ocular examination was done. Fundus was examined in detail, and visual fields recorded in all cases.

**Results:** Among 23 cases, 17 were females and 6 were males with ratio 2.83:1. Mean age: 47 years. Headache (91.3%) was most common symptom, followed by diminution of vision (34.78%). Ophthalmic manifestations included: pale disc (30%), papilledema (21.7%), visual field defects (21.7%), proptosis, ptosis, and reduced corneal sensation (8.6% each). The most common ICSOL were pituitary macroadenoma (39.13%) and pilocytic astrocytoma (21.7%). Among those with pituitary macroadenoma, 55.5% had visual field defects which correlated with the site of tumor.

**Conclusions:** Ocular manifestations occur very frequently in ICSOL. This study emphasizes the importance of ocular manifestations in the localization, extent of the lesion, prognosis for vision, and life of the patient in the case of brain tumors. Hence, we recommend ophthalmologic evaluation for all cases of ICSOL for early intervention and aid in visual rehabilitation.

**Poster No.: EX1-087**

**Panel No.: 087**

## A Rare Case Report of Bilateral Traumatic Carotid Cavernous Fistula

*First Author: Fadli RAFIKA*

*Co-Author(s): Syntia NUSANTI, Mohamad SIDIK*

**Purpose:** To increase awareness in diagnose rare case of bilateral traumatic carotid cavernous fistula and prevent it from serious complications.

**Methods:** This was a case report with a 44-year-old woman who came with a complaint of squint and diplopia for 1 month after a motorcycle accident. The accident occurred in April 2017. She underwent operation for orbital bone fracture in May 2017. There were complaints of headache, blurred vision, double vision, and pain 1 month after trauma. She was referred with diagnosis exotropia fixus et causa suspicious paretic of the nervous III. The corrected visual acuity at admission was 6/6 for the right eye and 6/8.5 for the left eye. Hirschberg test showed 30 degrees exotropia. The intraocular pressure was normal at the first visit. There was restriction in eye movement. The bruit was negative on first admission. Orbital Computed Tomography (CT) showed bilateral dilated and tortuous of the ophthalmic vein with suspicious of carotid cavernous fistula (CCF). Patient developed proptosis, redness on both eyes with corkscrew appearance, restriction of ocular movement, and bruit. The CT angiography revealed CCF bilateral type A. Patient underwent digital subtraction angiography (DSA) and balloon embolization in December 2017.

**Results:** The end result of this case was satisfying as the definitive diagnosis was established in short time and the size of the fistula was decreasing.

**Conclusions:** This case report highlighted a rare case of bilateral carotid cavernous. A proper and accurate examination will make a better outcome and prevent serious consequences.

**Poster No.: EX1-091**

**Panel No.: 091**

## A Unique Presentation of Atypical Optic Neuritis: Challenge in Diagnosis and Management

*First Author: Joshua LUMBANTOBING*

*Co-Author(s): Syntia NUSANTI, Emil SHAHREZA*

**Purpose:** To demonstrate a challenge in diagnosis of optic neuritis with unusual presentation of sectoral subretinal fluid on the optic nerve head.

**Methods:** Case report. A 25-year-old woman with the chief complaint of sudden visual loss of the right eye (RE), 1 week before hospital admission without any known risk factors. The only clinical supporting data was increased D-Dimer level that reached 1124 ng/mL. Relative afferent pupillary defect was found positive on RE, and fundus examination showed an optic nerve head edema with higher thickness in 1 sector (infero-temporal) and some dot-blot hemorrhage on the retinal background.

**Results:** Ocular coherence tomography (OCT) of optic nerve head showed an extreme increase of the retinal layer, and it was confirmed that the subretinal layer was filled with hypodense material (fluid). Intravitreal anti-VEGF as initial treatment was given to prevent further progression. Afterward, she underwent

examinations including brain MRI and peripheral blood test to find the underlying disease.

**Conclusions:** Optic neuritis with presence of subretinal fluid was uncommon. Theory proposed in 1938 suggests that the intermediary tissue of Kuhn may be disrupted by optic disc swelling and allows escape of peripapillary fluid. Similar case has been reported before, and it was successfully treated by single injection of anti-VEGF. Further evaluation is mandatory to find the underlying diseases.

**Poster No.: EX1-089**

**Panel No.: 089**

### **Bilateral Lagophthalmos of Borderline Tuberculoid Leprosy: A Case Report**

*First Author: Meera **MOHANAKUMAR***

*Co-Author(s): Debolina **DEB**, Ansu **JOHN**, Priyadharshini **PALANIYAPPAN**, Krishnima **RAGHU**, Saranya **DEVI K***

**Purpose:** A rare case report of bilateral facial nerve palsy with lagophthalmos and corneal damage secondary to corneal exposure in a long-standing patient with borderline tuberculoid leprosy was presented.

**Methods:** A 38-year-old male laborer presented with a sudden onset inability to close both eyes and epiphora of 1-month duration. He was a diagnosed case of BT leprosy, and had been receiving multi-drug therapy for the past year. On ocular examination, patient exhibited bilateral lagophthalmos with good Bell's phenomenon. The left cornea showed evidence of tropic ulcer secondary to exposure, actively taking up fluorescein stain. Corneal sensations were decreased in both eyes. Intraocular pressure recorded was normal and pupillary reactions were brisk. Systemic examination revealed a single hypopigmented patch over the nape of the neck and a trophic ulcer measuring 5 x 5 cm over the right heel.

**Results:** To rule out other underlying causes, the following blood investigations were done. Fasting and postprandial glycemic indices were normal. Serum ACE was also found to be within normal range. Serology for HIV, HBsAg, and HCV came as non-reactive. A combination of topical antibiotics and lubricants were ensued in view of exposure keratopathy. The MDT was continued with the addition of prednisolone in gradually tapering doses.

**Conclusions:** Though reported rarely, in endemic countries leprosy should be considered as an important cause of bilateral LMN facial paralysis. Screening of all the leprosy patients help in earlier identification of potentially sight-threatening lesions, which can be treated.

**Poster No.: EX1-090**

**Panel No.: 090**

### **Clinical Features of Nonarteritic Anterior Ischemic Optic Neuropathy Patients Attending the Neuro-Ophthalmology Department of a Tertiary Eye-Care Hospital in Bangladesh**

*First Author: Tanima **ROY***

**Purpose:** To draw an overview of clinical presentation of Nonarteritic Anterior Ischemic Optic Neuropathy (NAION).

**Methods:** This was a cross-sectional study among 101 patients with NAION, attended at neuro-ophthalmology department of a tertiary eye care hospital in Bangladesh from July 2017 to December 2017.

**Results:** The mean age of the patients was  $51.88 \pm 8.69$  years; 72 (71.28%) were males. Sudden painless unilateral vision loss (79.20%) was the most frequent symptom, followed by field defect (29.70%), commonly inferior (49.1%). Around 47% of patients presented with  $>6/60$  vision at the first visit, which increased to 59.4% after 6 months. On the contrary, 53% of patients presented with  $<6/60$  at presentation; notably, 15.8% of those patients' vision remained unchanged at the last visit. Diabetes mellitus ( $n = 53$ , 52%), hyperlipidemia ( $n = 44$ , 43.56%), systemic hypertension ( $n = 33$ , 32.3%), and smoking ( $n = 40$ , 39.60%) were found as common risk factors. Diabetic retinopathy found among 18 (17.82%) patients. Systemic methylprednisolone was administered in 27 patients; 17 (75%) of them were shown improvement by 2 lines or 1 meter. Erythropoietin was administered in 7 patients; 3 of them showed improvement in visual acuity. Anti-platelets therapy was given to all patients with vitamin supplements. Sequential NAION was found in 36 (35.64%) patients; 25 (24.75%) of them were diagnosed as bilateral sequential NAION at the first visit, whereas 11 (10.9%) patients developed subsequently over time.

**Conclusions:** NAION is an important cause of acute visual loss in adults. It is therefore worthwhile to report its risk factors and disease course for effective management.

**Poster No.: EX1-092**

**Panel No.: 092**

### **Efficacy of Adding Erythropoietin to Intravenous Methylprednisolone as a Treatment for Optic Neuritis: A Systematic Review**

*First Author: Nur **RAHMAWATI***

*Co-Author(s): Syntia **NUSANTI**, Nizma **PERMAISUARI**, Fabianto **SANTOSO***

**Purpose:** The objective of this systematic review

was to examine the existing literature comparing the safety and efficacy of adding recombinant human erythropoietin (rhEPO) to intravenous methylprednisolone for patients presenting with optic neuritis.

**Methods:** Literature searching was conducted using keywords and MeSH headings specifically chosen to identify published articles on Pubmed, Science Direct, ProQuest, EBSCO, JSTOR, and Cochrane. Articles included were full-text observational studies or randomized controlled trials in English. Animal studies were excluded. Outcomes measured in this study are visual acuity, perimetric variables, retinal nerve fiber layer (RNFL) thickness, optic nerve diameter, visual evoked potential (VEP) latencies and amplitudes, and also side effects of rhEPO.

**Results:** Eighty-nine articles were identified using optimized search parameters, and 2 articles (Class I) met all study criteria and need further assessment. One study showed significant perimetric variables improvement in 15 acute optic neuritis patients that received rhEPO as an adjuvant to intravenous methylprednisolone therapy. Other study also showed significant difference in RNFL and retrobulbar optic nerve diameter among 40 patients with optic neuritis. Latencies in VEP were also shorter in rhEPO group than in placebo group. After administration of rhEPO, no serious adverse events occurred in both studies.

**Conclusions:** Administration of rhEPO seems to be beneficial as a neuroprotective agent and might be a safe therapeutic option for the treatment of optic neuritis. This review indicates a need for standardized methods for evaluation to assess the efficacy of rhEPO in future clinical trials.

**Poster No.: EX1-093**

**Panel No.: 093**

### Endovascular Coiling Embolization in Direct Carotid-Cavernous Fistula: A Literature Review

*First Author: Yulika **HARNIZA***

*Co-Author(s): Syntia **NUSANTI**, Jacob **PANDELAKI***

**Purpose:** To discover the results of endovascular coiling embolization regarding the clinical symptoms, fistula closure, complications during and/or after procedure, long-term outcome, and duration of new clinical symptoms in the long-term outcome after the procedure.

**Methods:** Nine articles collected from multiple sources, including Pubmed, Clinical Key, and Ophthalmology Advance were reviewed. DCCF patients treated by endovascular coiling embolization with specified detail outcomes including symptoms alleviation, fistula closure, complications during and after procedure, and long-term outcome.

**Results:** Endovascular coiling embolization in DCCF

can improve the clinical symptoms at the rate of 88% and reached a complete fistula occlusion in 90% of the time, with duration of symptoms until elective procedure is a range between 5 to 12 months. There were no intraoperative complications. There were postoperative complications, such as unraveled micro-coil. The long-term outcomes are pseudoaneurysm, 6th nerve palsy, 3rd nerve palsy, and optic neuropathy. The recurrence fistula rate of 4% is common in fistulas with a larger tear associated with a larger cavernous sinus. These long-term outcomes happened in the range from 3 months to 5 years after the procedure.

**Conclusions:** Endovascular coiling embolization was proven to effectively occlude the fistula and alleviate the patient's symptoms. However, retreatment via various routes may be necessary in some patients because of residual or recurrent fistulas. This action must be taken carefully to prevent intra or postoperative complications. Several studies have reported long-term outcomes such as pseudoaneurysm, 6th nerve palsy, 3rd nerve palsy, and optic neuropathy.

**Poster No.: EX1-085**

**Panel No.: 085**

### Nasopharyngeal Carcinoma Presenting with Sudden Vision Loss

*First Author: Melita **DJAJA***

**Purpose:** To report a case of nasopharyngeal carcinoma in a 27-year-old female who initially presented with sudden visual loss.

**Methods:** A case report.

**Results:** A 27-year-old-female complained of sudden blurred vision on her right eye at the onset of 2 weeks before presentation. Mild pain was felt with eye movement. No history of headache, nausea, nosebleed, anosmia, or tinnitus. Her visual acuity for right and left eye was light perception and 6/6 respectively. Right eye's anterior segment within normal limit with RAPD. Optic nerve of the right eye was slightly pale with distinct margin. Ocular motility was free. Visual field exam revealed minimal temporal and nasal remnant. She was diagnosed as optic neuritis and treated with pulsed iv steroid. Her vision was not getting better, thus head CT scan was ordered. CT showed nasopharyngeal mass extended to paranasal sinuses, intraorbita, with bilateral cervical lymphadenopathy. Biopsy by ENT Department showed undifferentiated carcinoma WHO type III. Patient planned for radiotherapy and systemic chemotherapy.

**Conclusions:** Sudden vision loss might be the first and the only manifestation of nasopharyngeal carcinoma, and therefore should be considered as differential diagnosis.

Poster No.: EX1-084

Panel No.: 084

### Ophthalmic Manifestation of Vein of Galen Malformation: A Rare Presentation

First Author: Priyadharshini **PALANIYAPPAN**

Co-Author(s): Debolina **DEB**, Mary Santhosh **JOSEPH**, Ansu **JOHN**, Santhosh **JOSEPH**, Baghya **LAKSHMI**

**Purpose:** A case report of VOGM with papilledema, seizures, and hydrocephalus treated by embolisation of left posterior choroidal artery by supraselective catheterization, resulting in fistula obliteration and leading to resolution of complications and normal development of the child.

**Methods:** Interventional case report. VOGM is a rare congenital, embryologic malformation involving great cerebral vein of Galen, which result from the failure of regression of median procencephalic vein with venous outflow obstruction at the transverse or sigmoid sinus. Presentation is intractable cardiac failure at the time of birth. If baby survives infancy, then enlarging head, seizures, and delayed milestones are seen. If left untreated, it results in mental retardation and hydrocephalus. Rupture of VOG resulting in subarachnoid hemorrhage may be seen in adults. An 11-month-old child with global developmental delay born to a 2nd degree consanguinity with delayed milestones had multiple episodes of seizures in the last month. Clinical examination revealed enlarged head. Ophthalmic evaluation showed equally reacting pupils. Right eye fundus was normal, and left eye showed papilledema. CT of brain revealed dilated supratentorial ventricles. Digital subtraction angiography (DSA) revealed mural VOGM with single fistula from posterior choroidal artery.

**Results:** Supraselective catheterization of left posterior choroidal artery and fistula leading to VOGM was embolized, resulting in total obliteration of the fistula. The child did well post-procedure. Papilledema and systemic problems regressed after 2 months following procedure.

**Conclusions:** Ophthalmic manifestations of VOGM include Parinaud's syndrome. This child presented with delayed milestones, seizures, and fundus showed papilledema which is an unusual manifestation in an 11-month-old baby. VOGM can be effectively managed through endovascular route, resulting in resolution of ICP and normal development.

Poster No.: EX1-086

Panel No.: 086

### Proptosis in Cavernous Sinus Thrombosis Masquerading as Orbital Cellulitis

First Author: Ni Luh **NATALIA**

Co-Author(s): Juliari I **GUSTI AYU MADE**, Ia Sri **INDRAYANI**, Anak Agung Mas **TRININGRAT**, Kumara **TINI**

**Purpose:** To be aware of the basic presentation and initial management for cavernous sinus thrombosis.

**Methods:** A case reporting 34-year-old male diagnosed with cavernous sinus thrombosis and was given 3 months of anticoagulation therapy.

**Results:** A 34-year-old male patient complaining of redness, swelling, and pain on his left eye (LE) since 3 days earlier, double vision, and headache without history of head trauma. Visual acuity of the right eye (RE) and LE was 6/6 and 6/30. Left eye showed proptosis, palpebral edema without hyperemic, ptosis, conjunctival chemosis, ophthalmoplegia, and high intraocular pressure (IOP). Laboratory examination showed high concentration of D-Dimer (0.67 µg/mL) and CT scan indicated venous attenuation along of middle fosa, enhancement of cavernous sinus, and no evidence of orbital cellulitis. Cerebral digital subtraction angiography (DSA) showed left cavernous sinus thrombosis with vein rerouting to cortical vein (frontal and parietal vein) and vein of labbe with no cortical venous reflux. The patient was given topical timolol 0.5% twice daily, and from neurology department was given enoxaparin 90 mg every 12 hours subcutaneously for 5 days, acetosal 80 mg/day intraoral, followed by dabigatran 150 mg/day intraoral. After 3 months of therapy, the visual acuity improved, and he recovered with no sequelae.

**Conclusions:** Cavernous sinus thrombosis (CST) is rare but potentially causes permanent blindness. The ophthalmologist must be aware with the ocular presentation of CST, and can differentiate this abnormality with orbital cellulitis. Long-term anticoagulation therapy gives good results for this patient.

Poster No.: EX1-083

Panel No.: 083

### Visual Acuity Recovery in Bilateral Optic Neuritis and Epileptic Seizure Associated with Japanese Encephalitis Vaccination

First Author: Luh **MAHARANI**

Co-Author(s): Ign **SUWARBA**, Anak Agung Mas **TRININGRAT**, Dian **MEGA**

**Purpose:** To increase awareness of adverse effect on ocular manifestation, neurological problems, and the prompt treatment of optic neuritis-associated vaccination.

**Methods:** A case report of 15-year-old boy diagnosed with bilateral optic neuritis and epileptic seizure associated Japanese encephalitis vaccination (JE vaccination).

**Results:** A 15-year-old boy presented with blurry vision on his left eye (LE) 5 days before admission, continued with decreasing in visual acuity (VA) on the right eye (RE) and pain on eye movement (RE 1/60, LE light perception bad projection). He previously got JE vaccination 2 months ago and had seizure 1 week after vaccination. He got fever before his VA was decreased. No history of other immunization in 3 months. Ocular examination demonstrated bilateral optic disc swelling. Head CT scan within normal limits, EEG shows intermittent slow activity. Patient was diagnosed with epilepsy and got carbamazepin 2x265 mg with titration dose from pediatric department. No seizure attack was reported until now. Patient had optic neuritis treatment trial 4x250 mg methylprednisolone for 3 days, his VA was significantly improved (RE 6/6, LE 6/18).

**Conclusions:** JE vaccination probably gives adverse reaction to vaccine components, and this patient shows hypersensitive reaction thus resulted in optic disc swelling and the occurrence of seizures could be mediated by the immune system. Inflammation in optic nerve could be manifested in blurry vision and pain on eye movement. Visual acuity was getting better and no seizure attacks have been reported after treatment.

## Ocular Imaging

**Poster No.: EX1-100**

**Panel No.: 100**

### 3 Cases of Taxane-Induced Macular Edema: Multimodal Imaging and Treatment Outcomes

*First Author: Joel PEREZ*

*Co-Author(s): Kb FREUND, Anna TAN, Maiko INOUE*

**Purpose:** To present multi-modal imaging and treatment outcomes of 3 cases of cystoid macular edema (CME) secondary to systemic taxanes.

**Methods:** This was a retrospective, interventional, multicenter case series of 3 patients who complained of visual disturbances after receiving chemotherapeutic treatment for metastatic carcinoma.

**Results:** A 57-year-old woman (patient 1), a 56-year old woman (patient 2), and a 58-year old woman (patient 3) undergoing docetaxel and paclitaxel chemotherapy for metastatic carcinoma presented with bilateral blurring of vision. Optical coherence tomography (OCT) revealed bilateral intra-retinal cystoid changes. Three months after discontinuation of docetaxel treatment, Patient 1 showed marked improvement of CME as shown by OCT, with improved VA from 20/100 in both

eyes to 20/50 in the right eye and 20/40 in the left eye. Patient 2 was started on topical ketorolac and dorzolamide on both eyes, received 2 more cycles of paclitaxel chemotherapy and 5 weeks later, CME was slightly improved in both eyes with VA unchanged in the right eye, and improved in the left eye from 20/80 to 20/60. In patient 3, substantial reduction in CME was noted 5 weeks after discontinuation of paclitaxel. VA in the right eye and left eye improved from 20/25 to 20/20 and 20/70 to 20/25, respectively.

**Conclusions:** CME secondary to systemic taxanes may result in significant vision loss and cessation of taxanes, and mostly results in spontaneous improvement of CME and visual recovery. Topical ketorolac and dorzolamide may be effective to reduce CME in cases where taxane chemotherapy may not be discontinued.

**Poster No.: EX1-099**

**Panel No.: 099**

### A Novel Technique to Assess Severity of Diabetic Retinopathy Using Optical Coherence Tomography Angiography

*First Author: Li KELVIN*

*Co-Author(s): Colin TAN, Darren WONG*

**Purpose:** Diabetic retinopathy (DR) is a leading cause of blindness worldwide. The severity of DR has conventionally been graded based on clinical signs only. Optical coherence tomography angiography (OCTA), a noninvasive imaging device, delivers high resolution imaging of the retinal microvasculature in vivo. We aimed to correlate the retinal vasculature parameters seen on OCTA with the clinical severity of DR.

**Methods:** A prospective cohort study involving 82 diabetics with mild to severe non-proliferative diabetic retinopathy (NPDR) were compared against 20 healthy controls. The foveal avascular zone (FAZ) and vessel densities (VD) were measured for both superficial and deep capillary plexus and correlated with the severity of DR.

**Results:** Mean FAZ sizes were significantly larger in patients with DR compared to controls ( $0.47 \text{ mm}^2$  vs  $0.28 \text{ mm}^2$ ,  $P < 0.01$ ). In those with DR, mean FAZ size increases with severity of DR. (mild-  $0.36 \text{ mm}^2$  vs moderate-  $0.52 \text{ mm}^2$  vs severe-  $0.56 \text{ mm}^2$ ,  $P < 0.05$ ). Vessel densities were lower in patients with DR compared to controls ( $44.2$  vs  $51.3 \text{ mm}^3$ ,  $P < 0.001$ ). The vessel densities were also progressively lower with worsening severity of DR (mild-  $46.5$  vs moderate-  $43.9$  vs severe-  $40.9$ ,  $P < 0.005$ ). These 2 parameters have high diagnostic abilities when compared to standard color-fundus grading (ROC curves: Mean FAZ –  $0.73$ , VD-  $0.76$ ).

**Conclusions:** Retinal microvascular parameters measured on OCTA varies with the degree of severity of DR. This ability to differentiate DR severity is important in the clinical evaluation of DR. OCTA derived

parameters may potentially be useful in the field of DR screening through telemedicine.

**Poster No.: EX1-097**

**Panel No.: 097**

### **A Tale of 2 3D-Printed Smartphone Fundus Cameras: How to Make and Use Them**

*First Author: John **AKKARA***

*Co-Author(s): Davis **AKKARA**, Ethamma **DAVIS**, Anju **KURIAKOSE**, Prasanth **GIREESH***

**Purpose:** To evaluate the difficulty of making and using 2 different 3D printed smartphone fundus cameras. To obtain smartphone fundus images using these attachments and evaluate the image quality.

**Methods:** Stereolithography (STL) files for 2 different 3D-printed fundus cameras were obtained, 1 freely available online and 1 directly from an ophthalmologist who designed it. These were printed by the investigators on 3D-printer Ultimaker 3 using material PolyLacticAcid (PLA). The parts were assembled according to instructions and a 20D lens was fixed as specified. The ease of printing and assembling was noted. These were used with standard smartphones to take fundus photographs of dilated patients. Photos were evaluated and compared, and the learning curve involved in taking photos was noted. Photos were also compared with HopeScope smartphone fundus adapter and conventional fundus camera.

**Results:** 3D printing of pre-designed parts from computer files was relatively easy to do even for a beginner with minimal guidance. Designing the parts required more training and skill. Assembly of the parts was also relatively easy but required metal nuts and bolts, and also an additional smartphone holder part for one of the adapters. Once the extra materials were sourced and fitted, fundus photos were taken using these devices. The first device clipped on to the screen of the smartphone and was slightly more cumbersome to handle compared to the second which held onto the sides of the smartphone. Both took similar fundus photos.

**Conclusions:** Low-cost 3D-printed smartphone fundus cameras are excellent for affordable mydriatic fundus photography for clinicians, especially at bedside.

**Poster No.: EX1-101**

**Panel No.: 101**

### **Choroidal Thickness Measurements Using Enhanced Depth Imaging on Optical Coherence Tomography in Retinal Vein Occlusion**

*First Author: Chintan **DESAI***

*Co-Author(s): Manabjyoti **BARMAN**, Diva **MISRA**, Ronel **SOIBAM**, Awaneesh **UPADHYAY**, Hemlata **DEKA***

**Purpose:** To evaluate and compare choroidal

thickness in eyes with retinal vein occlusion (RVO) using enhanced depth imaging in optical coherence tomography (EDI- OCT), treated with either intravitreal injection Bevacizumab (BZB), Ranibizumab (RZB), or Dexamethasone (DEX) implant before and after treatment.

**Methods:** Fifty-one eyes of 51 patients with unilateral RVO were evaluated. Only treatment-naïve eyes were included in the study. Patients were excluded if they had other ocular disease, in absence of macular edema or duration of symptoms longer than 3 months. Twenty-seven patients had Branch RVO, while 24 eyes had Central RVO. The patients were randomized into 3 groups based on the intravitreal agent used for treatment of macular edema. Using EDI on spectral domain OCT (SD-OCT), central macular thickness (CMT) and subfoveal choroidal thickness (SFCT) were measured once at baseline and then at each monthly follow-up visit till 4 months. We evaluated the change in MCT and SFCT pre- and post-treatment in each group and also made comparisons between the 3 groups at each visit.

**Results:** The baseline MCT and SCT in RVO eyes was  $526.7 \pm 108.4 \mu\text{m}$  and  $296.7 \pm 78.4 \mu\text{m}$ , respectively. Improvement in both MCT and SFCT post-treatment was noted in all treatment groups with a P value of 0.015, 0.012, and 0.004 for BZB, RZB, and DEX respectively. Treatment with dexamethasone implant revealed a greater reduction in SFCT as compared to BZB (0.03) and RZB (0.04).

**Conclusions:** SFCT in treatment-naïve RVO patients improved significantly post-treatment with intravitreal agents, with the most improvement seen with the dexamethasone implant.

**Poster No.: EX1-096**

**Panel No.: 096**

### **Comparison of Accuracy of Measured Values in Sitting Position OCT and Supine Position OCT Under General Anesthesia in the Same Child**

*First Author: Kinei **RA***

**Purpose:** Reproducibility becomes a problem in optical coherence tomography (OCT) examinations, but it has not been studied in children. We reported on comparative examination of supine positional non-fixation scan under general anesthesia and the preoperative fixation target sitting scan for the same strabismus patient.

**Methods:** Total of 50 strabismic day surgery patients, aged 5 years old to 12 years old. Same mode measurement under the sitting fixation target and under general anesthesia without the fixation target were done. 1. Ganglion Cell Complex (GCC) scan 2. Macular MAP analysis 3. RLF scan of glaucoma ONH 4. Corneal pachymetry analysis 5. Angle analysis

We compared and studied with  $P < 0.001$ . Pearson correlation coefficient and both results with a scatter diagram. Handheld SD-OCT (Optovue, iVue, Los Angel) with supine fix stand was used.

**Results:** 1. Frequency of equivalent measurements obtained during sitting position and supine position of the same person was within 10%. 2. In the accuracy test ( $P < 0.001$ ) of measured values in the same person's sitting position and supine position measurement mode, each measurement parameter was significantly correlated between sitting position and supine position. Correlation coefficients ranged from 0.99 to 0.96 in PACHY, MAP, GCC, RNFL. however, ANGLE was 0.77.

**Conclusions:** Reliability is high in the sitting position of the same child and OCT measurement under supine position. The difference between the scan modes may be the presence or absence of fixation with respect to the fixation target and the difference due to supine focusing.

**Poster No.:** EX1-095

**Panel No.:** 095

### Comparison of Repeatability of Swept-Source and Spectral-Domain Optical Coherence Tomography for Measuring Inner Retinal Thickness in Retinal Disease

*First Author:* So Jung **RYU**

*Co-Author(s):* Hee Yoon **CHO**, Eun Hee **HONG**, Yong Un **SHIN**

**Purpose:** To compare repeatability between SS-OCT and SD-OCT for measurement of macular, macular retinal nerve fiber (mRNFL), and ganglion cell-inner plexiform layer (GC-IPL) thickness in various retinal diseases.

**Methods:** A total of 114 eyes of 74 subjects were investigated prospectively. Seventy-eight eyes with retinal disease and 36 normal eyes underwent 2 consecutive measurements of macular, mRNFL, and GC-IPL thickness using SS-OCT and SD-OCT. The data were obtained using the Early Treatment Diabetic Retinopathy Study (ETDRS) style. The eyes with retinal diseases were divided into 3 subgroups according to central macular thickness (CMT) for analysis. The intraclass correlation coefficient (ICC) was calculated to determine the repeatability of OCT device.

**Results:** In normal eyes, both OCT devices showed excellent repeatability of macula, mRNFL, and GC-IPL thickness measurements with high ICCs in all ETDRS subfields. In eyes with retinal disease, although SS-OCT showed better repeatability for inner retinal thickness measurements than SD-OCT, the overall ICCs were lower than those in normal eyes. In subgroup analysis, the ICCs in the low CMT group were lower than those in the normal and high CMT groups, particularly when using SD-OCT.

**Conclusions:** Both OCT devices had comparable repeatability for retinal thickness measurement in normal eyes and eyes with retinal disease. However, the possibility of measurement error should be considered in eyes with a thin and atrophic retina.

**Poster No.:** EX1-098

**Panel No.:** 098

### Enabling Choroidal Neovascularization to be Visible: OCT Angiography Imaging of Neovascular AMD

*First Author:* Paul **MITCHELL**

*Co-Author(s):* Gemmy Chui Ming **CHEUNG**, Gerald **LIEW**, Tien-Yin **WONG**

**Purpose:** To determine visibility and characteristics of choroidal neovascular membranes (CNV) using OCT angiography (OCTa) in neovascular AMD (nAMD) patients, including those with polypoidal choroidal vasculopathy (PCV) variant.

**Methods:** Over 6 months, 280 consecutive nAMD cases seen at Sydney West Retina had macular OCT angiography performed (Zeiss Plex-Elite 9000): including 51 treatment-naïve and 229 previously treated subjects. En-face OCTa, segmented to image outer retina/choriocapillaris levels were assessed for visibility of choroidal neovascular (CNV) fronds, apparent source and size of frond. Presence of subclinical CNV in asymptomatic eyes (or with shallow asymptomatic PED's) was assessed.

**Results:** In 221/280 subjects, CNV was visible on OCTa (79%) in at least 1 eye. Principal causes for non-visibility included geographic atrophy obscuring CNV, RPE tear, large RPE detachment, and movement artefact. Visible CNV size ranged from 0.2 disc areas (DA) to  $>5$  DA, averaging 1.6 DA. The most frequent CNV appearance was a 'tree', then 'bush', 'Medusa', and 'net' patterns. Some fronds were extremely extensive, often in patients with good VA, suggesting incorporation into macular perfusion, and particularly well shown in fluorescein-defined Type I ('occult' CNV). Greater than 50% of CNVs appeared to arise nasal to the fovea; most fronds did not cross central fovea. In 13/98 (13.3%) subjects with unilateral nAMD who were asymptomatic without sub- or intraretinal fluid in the fellow eye, OCTa revealed subclinical CNV.

**Conclusions:** OCTa provides unparalleled visibility of CNV membranes in a noninvasive, easily repeatable technique. OCTa can assess presence, risk, development, course, and response to treatment for nAMD (including PCV), representing a major advance.

Poster No.: EX1-094

Panel No.: 094

### Innovative Use of Android App to Measure Lesions on Slitlamp, Fundus, and Gross Ophthalmic Smartphone Photographs

First Author: John **AKKARA**

Co-Author(s): Davis **AKKARA**, Ethamma **DAVIS**, Anju **KURIAKOSE**

**Purpose:** To measure lengths, areas, and angles of various ocular lesions using a smartphone app on previously taken, unmarked slit lamp, fundus, and gross ophthalmic photos.

**Methods:** Smartphone slit lamp images including corneal/conjunctival lesions and 90D fundus images were captured using an Android smartphone and a low-cost slit lamp adapter by the investigators. Smartphone fundus images were also captured using a 3D printed smartphone adapter and also some fundus images using Hopescope smartphone fundus adapter. In addition, frontal and side profile smartphone images were captured of patients with ptosis and proptosis. Some other ophthalmic images were taken using conventional slit lamp cameras, and fundus cameras were also obtained. The app, designed for architecture, was used in a unique way to analyze these smartphone images. The conventional software used for image analysis, ImageJ, was also used on the same photographs to evaluate the advantages and disadvantages over the smartphone app.

**Results:** The innovative smartphone app used was easy to learn and use, and we obtained fairly accurate measurements from simple photographs. There was no significant difference from measurements obtained by the conventional image processing software ImageJ on a computer. We measured lengths, angles, and areas of various corneal/conjunctival lesions using the app on a standard Android smartphone. We also measured optic disc cupping and macular hole diameter in fundus photographs. In addition, ptosis and proptosis measurements were done in frontal and side profile photographs.

**Conclusions:** Affordable smartphone imaging and image analysis can be done on a smartphone which is comparable to conventional high-end imaging and software like ImageJ.

## Ocular Oncology & Pathology

Poster No.: EX1-113

Panel No.: 113

### A Mysterious Case of Transient Proptosis: A Rare Case Report

First Author: Debolina **DEB**

Co-Author(s): Aravind **BABU**, Priyadharshini **PALANIYAPPAN**, Suhas **PRABHAKAR**, M **RADHAKRISHNAN**, Krishnima **RAGHU**

**Purpose:** Early detection and prompt treatment for orbital schwannoma, to prevent severe complications.

**Methods:** A 42-year-old Indian lady presented with right eye swelling for 5 years. The swelling subsided and reappeared 15 days back. The patient was initially treated conservatively as a pseudotumor. Three years back, CECT right orbit revealed right intraorbital lesion, suspecting optic nerve glioma. MRI orbit revealed lobulated intraconal lesion in supero-medial aspect of right orbit, adherent to the optic nerve, suspecting cavernous hemangioma or SOL. She had been taking homeopathic medications for 1 year and stopped 15 days ago, following which the swelling reappeared. On examination, right eye distance and color vision reduced; eccentric proptosis; positive retropulsion; restricted elevation; pupils reacting to light; fundus examination revealed hyperaemic disc with disc edema and intrachoroidal membrane folds. Left eye anterior segment and fundus was normal.

**Results:** Repeat CT brain revealed a large heterogenous lobulated cystic lesion in the supero-medial aspect, displacing superior rectus laterally and medial rectus inferiorly, and no lesions in the brain. MRI orbit revealed a right, intraconal, multiloculated lesion, adherent to optic nerve. Patient underwent right transeptal antero-medial orbitotomy. Intraoperatively, 2 masses were excised and sent for histopathological examination. The final diagnosis of right eye orbital schwannoma was made after receiving the histopathological reports that showed benign spindle cell lesion with classic verocay bodies.

**Conclusions:** Rare orbital tumors, like schwannomas, are a diagnostic challenge for ophthalmologists due to their variable presentations and locations. It should be kept as a differential diagnosis for all progressive orbital masses and promptly managed.

**Poster No.: EX1-115**

**Panel No.: 115**

## A Rare Case of Orbital Schwannoma in a 14-Year-Old Boy

*First Author: Patricia Ann LEE*

*Co-Author(s): Jo Anne HERNANDEZ-TAN, Aprille June RAPISTA, Alex SUA*

**Purpose:** To describe a rare case of orbital schwannoma in a 14-year-old male.

**Methods:** Case report.

**Results:** A 14-year-old male presented with a 4-year history of painless progressive swelling of the left upper lid. Physical examination revealed a soft tissue mass with indistinct borders and no signs of inflammation. Best corrected visual acuity (BCVA) was 20/25 for both eyes. Ocular examination was otherwise normal. Systemic examination revealed no other lesions or abnormalities. Blood work-up was within normal limits. Orbital Magnetic Resonance Imaging (MRI) revealed a soft tissue mass with irregular margins involving the lacrimal gland and the superolateral periorbital soft tissue, causing medial displacement of the left globe. Incision biopsy was subsequently done, which revealed 2 rubbery masses with indistinct margins that were adherent to the orbicularis oculi, orbital septum, orbital fat, and lacrimal gland. Histopathologic examination revealed an orbital schwannoma, which exhibited strong and diffuse S-100 protein positivity by immunohistochemistry.

**Conclusions:** Orbital schwannomas are rare, slowly progressive, benign peripheral nerve sheath tumors that comprise only 1% of orbital tumors. While the clinical presentation for orbital schwannomas is varied, they usually present unilaterally with proptosis, exophthalmos, and restriction of ocular motility in the second to the fifth decades of life. Although this patient is young and presented only with painless, progressive eyelid swelling, orbital schwannoma remains an important differential diagnosis for slow-growing orbital tumors in all ages due to the sequelae associated with progressive enlargement, intracranial extension, and malignant transformation.

**Poster No.: EX1-106**

**Panel No.: 106**

## Analysis of Cellular and Molecular Features of Primary Retinoblastoma Cells

*First Author: Huan MA*

*Co-Author(s): Ying CHEN, Yang GAO, Rong LU, Cong NIE, Zhixin TANG*

**Purpose:** Retinoblastoma (RB) is the most common primary intraocular tumor of childhood. The spread of tumor cells is a valuable prognostic factor, yet the underlying mechanism of pathogenesis remains unclear. It is essential to understand cellular and

molecular features of RB cells.

**Methods:** Primary RB cells harvested from ophthalmectomy were cultivated in serum-free DMEM/F12. Cell morphology and proliferation pattern were observed. Phenotypic traits of retinal-development related biomarkers (CD133, OCT4, Nestin, GFAP, MAP2, and Recoverin) were investigated. Tumorigenicity was assessed by intraocular xenograft of primary or cell-lines cells into eyes of BALB/c nu/nu mice. RB cell-lines, Y79 and Weri-RB1, were cultured under the same condition and used as reference groups.

**Results:** The optimized growth of primary RB cells exhibited primitive and stem-like presentation. Results from qRT-PCR, flow cytometry, and immunocytochemistry emphasized precursor-like phenotypes in primary cells by demonstrating high expression levels of stem-cell markers (CD133, Nestin and OCT4). Following intraocular xenograft, tumorigenicity induced by primary cells was rapidly initiated in 10 days, and the growth of tumor ceased by D28. In contrast, the onset of tumorigenesis by Y79 or Weri-Rb1 was mild, however the tumor growth was exceedingly aggressive once initiated.

**Conclusions:** Cultured primary RB cells exhibit stem- and precursor-like features, and they may be the best representing model for in vitro studies of retinoblastoma. Yet, in vivo experiments with primary cells was limited due to unsustainable cell growth. RB cell-lines, for their steadiness in in vivo proliferation, could be the most suitable substituent model for establishing animal studies.

**Poster No.: EX1-114**

**Panel No.: 114**

## Efficacy and Safety Outcome Comparison of Endoresection and Proton Beam Therapy as Primary Treatment for Choroidal Melanoma

*First Author: Kurnia DENISA*

*Co-Author(s): Neni ANGGRAINI*

**Purpose:** To evaluate and compare the efficacy and safety between endoresection and proton beam radiotherapy, as primary treatment in choroidal melanoma.

**Methods:** Articles that were published from 2008 to 2018 were collected from multiple sources including Pubmed, Clinical Key, and Ophthalmology Advance. All studies that complied with the inclusion and exclusion criteria were categorized based on level of evidence Oxford Center for Evidence-based Medicine Levels of Evidence. Primary outcome is secondary enucleation. Secondary outcomes are metastasis, recurrence, death, visual outcomes, and complications.

**Results:** Twelve articles were eligible to be reviewed. Mean secondary enucleation, metastasis, and death rate was lower in endoresection group (6.29% vs 12.94%; 8.00% vs 20.85%; 6.86% vs 20.43), while

recurrence rate was lower in proton beam group (4.78% vs 6.86%). The most common complication that observed is retinal detachment. Other complications that were reported included cataract formation, radiation retinopathy, neovascular glaucoma, vitreous hemorrhage, elevated intraocular pressure (IOP), iris neovascularization, and optic neuropathy.

**Conclusions:** Endoresection as primary treatment for choroidal melanoma shows better efficacy compared to proton beam therapy, regarding the ability to preserve the eyeball. The safety between endoresection and proton beam therapy, both therapies show similar results.

**Poster No.: EX1-107**

**Panel No.: 107**

### Exenteration Following an Internal Carotid Artery Ligation in Cavernous Hemangioma: A Case Report

*First Author: Melvina SANDRA*

*Co-Author(s): Banu DIBYASAKTI, Wiryawan MANUSUBROTO, Agus SUPARTOTO, Purjanto UTOMO*

**Purpose:** Uncontrolled bleeding during the surgery of cavernous hemangioma is the most feared complication. Herein, we reported an exenteration following an internal carotid artery ligation, a rare procedure to prevent uncontrolled bleeding in cavernous hemangioma case.

**Methods:** A descriptive study: A 38-year-old female presented with slowly progressive and painless proptosis of her right eye since 2 years ago.

**Results:** Visual acuity of the right eye was hand movement with subconjunctival bleeding and hazy cornea. CT scan of the right eye showed amorphous and firmly defined retrobulbar mass with the size 3.6 x 3.2 x 3.7 cm. Arteriography showed right hypervascular retrobulbar mass with feeding vessel derived from the right external and internal carotid artery, suggesting hemangiosarcoma. The patient underwent ligation of the internal carotid artery performed by neurosurgeon to prevent uncontrolled bleeding intraoperative. On the following day, we performed a successful partial exenteration without significant blood loss. The histopathology revealed a cavernous hemangioma with no sign of malignancy.

**Conclusions:** Tumor removal of cavernous hemangioma can lead to massive bleeding during the surgery. The proper preoperative plan, such as ligation of internal carotid artery, is necessary to control the bleeding during the surgery.

**Poster No.: EX1-117**

**Panel No.: 117**

### Involution of Endophytic Optic Nerve Head Angioma with a Single Session of Photodynamic Therapy

*First Author: Pritam BAWANKAR*

*Co-Author(s): Pushkar DHIR, Diva MISRA, Preetam SAWANT, Awaneesh UPADHYAY*

**Purpose:** We reported a rare case of unilateral endophytic optic disc angioma with serous macular detachment and exudation who was successfully treated with photodynamic treatment (PDT).

**Methods:** A retrospective case report.

**Results:** A 17-year-old male was referred to us for evaluation and management of an unusual optic disc lesion in his right eye (RE). He had gradual progressive diminution of vision in RE for 2 months. Best corrected visual acuity (BCVA) in RE was 20/200 and 20/20 in the left eye. Anterior segment examination was unremarkable in both the eyes. Fundus examination of RE revealed an elevated, reddish lesion on the optic disc with hard exudate and subretinal fluid extending superonasally from the optic disc into the macula. Fluorescein angiography in RE showed progressive hyperfluorescence and late leakage from the lesion. Optical coherence tomography (OCT) of RE revealed serous macular detachment. The left fundus was normal. We decided to treat angioma with PDT. The tumor regressed during the first 4 months, but the plaques of hard exudate surrounding the optic disc impinged on the fovea. At the last control visit, after 1 year, angioma further regressed in size with a resolution of hard exudates. OCT revealed normal foveal contour in RE. BCVA in RE improved to 20/80.

**Conclusions:** PDT over a hemangioma on the optic nerve head allowed preservation of some visual function; this strategy can be considered a therapeutic option for tumors in this location.

**Poster No.: EX1-108**

**Panel No.: 108**

### Iris Metastasis from Primary Squamous Cell Carcinoma of the Esophagus: A Case Report

*First Author: Krati GUPTA*

*Co-Author(s): Dipankar DAS, Saurabh DESHMUKH, Henal JAVERI, Diva MISRA*

**Purpose:** To report a rare case of iris metastasis from primary squamous cell carcinoma of the esophagus.

**Methods:** Case report with complete photo documentation of all procedures and investigations including histopathology and immunohistochemistry.

**Results:** In the present report, a rare case of metastatic iris tumor resulting from esophageal squamous cell carcinoma was discussed. A 45-year-old male

presented with complaints of redness, pain, and diminution of vision in the right eye for 3 months. He was an endoscopic biopsy proven case of esophageal carcinoma and underwent chemotherapy and radiotherapy. Examination of right eye showed iris Mets. Patient underwent B-scan, UBM, MRI brain and orbit. Increase in size of lesion was noted on subsequent visits. He underwent enucleation.

**Conclusions:** To the best of our knowledge, this is the first reported case of esophageal squamous cell carcinoma metastasizing to the iris in India with complete photo documentation of all procedures and investigations including histopathology and immunohistochemistry.

**Poster No.: EX1-104**  
**Panel No.: 104**

### Management and Outcome of Extensive Periocular Basal Cell Carcinoma: A 5-Year Case Series

*First Author: Syeed KADIR*  
*Co-Author(s): Nilutparna DEORI, Rajendra MAURYA, Mahendra Kumar Singh SINGH, Virendra P SINGH, Tanmay SRIVASTAV*

**Purpose:** To report the clinical profile, management, and outcome of extensive periocular basal cell carcinoma in a teaching hospital of Northern India.

**Methods:** This was a prospective, interventional case series studied over a 5-year period. All patients were evaluated by history and a detailed clinical examination including tumor location, size, pattern of lesion, metastasis, and staging of tumor. Histopathological differentiation and radio-imaging characteristics were noted. Patients were treated either by primary surgical excision or using neoadjuvant chemotherapy followed by surgery. Drug toxicity, response of treatment, and recurrence were assessed.

**Results:** Twenty-two cases were studied. Age ranged from 18 - 84 years. Eleven were male. The duration of lesion ranged from 5 months to 2 years. Two young patients had xeroderma pigmentosa. The predominant tumor site was lower eyelid in 4, medial canthus in 5, both eyelids in 3, and upper eyelid and periocular area in 5 cases each. Four patients had multiple lesions, and 3 cases were complicated by myiasis and leading to orbital invasion. One case had involvement of maxillary sinus and nose. Twelve cases were managed by primary surgical excision with lid reconstruction, and 6 patients underwent cis-platinum based neoadjuvant chemotherapy followed by surgical excision and reconstruction. Exenteration was done in 4 cases. Recurrences were observed in 5 cases, which was further managed by excision and radiotherapy.

**Conclusions:** Management of extensive BCC is challenging. Myiasis can aggravate the condition. Multimodal treatment can help in achieving good

surgical outcomes and minimal recurrence in extensive basal cell carcinoma of eyelid and periocular area.

**Poster No.: EX1-110**  
**Panel No.: 110**

### Myeloid Sarcoma Masquerading as Neuroblastoma

*First Author: Dhashani SIVARATNAM*  
*Co-Author(s): Siew Moi CHING, Navin Kumar DEVARAJ, Siti Amirah HASSAN, Hoi Teh KOK, A.r ROSNIZA*

**Purpose:** We reported a case of a child with bilateral proptosis and a pelvic mass due to MS de novo. It is important for clinicians to know that bilateral orbital lesions in children strongly suggest a metastatic malignant lesion and prompt systemic workup is indicated to identify a primary tumor.

**Methods:** Myeloid sarcoma (MS) is an uncommon malignancy, and its diagnosis is equivocal to acute myeloid leukemia (AML). In rare circumstances, MS may present without AML, as MS de novo. We reported the case of a 10-month-old girl with synchronous MS de novo. She was misdiagnosed with neuroblastoma when she presented with bilateral proptosis and a mass in the pelvis. Neuroblastoma is the most common extracranial solid tumor seen in children, and one of the classical signs seen is bilateral proptosis. Histopathologically, both MS and neuroblastoma present ambiguously as small blue round cell tumors (SBRCT). Immunohistochemistry (IHC) examination may be used to identify MS, but a high index of suspicion is required by the pathologist to screen for these biomarkers and also interpret it correctly.

**Results:** Prompt management of this malignancy will avert the development of life-threatening AML. Our patient remains in clinical remission 2 years from diagnosis, with no relapse or progress to AML due to prompt diagnosis and antileukemic treatment.

**Conclusions:** This case highlights the importance of considering MS as a differential diagnosis of multifocal tumors involving the orbit.

**Poster No.: EX1-103**  
**Panel No.: 103**

### Outcomes of Intravitreal Melphalan for Vitreous Seeding Resistant to Systemic Chemotherapy or Intra-Arterial Chemotherapy in Retinoblastoma

*First Author: Hussain KHAQAN*

**Purpose:** To analyze the efficacy of intravitreal melphalan for vitreous seeding of retinoblastoma.

**Methods:** Eyes with vitreous seeding received the intravitreal melphalan at the end of systemic chemotherapy if vitreous seed persist. Intravitreal injection of melphalan (0.03 mg/0.1 mL in 0.05 mL)

followed by injection site cryotherapy.

**Results:** Among 105 treated eyes with vitreous seeds, 25 (23.8%) eyes showed complete regression in vitreous seeding with 1 injection monthly. A total of 31 (29.5%) eyes required 3 injections for complete regression of vitreous seeds, while 34 (32.4%) eyes required 6 injections for complete regression. Fifteen (14.3%) eyes did not show complete regression of seeding even after 6 injections.

**Conclusions:** Intravitreal melphalan has a significant role in the treatment of vitreous seeding of retinoblastoma.

**Poster No.: EX1-118**

**Panel No.: 118**

### Pathogenesis of Sporadic Orbitocranial Meningioma: Neurofibromatosis Type 2 Gene Mutation and Its Relation to Progesterone Receptor Expression

*First Author: Datu RESPATIKA*

*Co-Author(s): Banu DIBYASAKTI, Indra MAHAYANA, Agus SUPARTOTO, Purjanto UTOMO*

**Purpose:** Merlin, a protein of neurofibromatosis type 2 (NF2) gene, has an important role to prevent tumor progression. Progesterone receptor (PR) status associated with gene mutations on chromosome 22 (where the NF2 gene resides) is responsible in the incidence of meningioma. This study was aimed to investigate the role of NF2 gene mutation in the pathogenesis of sporadic orbitocranial meningioma and its association with PR expression.

**Methods:** This was a case-control study (positive NF2 mutation vs non-mutation). Thirty-four sporadic meningioma patients (confirmed by histopathological examination) with no familial NF2-related meningioma history were recruited. Interview about their obstetric, gynecologic, and contraception history was done to all patients. PR expression was measured with Real-Time PCR. NF2 mutation was investigated using Qbiomarker Somatic Mutation PCR Assay (Four allelic point mutations: c 634C>T/pQ212, c 655G>A/pV219M, c 784C>T/pR262, and c 1228C>T/pQ410).

**Results:** NF2 gene mutation was found in 35.29% of patients. Control group was strongly associated with exogenous hormonal exposure (mutation vs non-mutation: 83.3 vs 95.5%,  $P < 0.001$ ). PR was found significantly lower in control group ( $P = 0.033$ ) which corresponded with long-term exposure of exogenous progesterone. However, case group was associated with higher rates of progression to grade II (mutation vs non-mutation, 18.2 vs 5%,  $P < 0.001$ ) and also linked to fibrous and anaplastic appearance of tumor tissue.

**Conclusions:** Meningioma pathogenesis was not only independent of NF2 mutation, but also strongly associated with exogenous progesterone exposure. Benign to malignant progression of meningioma was

associated to NF2 mutation.

**Poster No.: EX1-111**

**Panel No.: 111**

### Practice Patterns in the Management of Sebaceous Cell Carcinoma of the Eyelid in Asia-Pacific Region

*First Author: Janice Jing Chee CHEUNG*

*Co-Author(s): Yuen Ting KWOK, Stacey LAM, Hunter YUEN*

**Purpose:** To determine the practice patterns of ophthalmic plastic surgeons regarding the management of eyelid sebaceous gland carcinoma (SGC).

**Methods:** An electronic survey was distributed to members in the Asia-Pacific region, requesting their demographic information and treatment approaches to SGC.

**Results:** A total of 192 respondents completed the survey, with 95.3% of respondents from the Asia-Pacific region. For initial diagnosis, most surgeons selected incisional biopsy (54.8%), followed by full thickness excisional biopsy (34.8%). Initial workup is mainly by physical examination, palpation of lymph nodes, and radiological imaging. Conjunctival map biopsy is done in selective cases. Sentinel lymph node biopsy (SLNB) is done mainly for tumors larger than 10 mm. Management is mainly by surgical excision (5 mm margin) combined with adjuvant, with Mitomycin-C being the most common. Margin involvement is determined by frozen section by pathologist (57.2%), followed by Moh's micrographic surgery (18.1%). Surveillance is mainly with physical examination alone.

**Conclusions:** SGC is not uncommon in Asian population. This survey reported herein found that Asia-Pacific oculoplastic surgeons prefer incisional biopsy for lesions suspicious of SGC. This may be related to more nodular lid mass presentation in this population. This is in contrast to survey results from British cohort. Conjunctival map biopsy is more commonly performed, even though pagetoid spread is more commonly seen in Caucasian population. In addition, despite Moh's micrographic surgery and SLNB may have survival benefits, access to this expertise may be limited and therefore not widely used.

**Poster No.: EX1-112**

**Panel No.: 112**

### Reliability of Impression Cytology in the Diagnosis of Ocular Surface Squamous Neoplasia

*First Author: Karan BHATIA*

*Co-Author(s): K V Satyamurthy KODUR, Shilpa MALED, Ruchita MANAKTALA, Ronak SOLANKI, Keerti WALI*

**Purpose:** To analyze the efficacy of impression cytology (IC) for diagnosing ocular surface squamous neoplasia

(OSSN) along with its correlation to gold standard biopsy.

**Methods:** Eyes with clinically evident OSSN or suspicious lesions underwent IC and tissue biopsy at a tertiary level eye hospital in South India, from July 2016 to April 2018. OSSN was grouped as carcinoma in situ (CIS) and invasive squamous cell carcinoma (ISCC). The results of IC were compared with biopsy.

**Results:** A total of 57 eyes of 51 patients with an age range of 18 - 85 years (mean 41 years) were involved in the study. Forty-four eyes had clinically typical lesions suggestive of OSSN and 13 eyes had suspicious lesions like atypical pterygia or pingueculae. IC showed CIS in 36.84% (versus 38.59% with biopsy), ISCC in 31.57% (23.7% with biopsy), and was negative in 28.07% versus 22.8% with biopsy.

**Conclusions:** Impression cytology is a good screening tool for OSSN, and also helps in differentiating it from suspicious lesions.

**Poster No.: EX1-116**

**Panel No.: 116**

### Retinoblastoma and Inflammation: What is New in Ophthalmology?

*First Author: Suklengmung* **BURAGOHAIR**

*Co-Author(s): Harsha* **BHATTACHARJEE**, *Kasturi* **BHATTACHARJEE**, *Dipankar* **DAS**

**Purpose:** To report a unilateral group E RB (Retinoblastoma) in a 3-year-old child with iris, choroidal, and perineural optic nerve involvement, with evidence of inflammation in the tumor.

**Methods:** It was an institutional, laboratory-based, observational single case study. A 3-year-old child presented to a tertiary eye care center of Northeast India with a white papillary reflex in her right eye (OD). A clinical diagnosis was made of Group E RB in OD with USG (ultrasonography) B-scan and optical coherence tomography of OD showing intraocular densely calcified soft tissue mass. EUA (Examination Under Anesthesia) and then enucleation of OD was done under GA (General Anesthesia) after taking proper consent. The specimen was fixed with 10% Neutral Buffered Formalin. Subsequently grossing and slide preparation for Haematoxylin and Eosin and IHC (immunohistochemistry) for NSE (neuron specific enolase), p53 and LCA (leucocyte common antigen) was done. Findings were noted by ocular pathologists and were reported.

**Results:** Acute inflammation was noted in differentiated Fleisher-Wintersteiner rosette and the undifferentiated zone of the tumor. Acute inflammatory cells were seen in the lumen of the rosettes and leucocytes were seen in the differentiated zone of the tumor disintegrating the rosettes. Rosettes that were involved with inflammation were larger. NSE was positive for the sample, LCA was  $\pm$  and p53 was negative for the

sample.

**Conclusions:** Inflammatory cells were seen in the undifferentiated zone, differentiated zone, areas of necrosis, and areas of optic nerve head involvement. Inflammatory response plays a role in tumor conversion and local spread.

**Poster No.: EX1-109**

**Panel No.: 109**

### Study of the Histopathological Characteristics of Ciliary Body from the Enucleated/Eviscerated Human Eye and Comparison of Histopathological Features of Ciliary Body in Various Etiologies

*First Author: Hitesh* **AGRAWAL**

*Co-Author(s): Anthony Vipin* **DAS**, *Subhadra* **JALALI**, *Dilip* **MISHRA**

**Purpose:** To understand the histopathology of the ciliary body in enucleated/eviscerated human eyes due to absolute glaucoma, anterior segment diseases, and painful blind eyes with excluding causes of infection and malignancy.

**Methods:** We collected a total of 20 eyes. We dissected the ciliary body tissue through the scleral pocket. All the specimens underwent histopathological evaluation with H&E stain. Detailed histopathology examination done under microscope.

**Results:** Post-trauma eyes (6)- atrophy of ciliary processes, elongated villi like projection, hyperpigmented pigmented epithelium (PE), eosinophilic material deposit in non-pigmented epithelium (NPE), and hypertrophy or congested blood vessels in stroma. Atrophied Bulbi (5)-flattening/fingerlike projections of ciliary processes, inward folding, or eosinophilic material deposit in NPE. Absolute glaucoma eyes (3)- flattening and folding of ciliary processes. Atrophy and eosinophilic material deposit in NPE. Inflammatory cells and congested blood vessels in stroma. Anterior staphyloma (2)- Flattening of ciliary processes. Eosinophilic material deposit in NPE. Exudative retinal detachment (1)- Atrophy of ciliary processes. Hypertrophy of PE. Pigment dispersion in NPE. Stroma showing thick hyalinised collagen and amorphous eosinophilic material. Coat's disease (1)- Fused ciliary processes. Eosinophilic material deposit in NPE. Stroma scanty. With Sturge Weber syndrome (1)- Flattening of ciliary processes. Hyperpigmentation of PE. Swelling of cells in NPE. Stroma edematous with muscle hypertrophy. Orbital cellulitis (1)- Focal hypertrophy of PE. Muscle hypertrophy in stroma.

**Conclusions:** Most of the specimens were showing flattening of ciliary processes. PE, NPE, and stroma showing variable findings based on etiology. Further molecular analysis is needed to look for secretory activity of ciliary body.

**Poster No.: EX1-102**

**Panel No.: 102**

### Taming the Masquerader: A Rare Case of Sebaceous Gland Carcinoma

*First Author: Abhishek ONKAR*

*Co-Author(s): Pooja CHOUDHARY, Arvind MORYA, Meenakshi RAO, Hemant RATHOD, Saurabh SAMDARIYA*

**Purpose:** To bring in perspective a rare case of exophytic, solitary, lower eyelid sebaceous gland carcinoma in an elderly male.

**Methods:** A 70-year-old male presented with complaints of painless, progressive mass on left lower eyelid for past 6 years which grew rapidly in past 4 months. Complete ophthalmic examination revealed a pedunculated, exophytic mass temporally. Mechanical ectropion with loss of eyelashes in the region of mass was present. The dimensions of the mass were as follows: Vertical: 3 cm; Horizontal: 3.5 cm; Antero-posterior: 1 cm approximately with the stalk 1 cm from lateral canthus. On palpation, it was firm, non-tender with rounded, irregular indurated borders free from underlying structures. Surface vascularization was noted, with variegated coloration and fissuring superiorly. Full-thickness wide local resection of the mass was done and sent for histopathological examination.

**Results:** Histopathological examination confirmed the tumor to be a grade-1 sebaceous cell carcinoma. SGC masquerades as benign lesions, making its diagnosis difficult and delayed, often leading to exenteration and even death. This case highlights the successful management of an unusual case of solitary, non-recurrent, lower lid SGC in elderly male without syndromic association or metastasis.

**Conclusions:** SGC masquerades as benign lesions, making its diagnosis difficult and delayed, often leading to exenteration and even death. This case highlights the successful management of an unusual case of solitary, non-recurrent, lower lid SGC in elderly male without syndromic association or metastasis.

**Poster No.: EX1-105**

**Panel No.: 105**

### Unusual Site of Orbital Kaposi Sarcoma in an HIV-Positive Patient

*First Author: Neni ANGGRAINI*

*Co-Author(s): Nuryati SIREGAR, Evy YUNIHAUTUTI*

**Purpose:** To present an unusual case of retrobulbar kaposi sarcoma in HIV-positive patient.

**Methods:** A 27-year-old man was presented with protruding right eye since 1 year prior. This patient had been diagnosed as HIV-positive and pulmonary tuberculosis. He was in antiretroviral and anti-tuberculosis treatment. Laboratory examination

showed low count of CD4+ T cells ( $<100$  cells/mm<sup>3</sup>) and reactive Hepatitis C virus. Ophthalmologic examination showed decreased visual acuity, proptosis, and restricted eye movement. The imaging showed heterogenous septated mass that occupied almost all retrobulbar space with contrast enhancement. The lesion expanded to lateral canthal and lacrimal gland. Orbital floor destruction was noted.

**Results:** The patient underwent right orbital exenteration. Histopathology examination disclosed late (spindle cell) stage of kaposi sarcoma. At 8 years follow-up, there was no tumor recurrency in orbital region.

**Conclusions:** Kaposi sarcoma commonly occurs in HIV-positive patients, but is uncommon in the eye. It usually affects the conjunctiva and eyelid. In this case, kaposi sarcoma occurred in the orbital region as a retrobulbar tumor. Therefore, kaposi sarcoma is one of the differential diagnoses that must be considered in orbital tumors with HIV-positive patients.

## Ophthalmic Epidemiology, Telemedicine, Big Data & AI

**Poster No.: EX1-125**

**Panel No.: 125**

### A Paradigm Shift in the Evaluation of Pediatric Myopia Using Corneal Tomography and Biomechanical Indices: The Present and the Future

*First Author: Ann KOSHY*

*Co-Author(s): Mathew FRANCIS, Jyoti MATALIA, Abhijit SINHA ROY, Rohit SHETTY*

**Purpose:** Using artificial intelligence (AI) to predict the association of corneal tomographical (TP) indices (Pentacam HR) and biomechanical indices (BP) (Corvis) with different grades of myopia.

**Methods:** A total of 980 eyes of children aged 7 - 17 years were classified as emmetropia, low ( $-3$  D), moderate ( $> -3$  D to  $6$  D), and high myopia ( $> -6$  D). Patients were subjected to Pentacam and Corvis scans, which were evaluated using artificial intelligence. Then, based on the indices from the scans (from each individually and both in combination), Area Under the Curve (AUC), Classification Efficiency (CA), and highest Prediction Score (PS) were calculated.

**Results:** Corneal tomographical indices alone gave AUC = 0.69 and CA = 0.46. The highest predictive score was given by corneal aberration and maximum keratometry using the Pentacam. Biomechanical indices alone gave an AUC = 0.70 and CA = 0.50. Using the Corvis, corneal stiffness (kc), extra corneal stiffness (kg), and a ratio of corneal stiffness to extra corneal stiffness (kc/kg) had

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the highest prediction Score (PS). When combined, both corneal tomography and biomechanical indices gave an AUC = 0.74 and CA = 0.55. Biomechanical indices were found to have a better reliability and performance factor in AI prediction than tomographical indices.

**Conclusions:** Biomechanical indices can be used as an additive factor in predicting pediatric myopia using artificial intelligence. This is a novel technique that can change the interface of myopia diagnosis.

**Poster No.: EX1-123**

**Panel No.: 123**

### Association Between Estimated Retinal Ganglion Cell Counts and Visual Acuity: The Singapore Chinese Eye Study

*First Author: Yijin TAO*

*Co-Author(s): Miao Li CHEE, Ching-Yu CHENG, Yih-Chung THAM, Tien-Yin WONG, Hua ZHONG*

**Purpose:** To estimate the retinal ganglion cell (RGC) count and investigate its association with visual acuity in a Singapore Chinese population.

**Methods:** Participants for this study were enrolled from the Singapore Chinese Eye Study, a population-based eye study on Chinese adults aged 40 years and above. All participants underwent detailed standardized ocular examinations, including best corrected visual acuity (BCVA, in logMAR), visual field examination using the 24-2 SITA program of Humphrey Field Analyzer II, and peripapillary retinal nerve fiber layer (RNFL) thickness measurement using the Cirrus high-definition optical coherence tomography (OCT). The estimated RGC count was calculated using previously reported equations which incorporate visual field and Cirrus OCT's RNFL parameters. Multivariable linear regression analysis was used to evaluate the association of the estimated RGC count with BCVA.

**Results:** A total of 857 eyes from 857 participants were included for analysis. The mean ( $\pm$  standard deviation) age of participants was 54.0 ( $\pm$  6.7), and 48.7% were women. The average estimated RGC count was 938,325.2  $\pm$  179,512.5 cells. After adjusting for age, gender, intraocular pressure, disc area, and axial length, estimated RGC count was significantly associated with BCVA (per SD decrease,  $\beta$  = 0.006; 95% confidence interval 0.002 to 0.011;  $P$  = 0.003).

**Conclusions:** In normal eyes, lower eRGC count is associated with poorer visual acuity. Clinically, RGC count may account for the minute variations in BCVA in normal eyes.

**Poster No.: EX1-119**

**Panel No.: 119**

### Clinical Study of Retinal Vein Occlusions: Risk Factors and Clinical Features. A Rural Hospital-Based Study

*First Author: Anshul SINGH*

**Purpose:** To study risk factors associated with RVOs in rural population - age, sex, systemic hypertension, diabetes mellitus, dyslipidemia, body mass index, and serum hyperhomocystinemia.

**Methods:** Case control study - 63 Fresh RVO patients (BRVO, CRVO, HCRVO) and 60 non-RVO controls  
**Methodology:** Measurement of weight, height, blood pressure, PMBS, FBS, serum lipid profile, and serum homocysteine was done using standardized protocols.  
**Statistical Analysis:** Was performed in R-programming language (R-3.0.0), and level of significance was tested at 5%.  
**Outcome Measures:** Univariate analysis was performed to independently determine the effect of risk factors. Multivariate logistic regression analysis was performed with different risk factors, and adjusted odds ratios with 95% confidence intervals were obtained.

**Results:** Mean age of cases was 57.88  $\pm$  11.83 years and of controls was 53.23  $\pm$  12.27 years. Gender distribution was insignificantly different in 2 groups ( $P$  = 0.6788). Prevalence of hypertension as risk factor was 85% in cases compared to 31.7% in controls (Adjusted OR = 11.94, 95% CI: 4.68-30.41,  $P$  < 0.0001). Prevalence of diabetes mellitus as risk factor was 21.6% in cases compared to 10% in controls (adjusted OR = 2.28, 95% CI: 0.62-8.37,  $P$  = 0.214]. For dyslipidemia, the adjusted OR was 1.69 (95% CI: 0.61-4.67), and the effect was insignificant, with  $P$  = 0.313. Mean homocysteine for RVO cases was 21.16  $\pm$  13.18, and for non-RVO controls was 12.86  $\pm$  3.36 ( $P$  < 0.0001).

**Conclusions:** RVOs were associated with an increase in age. There was no gender predilection. Systemic hypertension was a major risk factor for RVO. Serum hyperhomocystinemia was an independent risk factor for RVO. In an already resource-constrained rural population, this study has been in highlighting the importance of risk factors contributing to development of RVOs.

**Poster No.: EX1-120**

**Panel No.: 120**

### Correlation Between Modifiable Risk Factors and Age-Related Macular Degeneration: A Case-Control Study

*First Author: Krati GUPTA*

*Co-Author(s): Harsha BHATTACHARJEE, Saurabh DESHMUKH, Diva MISRA, Dhaval PATEL*

**Purpose:** To find the correlation between modifiable risk factors like Body Mass Index (BMI), waist

circumference, and smoking with age-related macular degeneration (AMD).

**Methods:** Hospital-based, observational, case-control study. A hundred patients presenting to our outpatient department over a period of 1 year were included. The selected participants were grouped into the AMD group, which included 50 eyes with non-neovascular AMD, and neovascular AMD, along with 50 eyes as a control group. All participants underwent comprehensive ophthalmological examinations along with measurements of weight, height, and waist circumference.

**Results:** Fifty eyes of 50 patients diagnosed to have AMD and 50 eyes of 50 age-matched controls were included in this study. The mean age was 66 years (49 - 85 years). The mean BMI in patients with neovascular AMD was  $27.74 \text{ kg/m}^2 \pm 4.93$  ( $n = 19$ ). The mean BMI in patients with non-neovascular AMD was  $25.58 \text{ kg/m}^2 \pm 2.90$  ( $n = 31$ ), whereas mean BMI in the control group was  $23.85 \text{ kg/m}^2 \pm 3.31$  ( $n = 50$ ). There was a statistically significant difference between the 2 AMD groups and the control group with respect to BMI ( $P < 0.001$ ). The mean waist circumference in patients with neovascular AMD was  $104.63 \text{ cm} \pm 5.78$  ( $n = 19$ ), and in patients with non-neovascular AMD was  $102.677 \text{ cm} \pm 6.11$  ( $n = 31$ ) whereas mean waist circumference in the control group was  $91.74 \text{ cm} \pm 6.70$  ( $n = 50$ ) and the difference was statistically significant ( $P < 0.001$ ). Statistically significant difference was observed between the smokers belonging to case and control groups ( $P < 0.001$ ).

**Conclusions:** A statistically significant correlation exists between BMI, waist circumference, smoking, and severity of AMD.

**Poster No.: EX1-121**

**Panel No.: 121**

### Deep Learning for Diabetic Retinopathy with OCT Angiography

*First Author: Toshihiko* **NAGASAWA**

*Co-Author(s): Hiroki* **MASUMOTO**, *Hitoshi* **TABUCHI**

**Purpose:** To assess the ability of deep learning (DL) to detect diabetic retinopathy (DR) using optical coherence tomography angiographic (OCTA) images.

**Methods:** One hundred OCTA images (average age 62.1 years old, female 53%, standard deviation 9.9) (no apparent retinopathy (NDR): 17, mild-nPDR: 9, moderate-nPDR: 17, severe-nPDR: 25, PDR: 32) were amplified. Patients who underwent vitreous surgery and patients with low quality OCTA images were excluded. We conducted training with deep convolutional neural network (DNN) models using the OCTA images. In this study, identification including NDR (normal vs diabetes sufferer) (Test 1) and identification without NDR (normal vs diabetic retinopathy onset) (Test 2) were performed. Area under the curve (AUC),

sensitivity, and specificity in detecting DR were examined.

**Results:** Test 1: AUC 0.855 (0.821 - 0.890), sensitivity 0.84 (0.753 - 0.906), specificity 0.77 (0.676 - 0.836); Test 2: AUC 0.924 (95% CI: 0.873 - 0.975), sensitivity 0.856 (0.761 - 0.923), specificity 0.907 (0.839 - 0.953). Correct answer rates by normal 81.4%, mild + moderate-n PDR 96.4%, severe PDR 92%, and PDR 96.7%.

**Conclusions:** A combination of DL and OCTA images could detect DR with a high level of accuracy and may be useful in clinical practice and retinal screening.

**Poster No.: EX1-124**

**Panel No.: 124**

### Diabetic Retinopathy Screening Program in a Southern Part of Bangladesh: Our Experience and Key Findings

*First Author: Md.shafiqul* **ISLAM**

**Purpose:** Diabetic retinopathy is one of the major causes of blindness worldwide. Bangladesh is a developing country. Here, retina service outside the capital city Dhaka is very little. Its southern part has no service for its poor diabetic patients. So, we started a pilot project in our hospital to see the magnitude of the problem, as well as identify early the treatable diabetic retinopathy cases to prevent blindness.

**Methods:** We started it in July 2016. We have a vertical referral system starting from village or union sub center. Our health workers give health education to diabetic patients regarding diabetic retinopathy. They also referee to next step according to referral criteria. Next step is upzilla health complex/sub district level. Here we have trained general practitioners. They are doing direct ophthalmoscopy. They are referring the suspected cases to an ophthalmologist in the District level. In the district level, we have a color fundus camera. From here patients are sent to our hospital that is a tertiary level hospital. We have horizontal referral system also with diabetic hospitals. They have portable fundus camera. We also have links with other eye clinics.

**Results:** In the last 3 years, we screened more than 2500 patients. Among them, 1500 were diabetic patients. Among the diabetic patients, 42.10% have diabetic retinopathy. Among the diabetic retinopathy positive patients, 10% have an advanced stage of disease. Duration of diabetes, poor control, cardiovascular disease, and poor renal function are the major risk factors for diabetic retinopathy.

**Conclusions:** A diabetic retinopathy screening program is very important for the prevention of blindness.

Poster No.: EX1-122

Panel No.: 122

### Dilated Smartphone Imaging for the Detection and Grading of Diabetic Retinopathy

First Author: Kaye Lani Rea **LOCAYLOCAY**

Co-Author(s): Milagros **ARROYO**, Victor **CAPARAS**, Keshia Lourdes **DUYONGCO**, Paolo **SILVA**

**Purpose:** This study aimed to determine the diagnostic efficacy of dilated smartphone fundus imaging for the detection and grading of diabetic retinopathy (DR).

**Methods:** This was a single institution, hospital-based, prospective diagnostic validation study.

**Results:** At least 28 adult patients (55 eyes) diagnosed with diabetes underwent dilated fundus imaging through 2 modalities: (1) iPhone 6s and (2) ultrawide field Optos fundus camera. An independent trained retina specialist graded both iPhone and Optos images for DR and diabetic macular edema (DME). A second retina specialist adjudicated grading discrepancies. Agreement between smartphone and 100-degree Optos image grading for DR and DME was noted to be good to excellent (kappa = 0.79, 95% confidence interval [CI], 0.67-0.92; weighted kappa = 0.90, 95% CI, 0.85-0.96). Compared to 100-degree Optos fundus imaging, the sensitivity and specificity of dilated smartphone fundus imaging for the detection of referable DR, defined as at least moderate nonproliferative DR and/or DME, were 93.6% (95% CI, 78.6-99.2) and 100% (95% CI, 85.1-100), respectively. All of the patients who underwent dilated smartphone fundus imaging experienced no discomfort or untoward adverse events.

**Conclusions:** Dilated smartphone fundus imaging is a highly specific and sensitive tool for the detection of DR. This technique is a promising and effective means for eye care professionals or general ophthalmologists especially in remote and/or resource-poor areas like the Philippines to screen and monitor patients with DR with guidance from retina subspecialists, who may not always be available in such areas, through a telemedicine platform.

## Orbital and Oculoplastic Surgery

Poster No.: EX1-140

Panel No.: 140

### A Rare Case of Bilateral Severe Microphthalmia with Orbital Cyst with Massive Retinal Gliosis

First Author: Shweta **RAGHAV**

Co-Author(s): Ruchi **GOEL**, Apoorva **SEHGAL**

**Purpose:** Bilateral anophthalmia / microphthalmia is a rare presentation with an estimated prevalence of 3 per 100,000. It may be associated with other syndromes. This report demonstrates a rare case of bilateral severe microphthalmia with cyst with massive retinal gliosis and hypoplastic optic nerve.

**Methods:** A 33-year-old male presented to clinic with a complaint of swelling in both eyes, with sudden increase in size in right orbit swelling noticed over a week with dull pain. As per attendants and him, he was bilateral anophthalmia since birth and there was not any significant birth and systemic history. His elder brother and sister had normal systemic and ocular examination. Contrast enhanced MRI revealed a large peripherally enhancing cystic lesion with eccentric enhancing soft tissue components within right orbit (6.1(AP)×4.2(Trans)×4.1(CC)cm) and few similar smaller lesions in left orbit, along with rudimentary bilateral ocular globe with foci of calcification within and hypoplastic bilateral optic nerves. Visualized intracranial structures were normal in appearance.

**Results:** Due to large size and pressure effects, right orbit cyst was surgically excised. On histopathological examination, massive retinal gliosis with presence of ciliary body and large ectatic vessels with fibrin thrombi were noted. Immunohistochemically the glial component stained with GFAP, EMA imparted dot like positivity to the cells. MIB - I index was <2%.

**Conclusions:** Severe microphthalmia can also present as anophthalmia. Commonly associated orbital cysts can present differently, causing a diagnostic dilemma. Surgical excision with a histopathological examination can confirm the diagnosis and guide further management.

Poster No.: EX1-144

Panel No.: 144

### A Rare Case of Multicentric Castleman Disease with Bilateral Orbital Involvement

First Author: Kirthi **KOKA**

Co-Author(s): Bipasha **MUKHERJEE**

**Purpose:** To report a case of bilateral orbital Castleman's disease with systemic lymphadenopathy.

**Methods:** Interventional case report.

**Results:** A 44-year-old gentleman presented with progressive prominence of both eyes for 4 years and painful diminution of vision in his right eye for 15 days. On examination, his right eye visual acuity was hand movement with severe proptosis and lagophthalmos, resulting in exposure keratopathy. His left eye visual acuity was 6/6; N6 with axial proptosis. Computed tomography (CT) scan showed diffuse, ill-defined isodense lesion involving periorbital, retrobulbar, and extraconal spaces of both orbits and opacified paranasal sinuses. Right eye incisional biopsy under general anesthesia was carried. Histopathology showed sheets of lymphocytes arranged in a follicular pattern with onion skin appearance and hyalinized blood vessels in the interfollicular area. Immunohistochemistry confirmed the diagnosis of Castleman's disease. PET CT revealed multiple lymph node involvement. Following oncologist consultation, he received 32 GY EBRT to both orbits with significant reduction in proptosis post-treatment. He was scheduled to receive 6 cycles of injection Rituximab for systemic involvement.

**Conclusions:** Castleman's disease, a non-neoplastic lymphoproliferative disorder typically affects single or multiple groups of lymph nodes. Orbital involvement is rare, with only 5 cases of bilateral orbital involvement reported to date. Clinical features mimic IOID and orbital lymphomas. Histopathological features help clinch the diagnosis. Long-term follow-up is of utmost importance, as these patients are prone to develop secondary tumors.

**Poster No.: EX1-139**

**Panel No.: 139**

### Clinico-Radiological-Pathological Correlation of Nonneoplastic Lacrimal Gland Enlargement/Dacryoadenitis in a Chinese Cohort

*First Author: Ka Hei Kenneth LAI*

*Co-Author(s): Kelvin Kam-Lung CHONG, Simon KO, Julie LOK, Alvin YOUNG*

**Purpose:** To study the clinical, serological, and radiological patterns in major histological entities (LEGO).

**Methods:** Retrospective surgical chart review of consecutive patients who underwent lacrimal gland biopsy in a university oculoplastic unit over 5 years. Pathological diagnoses of neoplasm were excluded.

**Results:** A total of 162 patients (89 female), with a mean age of  $57 \pm 17$  (9-88) receiving 252 (45 bilateral) lacrimal gland biopsies were included. Sixty-two patients were diagnosed as lymphoid/lymphoplasmacytic infiltrate (38%), 39 (24%) as eosinophil-rich lesions, 39 (24%) with other/miscellaneous pathologies, and 22 (14%) cases of

IgG4-related ophthalmic disease (IgG4ROD) based on the IgG4RD comprehensive diagnostic criteria. Fifty-one (82%) patients with lacrimal gland lymphoid/lymphoplasmacytic infiltrate presented acutely (within 3 months), and unilaterally 55 (89%) at a mean age  $62 \pm 18$  SD (9-88), with slight female preponderance (1.27:1). Fifteen (70%) patients with IgG4ROD presented subacutely (over 3 months) and bilaterally at a mean age of  $56 \pm 12$  (31-72), with equal male to female ratio (1:1). 75% of these patients had raised serum IgG4 level on presentation. All (100%) patients with eosinophil-rich dacryoadenitis presented acutely at a mean age of  $60 \pm 16$  (26-88) with 13% bilateral manifestation, 7 of 16 (44%) tested showing raised serum IgE, and 8 of 35 (23%) tested showing circulating eosinophilia. Extraocular muscle enlargement on orbital imaging was evident in 44% of patients with IgG4 ROD, 19% of lymphoid/lymphoplasmacytic lesion, and 48% of eosinophil-rich lesion, respectively.

**Conclusions:** IgG4-related dacryoadenitis usually presented bilaterally and subacutely, while most lymphoid/lymphoplasmacytic lesions were unilateral with acute inflammation. Lacrimal gland biopsy remains the gold standard for diagnosis, while clinical, serological, and radiological features differ in major histological entities.

**Poster No.: EX1-135**

**Panel No.: 135**

### Endoscopic Transnasal Approach for Resection of Orbital Apex Tumor

*First Author: Rong LU*

*Co-Author(s): Rongxin CHEN, Yang GAO, Huan MA*

**Purpose:** To investigate indications, surgical skills, and post-surgery outcomes for patients solely treated with endoscopic transnasal resection of orbital apex tumor (OAT).

**Methods:** This study was a retrospective, noncomparative case series. A total of 23 patients (23 eyes) with OAT underwent endoscopic transnasal approach for resection of the tumor in Zhongshan Ophthalmic Center from March 2016 to May 2018. At each follow-up visit, the patients were examined for measurement of best corrected visual acuity (BCVA), slit lamp examination, indirect ophthalmoscopy, and visual field.

**Results:** There were 23 patients, including 10 male and 13 female, with a mean age of  $43.0 \pm 17.7$  (range, 12 to 70) years, and followed up for  $12.6 \pm 7.5$  (range, 2 to 26) months. All 23 patients had unilateral tumor. Among the 23 cases, 14 were located in right and 9 were located in left orbit. 20 patients with OAT underwent purely endoscopic transnasal surgery, other 3 patients underwent endoscopic transnasal approach combined with transcutaneous or transconjunctival surgical approach. Twenty OAT were removed completely or partly, and other 3 patients underwent

pure decompression of optic nerve. With pathological diagnosis, these 20 resected tumors included 10 hemangiomas, 4 inflammatory pseudotumors, 2 schwannomas, 2 fibrous dysplasias, 1 solitary fibrous tumor, and 1 adenoid cystic carcinoma. The tumor sizes were between 13 x 10 x 10 mm and 40 x 21 x 15 mm. Twenty-two patients gained improved or stable BCVA after surgery. However, other 2 patients showed postoperative vision decline.

**Conclusions:** Transnasal endoscopic dissection for tumor removal demonstrated optimal post-surgery outcome and promising prognosis for patients with OAT.

**Poster No.: EX1-128**

**Panel No.: 128**

### Endoscopic Transnasal Canalicularrhinostomy for the Treatment of Refractory Common Canalicular Obstruction with an Unidentifiable Lacrimal Sac

*First Author: Jason LEE*

*Co-Author(s): Yunhai TU, Wencan WU*

**Purpose:** To describe the role of endoscopic transnasal canalicularrhinostomy in the treatment of refractory common canalicular obstruction (CCO) associated with an absent or unidentifiable lacrimal sac.

**Methods:** The records of patients with refractory CCO who underwent endoscopic transnasal canalicularrhinostomy at the Eye Hospital of Wenzhou Medical University from October 2007 to December 2016 were retrospectively reviewed.

**Results:** Fifty-six patients (56 eyes) with refractory CCO were recruited into the study. Eight patients were excluded due to the presence of a residual lacrimal sac or a failure to complete the follow-up duration. The anatomic and functional success rate were both 85.4% (41/48) at a mean follow-up of 18.6 months. Five cases failed as a result of ostial synechia and 2 failed because of ostial obstruction by granulation. Postoperative complications included mild nasal bleeding in 5 cases, dried nasal feeling in 8 cases, and olfactory dysfunction in 4 cases.

**Conclusions:** While being surgically challenging, endoscopic transnasal canalicularrhinostomy has comparable findings to its external approach counterpart or CDCR with Jones tube. As such, it may prove to be a novel alternate surgical technique for patients with refractory CCO with no identifiable lacrimal sac.

**Poster No.: EX1-137**

**Panel No.: 137**

### Ethnicity, Age, and Gender Variations in Orbital Volumes and Optic Nerve Lengths in a Southeast Asian Population

*First Author: Trisha ZHANG*

**Purpose:** Orbital volume measurement is essential in the assessment of orbital trauma and thyroid eye disease. The significance of optic nerve length is unknown, but it may have a role in the pathogenesis of optic neuropathy in orbital disease. There is currently little information on the normative values for various age, gender, and ethnic groups in the Southeast Asian population. Our purpose was to establish these normal values.

**Methods:** Thirty-six orbital computed tomography scans were randomly selected with equal distribution between gender, age, and ethnic age groups. Reconstruction was carried out using Syngo.via (Siemens, Germany). Orbital volume measurements were made with 3-dimensional volume rendered region of interest using coronal cuts. Optic nerve lengths were measured in axial view.

**Results:** Mean orbital volume varied significantly among various ethnicities ( $P = 0.034$ ), with Chinese ( $24.94 \text{ mm}^3$ ) having the largest orbital volume; followed by Malays ( $23.54 \text{ mm}^3$ ) and Others ( $22.69 \text{ mm}^3$ ). Optic nerve length measurements were also significantly different (Chinese  $3.08 \text{ mm}$ , Malays  $3.14 \text{ mm}$ , Others  $2.87 \text{ mm}$ ;  $P = 0.048$ ). Males ( $24.96 \text{ mm}^3$ ) were also found to have significantly larger orbital volumes as compared to females ( $22.49 \text{ mm}^3$ ) ( $P = 0.00047$ ). Patients in the 40-60 age group ( $3.22 \text{ mm}$ ) were found to have significantly longer optic nerves ( $P = 0.00058$ ), followed by those in the >60 group ( $3.07 \text{ mm}$ ) and the 20-40 group ( $2.80 \text{ mm}$ ).

**Conclusions:** Our study establishes the normative data for age, gender, and ethnic groups of orbital volume and optic nerve length in our Southeast Asian population. This helps guide clinicians in an understanding of the pathogenesis of optic neuropathy and determining surgical options for patients requiring orbital reconstruction or decompression.

**Poster No.: EX1-131**

**Panel No.: 131**

### Extrascleral Extension of Choroidal Melanoma After Brachytherapy Treatment

*First Author: Christopher LO*

*Co-Author(s): Juliet ESSILFIE, Hamzah MUSTAK, Daniel ROOTMAN, Annie TRAN, Tara YOUNG*

**Purpose:** The purpose of this study was to report cases of choroidal melanoma that developed extrascleral tumor recurrence after intraoperative fine needle aspiration biopsy (FNAB) and treatment with

iodine-125 brachytherapy.

**Methods:** In this single institution case series, all instances of biopsy-confirmed orbital melanoma after known intraocular melanoma were reviewed. Tumor characteristics, clinical course, time to recurrence, cytogenetics of initial tumor and recurrence, and presence of intraocular recurrence were documented.

**Results:** Five cases of orbital melanoma following uveal melanoma are described. Each case underwent diagnosis with FNAB and treatment with plaque radiotherapy. The primary lesion in 80% (4) appeared to have complete regression for an average of 2 years, with the orbital melanoma developing after this interval. In 60% (3), the intraocular tumor remained in regression after extrascleral extension was noted, while recurrence of the intraocular tumor was seen in conjunction with an extrascleral component in 40% (2). Four cases (80%) ultimately underwent enucleation or exenteration. Four cases in this series had molecular characteristics associated with high metastatic risk (3 patients with monosomy 3, 1 with BAP-1 mutation).

**Conclusions:** In our case series of ipsilateral extrascleral orbital melanoma after intraocular melanoma, four (80%) patients had molecular markers associated with high-risk tumor biology. FNAB is a useful prognostic tool, and while ex-vivo studies suggest that the number of cells seeded into the needle tract are less than that required for experimental growth, there may be some risk of seeding in vivo for high risk tumors.

**Poster No.: EX1-142**

**Panel No.: 142**

### Intralesional Bleomycin Injection in the Management of Orbital Lymphangiomas

*First Author: Ankit TOMAR*

*Co-Author(s): Sonal CHAUGULE, Santosh HONAVAR, Sameeksha TADEPALLI*

**Purpose:** To evaluate the efficacy of intralesional bleomycin injection in the management of lymphangiomas of the orbit.

**Methods:** Retrospective review of 22 patients (mean age:  $18.05 \pm 16.85$  years) with orbital lymphangiomas. Reconstituted bleomycin 1 – 5 mL (1 IU/mL) was injected into the lesion as seen on imaging. Nine patients underwent surgical debulking, followed by injection of bleomycin. The injection was repeated after 6 weeks when needed.

**Results:** All cases showed significant regression, with marked clinical improvement in terms of function and cosmesis with a mean reduction in proptosis  $2.34 \pm 2.53$  mm (range 0 - 10 mm). No systemic or ophthalmic side effects were noted in the follow-up period of  $17.25 \pm 15.20$  months.

**Conclusions:** Lymphangiomas of the orbit showed favorable and promising results with intralesional

injections of bleomycin, and hence should be considered as the first-line therapy.

**Poster No.: EX1-218**

**Panel No.: 218**

### Kimura Disease of the Eyelid

*First Author: Putu YULIAWATI, MD*

*Co-Author(s): Sukartini DJELANTIK, Prichilia PERMADI, Ni Made UTARI*

**Purpose:** To report a rare case patient with Kimura disease of the eyelid.

**Methods:** An 11-year-old male patient came with swollen upper eyelid in both eyes for 6 months, without pain and additional symptoms. From the examination, there was a mass in both eyes in superior palpebral, firm palpation, mobile, and painless. Laboratory examination, CT orbital, and histopathological examination should be performed immediately.

**Results:** Initial laboratory investigation revealed normal indices of full blood count with slight eosinophilia with a rise in percentage IgE levels (5.41%). CT orbital of the mass showed a well-defined lesion 10 x 18 x 11 mm in left superior retropalpebral showed mass in lacrimal gland. Surgical excision in the right palpebral of the mass was done, and histopathological examination of the specimen showed diffuse infiltrating eosinophil, high endothelial post capillary venules, folliculolysis dan microabscess, showed Kimura disease.

**Conclusions:** We described a rare cause of painless subcutaneous palpebral swelling that occurred in a middle-aged Asian man. Kimura disease usually presents as painless, subcutaneous soft-tissue swelling. Diagnosis of Kimura disease is always a clinical dilemma, with no specific diagnostic guideline. Though there is no consensus for the treatment of recurrent disease, the overall outcome is good as there is no association with malignancy.

**Poster No.: EX1-130**

**Panel No.: 130**

### Langerhans Cell Histiocytosis of the Orbit (Histiocytosis X) vs Extrapulmonary Tuberculosis

*First Author: Michelle Marie ARANETA*

*Co-Author(s): Alex SUA*

**Purpose:** To characterize the clinical, radiologic, and pathologic features of Langerhans cell histiocytosis (LCH) versus extrapulmonary tuberculosis (EPTB) of the orbit, with review of current management strategies.

**Methods:** This is a case report.

**Results:** An 11-year-old Filipino male had a 1-month history of slowly progressive temporal periorbital swelling of the right eye with no inciting factor. Oral antibiotics proved ineffective. CT scan of the head

demonstrated a small cystic lesion with sclerotic margins in the right zygoma. LCH versus EPTB were considered. Chest X-ray came out negative. After lateral canthotomy with cantholysis, histopathology showed osteomyelitis for the bone and chronic caseating granulomatous inflammation for the canthal mass. There was no culture growth or acid fast bacilli on microscopy, but immunohistochemical stain was negative for CD1a. Anti-Koch's therapy was initiated. Patient has had no recurrence for 1 year.

**Conclusions:** Clinical presentation, imaging, microbiology, histopathology, and treatment outcome have to be integrated when diagnosing orbital lesions in children unresponsive to antibiotics. A combination of these aided in distinguishing between LCH and EPTB. The patient had orbital bone sclerosis and osteolysis, multinucleated giant Langhans cells with caseation necrosis, negative CD1a, and a favorable response to anti-Koch's therapy. These established the diagnosis of orbital tuberculosis. In EPTB, various tests are needed as microbiological methods are still suboptimal.

**Poster No.: EX1-138**

**Panel No.: 138**

### Management of Huge Blowout Fracture with Total Displacement of an Intact Globe Into the Maxillary Sinus: A Case Report

*First Author: Brenda HAYATULHAYA*

*Co-Author(s): Yunia IRAWATI*

**Purpose:** To emphasize challenging management of intact globe dislocation in blow out fracture into maxillary sinus. Selection of materials for wide orbital floor reconstruction with multiple fracture and long-term plan in aesthetic side.

**Methods:** A case series.

**Results:** This case series reported 2 cases with total displacement of an intact globe into the maxillary sinus. A 42-year-old female and 31-year-old male were separately admitted to our hospital due to a traffic accident presented with unidentified right eyeball. Visual acuity of the right eye was no light perception with no eyeball in right orbit, superior palpebral rupture of the right eye on first patient, and multiple orbital wall fracture of the right eye on second patient. They were diagnosed with blow out fracture with eyeball dislocation; superior palpebral rupture of the right eye. The diagnosis was established following clinical and ancillary examination with orbital CT scan. We performed superior palpebral rupture repair, followed by eyeball repositioning and titanium mesh implantation of the right eye. The surgery gave good results in preserving structural position of eyeball, and giving a good aesthetic result to patient.

**Conclusions:** Initial treatment for blow out fracture with total displacement of an intact globe is proposed to repair structural position of the eye immediately.

The use of a titanium implant for a large orbital defect gave a good result in repositioning the eyeball, with the advantage of wide coverage and firmness to support the eyeball to be in position.

**Poster No.: EX1-136**

**Panel No.: 136**

### Orbital Foreign Bodies: An Analysis of 42 Cases

*First Author: Khairun NESA*

*Co-Author(s): Sharmin AHMED, Syeed KADIR, Rajendra MAURYA, Sharifa MITU, Ashraful RIDOY*

**Purpose:** We attempted to describe the pattern of foreign bodies, types of injuries, visual status, clinical presentation, radiological appearance, and management strategies of intraocular foreign bodies (IOFB).

**Methods:** This observational case series study was conducted in 2 tertiary care eye hospitals from July 2010 to June 2018. We preferred CT scan of the orbit to identify the types and location of orbital foreign bodies. Surgery was planned based on certain aspects that included the nature of the foreign body, location of the foreign body, and presence of other injuries or foreign body-related complications.

**Results:** We analyzed 42 patients of orbital foreign bodies. Most of the patients (85%) were below 40 years of age and were young males. The mean age was 28.26 years, and median age was 24 years. The types of injury were physical assault (52.38%), followed by accidental (40.38%) and iatrogenic (7.24%). The mean duration of presentation was 28 days, and range was 1 to 240 days. The location of OFB was extraconal space (44%), intraconal space (29%), and 26% involved both spaces. The pattern of orbital foreign bodies were metallic (45.24%), vegetative foreign body (38%), plastic/silicone material (11.9%), and others (4.7%). Foreign bodies were extracted in 92.85% of cases, and conservative Rx was given only for 7.15% of cases. Visual improvement following management was statistically highly significant.

**Conclusions:** Obtaining an accurate and detailed clinical history is essential for the management of orbital foreign bodies. Early diagnosis, surgical exploration, and extraction greatly influence the visual prognosis and final outcome.

**Poster No.: EX1-129**

**Panel No.: 129**

### Outcome of Reconstruction of Blowout Orbital Floor Fracture with Corticocancellous Iliac Bone

*First Author: Golam HAIDER*

*Co-Author(s): Sharmin AHMED, Md. Ismail HOSSAIN, Hasan JAWAD, Syeed KADIR, Mukti MITRA*

**Purpose:** To compare functional outcome between autogenous group (corticocancellous iliac bone graft) and alloplastic group (titanium mesh) in the repair of orbital floor fracture.

**Methods:** This prospective study was done in tertiary hospital in collaboration with oculoplastic clinic and maxillofacial surgery department from June 2008 to May 2017. Preoperative assessment and CT scan of orbit done prior to surgery. A total of 4 assessments (baseline, after operation, at 3 months, and at 6 months) were done to evaluate outcome. Comparison of muscle limitation and diplopia score in 2 groups were done by student *t* test.

**Results:** Total patients were 64, male-39 (61%) and female-25 (39%). Mean age of 27 years (range, 8 to 51). Among them, alloplastic material was given to 19%, and Iliac bone graft was given to 81%. During postoperative assessment, enophthalmos in alloplastic group, 11.1%, and autogenous group, 8.3%, extrusion of the graft in alloplastic group, 11.1%, and autogenous group was nil, infection in alloplastic group, 22.3%, and autogenous group, 8.3%. Muscle limitation and diplopia was assessed in 3 assessment points at postoperative period, after 3 and 6 months. No significant difference in mean muscle limitation score, and diplopia was found in 2 groups at postoperative period ( $P > 0.05$ ), at 3 months ( $P > 0.05$ ) and 6 months ( $P > 0.05$ ).

**Conclusions:** Corticocancellous iliac bone graft in the reconstruction of blowout orbital fractures are comparable to alloplastic material in terms of enophthalmos, muscle limitation, and diplopia score. However, autogenous material shows less complications and relatively better alleviation of symptoms of blowout fracture.

**Poster No.: EX1-132**

**Panel No.: 132**

### Powered Endoscopic Dacrycystorhinostomy, Raising the Bar

*First Author: Roopa HIREMATH*

**Purpose:** To assess the efficacy of powered endoscopic dacrycystorhinostomy (DCR) with large bony ostium exposing of fundus of sac and primary mucosal anastomosis. The study involved prospective interventional case series with short perioperative follow up.

**Methods:** Operative and postoperative data were prospectively collected on 42 patients (15 men and 27 women; mean age, 62.4 years; range 14 – 91 years) who presented to a lacrimal clinic with epiphora and obstruction of the nasolacrimal system, and who consecutively underwent either primary or revision powered endoscopic DCR. All surgeries done by the same surgeon by standardized surgical technique. Follow-up evaluations included symptom evaluation and endoscopic assessment of the newly created ostium with fluorescein testing at each postoperative visit.

**Results:** The only surgical complication was one case of subcutaneous emphysema. Forty of the 42 DCRs were patent after a mean follow-up of 11 months (standard deviation = 5 months), yielding a success rate of 95.7%. One of the 42 DCRs was a failure because of the improper use of medications. Two patients with a patent ostium and positive results on fluorescein testing continued to have some symptoms.

**Conclusions:** Powered endoscopic DCR which meets with full sac exposure and primary mucosal apposition has a success rate comparable to that achieved with external DCR.

**Poster No.: EX1-141**

**Panel No.: 141**

### Rare Pediatric Unilateral Idiopathic Orbital Inflammatory Disease

*First Author: Arwinderjit WALIA*

*Co-Author(s): Radzlian BIN OTHMAN, Dhashani SIVARATNAM*

**Purpose:** We reported a rare case of unilateral pediatric idiopathic orbital inflammatory disease (IOID) with recurrent relapses.

**Methods:** A 14-year-old boy presented in August 2015 with a 3-day history of left eye pain and diplopia. On examination, his visual acuity was 6/6 bilaterally, with moderate proptosis in the left eye and restriction in all directions of gaze. The intraocular pressure in the affected eye remained within normal limits and fundus examination was unremarkable. There was no abnormality in the routine blood investigations done, however the contrasted CT scan of the orbit showed an enhancing heterogenous lesion in the left intraconal space with orbital apex involvement. A provisional diagnosis of left IOID was made, and he was started on IV methylprednisolone 500 mg bid for 3 days, followed by a tapering dose of oral prednisolone.

**Results:** Over the next 3 years, he had 5 recurrences. The first 3 episodes occurred within a span of 2 months, while tapering off oral prednisolone. After the 3rd attack, second line maintenance therapy with methotrexate was commenced. He continued to have 2 more attacks, both of which with a lapse of more than 1 year in between, and responded to IV methyl

prednisolone.

**Conclusions:** Pediatric IOID is uncommon, and 37% experience recurrence. Second line immunosuppressive therapy plays an important role in its management. It is vital to carefully monitor compliance to therapy and avoid the complications of recurrent high dose steroids and long-term second line therapy.

**Poster No.: EX1-143**

**Panel No.: 143**

### Reversed Probing and Silicone Intubation for Acquired or Congenital Complete Stenosis of Punctum

*First Author: Pham NGOC DONG*

*Co-Author(s): Thi Thuy Hang DO, Do TUYET NHUNG*

**Purpose:** To evaluate the outcome of reversed probing and silicon intubation to treat acquired or congenital complete stenosis of punctum.

**Methods:** Prospective study on the acquired or congenital complete stenosis of punctum. Upper and lower canaliculi were completely cut in their middle. Lumen of canaliculi was looked for under surgical microscope. If it was found, pig tail probing was reversely inserted to position of punctum. Punctum was created by a knife and scissors. Bicanaliculi or monocanicular intubation was performed if both (upper and lower) or only one canicular was found. If none of them were found, surgery was a failure. Silicone tube went from punctum (newly formed), via canalicular (with the wound) to the nasolacrimal duct. Silicone tube was tightened in the nasal cavity. The wound of canaliculi was closed with 6-0 vicryl suture.

**Results:** Fifteen eyes (15 patients) with 8 acquired and 7 congenital complete stenosis of punctum were enrolled in the study. The canalicular lumen of all 8 acquired punctum stenosis eyes was found and surgery was done successfully. That of congenital one found only in 4 eyes, but not in other 3 eyes. In those, where surgery was done successfully, 10 eyes had no more epiphora, and 2 eyes still suffered from mild epiphora. There was no change in 3 congenital punctum stenosis.

**Conclusions:** Reversed probing and silicone intubation was a good choice to treat complete stenosis of punctum, both congenial or acquired. It did not work on the patient who did not have canalicular.

**Poster No.: EX1-133**

**Panel No.: 133**

### Revision of Failed External Dacryocystorhinostomies: Efficacy and Safety of Adjunctive Intranasal Mitomycin-C and Triamcinolone

*First Author: Sombat TANABOONYAWAT*

*Co-Author(s): Vagefi M. REZA, Idowu OLUWATOBI, Kersten ROBERT, Copperman THOMAS*

**Purpose:** Failed dacryocystorhinostomies often result from fibrosis and mucosal scarring around the ostium. Topical steroid and mitomycin-C (MMC), an anti-proliferative agent, can potentially minimize mucosal scarring as well as fibrosis arising from wound healing. The purpose of this study was to evaluate the safety and efficacy of combined usage of adjunctive MMC and intranasal triamcinolone (TA) in revision external dacryocystorhinostomy (rEx-DCR).

**Methods:** A retrospective, interventional case series of all patients who underwent revision surgery for failed primary external dacryocystorhinostomy between June 2012 and December 2017 at a single institution. In all rEx-DCR procedures, silicone tube intubation was performed, and the tube was removed at least 3 months after surgery. All patients had intraoperative applications of mitomycin-C (0.5 mg/mL) for 3 minutes, and Gelfoam soaked with triamcinolone (40 mg/mL) onto the ostium. The outcome measures were anatomical and functional success rates at least 6 months after surgery.

**Results:** Thirty-seven rEx-DCRs were performed on 33 patients after initial failed Ex-DCR procedures. One rEx-DCR had failed EX-DCR 3 times, 9 had failed twice, and 27 had failed once. The mean follow-up period and stent period was 8.67 and 4.76 months, respectively. Anatomical success was noted in 97% (36/37) of patients, and functional success in 70% (26/37). None of the patients were noted to have any complications from adjunctive treatment with MMC and TA.

**Conclusions:** Intranasal MMC and triamcinolone are safe and effective adjunctive therapeutic agents to rEx-DCR that can minimize mucosal scarring.

**Poster No.: EX1-126**

**Panel No.: 126**

### Sight-Threatening Extraocular Cysticercosis Cyst

*First Author: Hiranmoyee DAS*

**Purpose:** To report 3 unusual cases of extraocular cysticercus cysts causing visual impairment.

**Methods:** Case reports.

**Results:** Case 1: 20-year-old male with painless progressive loss of vision and mild proptosis in right eye for 2 weeks. USG orbit revealed a unilocular cyst with

central solid structure showing undulating movements in the right optic nerve shaft. Case 2: 22-year-old male with mild proptosis and blurred vision in right eye for 1 month. MRI revealed cysticercus cyst in the superior rectus muscle indenting the globe from behind. Case 3: 18-year-old female with headache, vomiting, and blurring of vision in both eyes for 2 weeks. Fundoscopy revealed papilloedema. CT brain revealed a cyst in the cerebral aqueduct obstructing the drainage of cerebrospinal fluid, causing dilation of all the ventricles.

**Conclusions:** Of more than 500 cases collected in several series, 68% of ocular cysticercus cysts are located in posterior segment (intraocular) and they are sight-threatening. But these 3 cases presented with visual impairment, though they were extraocular in location. High index of suspicion is required for the diagnosis of ocular cysticercosis because of endemic nature of this infestation in Northeast India due to consumption of smoked pork.

## Pediatric Ophthalmology & Strabismus

**Poster No.: EX1-145**  
**Panel No.: 145**

### 0.5% Timolol Eye Drop Monotherapy as a First-Line Treatment for Capillary Hemangioma

*First Author: Usa* **THITIRATSANONT**  
*Co-Author(s): Kunlayanut* **KANJANABURA**, *Piyarat* **SIMTHAMNIMIT**, *Chalernpol* **SRICHAROEN**, *Nattapong* **THITHIRATSANONT**

**Purpose:** To evaluate efficacy and safety of 0.5% Timolol eye drop monotherapy as a first-line treatment for capillary hemangioma.

**Methods:** Retrospective, consecutive, clinical case series.

**Results:** The medical records, including consequent photographs of children with capillary hemangioma treated consecutively with 0.5% timolol solution from October 1, 2017 to July 31, 2018 were reviewed. Eleven cases of capillary hemangioma, age 0-8 months, were treated with 0.5% timolol eye drop, applied to the lesions twice a day monotherapy for at least 1 month. General physical examination, including vital signs, respiration, skin lesions, eye examination before treatment, and every follow-up visit was recorded. Eight of 11 cases had shown improvement in size, thickness, and coloration of the lesions without any complications. The clinical improved within 2 months. One case had relapsed after treatment cessation and got better after re-treatment. One case lost follow-up. One case failed the monotherapy and extra additive treatment with propranolol and vinblastine.

**Conclusions:** 0.5% Timolol eye drop monotherapy can be used safely as a first-line treatment for capillary hemangioma, especially uncomplicated cases.

**Poster No.: EX1-169**  
**Panel No.: 169**

### Cataract Profiles in Congenital Rubella Syndrome with Bilateral Pigmentary Retinopathy: A Case Series

*First Author: Eka* **BUDININGTYAS**  
*Co-Author(s): Rita S.* **SITORUS**

**Purpose:** To report a case series of 3 rubella retinopathies with different cataract manifestations in congenital rubella syndrome (CRS).

**Methods:** Case 1: A 9-month-old baby girl came with a whitish appearance on her right eye since she was 3 months old. Ophthalmology examinations showed microcornea and unilateral cataract. Funduscopy revealed salt-and-pepper retinopathy on both eyes. Case 2: A 1-month-old baby boy underwent eye screening because his mother had previous history of positive rubella serology during her pregnancy. Initial visit showed normal anterior and posterior segment of both eyes. One year after, there were appearances of salt-and-pepper retinopathy in both eyes, while the lens remained clear. Case 3: A 1-year-old boy came with whitish appearance on both eyes since 2 months old. Initial visit showed total lens opacity in both eyes. After the patient underwent cataract surgery, salt-and-pepper retinopathy were found on both eyes. All 3 patients had the classic triads of CRS involving ocular, hearing, and cardiac abnormality.

**Results:** All of the cases showed different ocular manifestations for CRS. Those variations may explain that different times of infection will affect the outcome of clinical manifestation and may infect any organ at different times.

**Conclusions:** The ocular manifestations of cataract and pigmentary retinopathy in CRS may vary in any cases. The time of maternal infection by the rubella virus during the embryological process determine which organ or tissue will be affected. Thorough ophthalmological examinations are important to make the diagnosis of clinical CRS.

**Poster No.: EX1-162**  
**Panel No.: 162**

### Characteristics of Birth-Related Retinal Hemorrhages in Newborns

*First Author: So Young* **KIM**  
*Co-Author(s): Moon Sun* **JUNG**, *Hoon Dong* **KIM**, *Eungsuk* **LEE**

**Purpose:** To report the characteristics of birth-related retinal hemorrhages in newborns.

**Methods:** Healthy newborns born in South Korea from June 2012 to March 2017 were offered universal eye screening tests. The retinal fundus examinations were performed using a wide-field digital imaging system. All retinal images were reviewed, and the pattern, size, extent, and severity of the retinal hemorrhages were recorded by 1 pediatric ophthalmologist.

**Results:** A total of 55,901 healthy newborns underwent eye examination and birth-related retinal hemorrhages (BRRHs) were detected in 14,668 cases and 26,307 eyes (26.24%). Macula and optic nerve were involved in 47.2%, 10.2% involved beyond Zone 1, and 6.0% involved multilayers of retina. Vitreous hemorrhages were found in 0.84%. Roth spots were found in 34.1%, and it is closely related to size and number of hemorrhage spots ( $P < 0.01$ ), and 24.18% had severe retinal hemorrhages and follow-up examinations were required. The most related risk factor of BRRHs was vaginal delivery compared to cesarean section (odds ratio, 12.2).

**Conclusions:** BRRHs are common and known to be benign in most cases. However, they often involve macula, optic nerve, and multilayers of retina, and vitreous hemorrhages can be accompanied. Therefore, close observation may be necessary in severe cases. Our study showed that a significant number of healthy newborns exhibit retinal hemorrhages, and the prevalence was 26.24%.

**Poster No.: EX1-167**

**Panel No.: 167**

### Clinical Analysis and Curative Effect of Congenital Nasolacrimal Duct Obstruction in Children After Incision of Lacrimal Sac Abscess

*First Author: Wen LIU*

*Co-Author(s): Chengyue ZHANG*

**Purpose:** To observe the etiological features and surgical effects of congenital lacrimal duct obstruction in children after incision of lacrimal sac abscess.

**Methods:** Retrospective analysis of the history and clinical characteristics of 22 cases with congenital nasolacrimal duct obstruction (24 eyes) after incision of lacrimal sac abscess, and explore the radiographic characteristics of nasolacrimal canals. Ritleng lacrimal intubation or nasal endoscopic dacryocystorhinostomy (NES-DCR) were performed. The therapeutic effect was analyzed, and the complications were observed.

**Results:** There were 14 eyes with nasolacrimal canal agenesis (58%), including 12 eyes with bony stenosis and 2 eyes with atresia. All the patients had scar in the dacryocyst area. Ten eyes without nasolacrimal canal agenesis, including 8 eyes with complex obstruction, 2 eyes with dacryocystocele. Ritleng lacrimal intubation was performed in patients without nasolacrimal canal agenesis. Nasal endoscopic dacryocystorhinostomy

(NES-DCR) was performed in patients with nasolacrimal canal agenesis. The total cure rate was 87.5% (21/24); 2 eyes had improved, 1 eye had no effect. The follow-up time was 5 - 55 months (mean 30 months) after the removal of the tube or dacryocyst stent. Complications included 2 eyes of possible false passage formation in the operation, 1 eye of laceration of lachrymal point, and 1 eye of silicon tube prolapse.

**Conclusions:** Recurrent lacrimal sac abscess probably exists with complex etiological features. Incision of lacrimal sac abscess should not be performed blindly. Lacrimal intubation should be performed in these patients without nasolacrimal canal agenesis and NES-DCR with nasolacrimal canal agenesis.

**Poster No.: EX1-151**

**Panel No.: 151**

### Clinical Characteristics of Patients with Ocular Motility Limitation Caused by Injuries

*First Author: Le LIEU*

**Purpose:** To describe the clinical characteristics of patients with ocular motility limitation caused by injuries.

**Methods:** Cross-sectional description study, case series with no control on patients with ocular motility limitation after injuries examined at Vietnam National Institute of Ophthalmology (VNIO) from September 2016 to September 2017.

**Results:** There were 42 eligible patients in the study group. Male: 69%, female: 31% with the percentage of male patients being more than twice that of female patients. The age ranged from 18 to 35 years old. Traffic accidents were a common cause (83.2%). The most common complaints were diplopia (90.5%), strabismus accounted for 7.1%, loss of vision 2.4%, and ocular motility limitation. Severe limitation accounted for 50%, moderate 31%, while the group with mild limitation accounted for only 19%. Horizontal strabismus was the most popular among the study group (57.1%); non-strabismus was less frequent (33.3%); vertical strabismus and combine strabismus accounted for only 7.1% and 2.4%, respectively. The positions of the injuries causing ocular motility limitation were nerve palsy in 50% of patients with ocular motility limitation; 33.4% had damaged extraocular muscles and/or fractures of the orbital floor; 7.1% had combined cause and 9.5% could not be identified.

**Conclusions:** Ocular motility limitation after injuries is often severe, and there is a close relation between the severity and the cause of ocular motility limitation.

Poster No.: EX1-148

Panel No.: 148

### Comparison of Plusoptix S12R Photoscreener with Cycloplegic Retinoscopy and Autorefractor in the Pediatric Age Group

First Author: Varun **SAINI**

Co-Author(s): Raffat **ANJUM**, Jawahar **GOYAL**, Anika Gupta **GUPTA**, Usha **RAINA**, Pallavi **SAINI**

**Purpose:** To compare refractive measurements made in children using non-cycloplegic photoscreener Plusoptix S12R with cycloplegic retinoscopy, non-cycloplegic autorefractor, and cycloplegic autorefractor.

**Methods:** The study population (200 eyes of 100 children) was divided into 2 groups – Group 1 (age 3-7 years) and Group 2 (age 8-15 years). In Group 1, Plusoptix was compared with cycloplegic retinoscopy. In Group 2, Plusoptix was compared with cycloplegic retinoscopy and autorefraction. Unpaired *t*-test and Pearson's correlation were used for statistical analysis.

**Results:** The mean difference in sphere (DS), spherical equivalent (DSE), and cylinder (DC) between cycloplegic retinoscopy and Plusoptix in Group 1 were  $0.68 \pm 0.23$  ( $P = 0.003$ ),  $0.77 \pm 0.23$  ( $P = 0.001$ ), and  $0.18 \pm 0.10$  ( $P = 0.069$ ). In Group 2, DS, DSE and DC between cycloplegic retinoscopy and Plusoptix were  $0.86 \pm 0.26$  ( $P = 0.001$ ) and  $0.97 \pm 0.27$  ( $P < 0.001$ ),  $0.23 \pm 0.12$  ( $P = 0.054$ ); between cycloplegic autorefractor and Plusoptix were  $0.69 \pm 0.25$  ( $P = 0.007$ ),  $0.74 \pm 0.26$  ( $P = 0.005$ ), and  $0.10 \pm 0.11$  ( $P = 0.358$ ); and between non-cycloplegic autorefractor and Plusoptix were  $-0.25 \pm 0.24$  ( $P = 0.300$ ),  $-0.19 \pm 0.25$  ( $P = 0.440$ ), and  $0.11 \pm 0.11$  ( $P = 0.305$ ). Pearson's correlation coefficients of S, SE, and C between Plusoptix and cycloplegic retinoscopy were 0.948, 0.938, and 0.924 in Group 1 and 0.972, 0.972, and 0.946 in Group 2, and these values were statistically significant. Plusoptix also had a significant positive correlation with cycloplegic and non-cycloplegic autorefraction in both groups. Plusoptix gave axis values within  $15^\circ$  of cycloplegic retinoscopy in 87.93% of eyes in Group 1 and in 77.94% of eyes in Group 2.

**Conclusions:** Plusoptix S12R shows good correlation with cycloplegic retinoscopy and autorefraction in children. Technology like photoscreeners can be employed to hasten the diagnosis and management of routine issues like refractive errors and amblyopia, thereby increasing the efficiency of the overburdened healthcare system.

Poster No.: EX1-157

Panel No.: 157

### Congenital Iris Stromal Cyst with Recurrence After Excision

First Author: Stephanie Suzanne **GARCIA**

Co-Author(s): Mario Jr. **AQUINO**, Dina **PERALTA**

**Purpose:** Limited information is available on recurrent iris stromal cysts in children due to the small number of reported cases.

**Methods:** Single case report.

**Results:** A 4-month-old male with unremarkable perinatal history, and no history of ocular trauma was seen due to a colored spot on the right eye noted since birth. Examination revealed corneal edema, shallow anterior chamber, and a gray translucent round anterior chamber mass with surface vasculature. Intraocular pressure (IOP) was 50 mm Hg. The iris cyst was excised and was noted to be adherent to the corneal endothelium and nasocentral lens. Rupture of the cyst was noted intraoperatively. Lensectomy was also done since nasocentral opacity of the lens was noted. Histopathology showed stratified nonkeratinized epithelium. Postoperatively, IOP was 9 mm Hg. Four months later, a fibrotic membrane was seen at the site of excision as well as a translucent cystic mass on the nasal iris. Ultrasound biomicroscopy revealed a large anterior chamber cyst adherent to the cornea without posterior extension. The patient underwent excision of recurrent iris cyst with cryotherapy and large sectoral iridectomy. Histopathology showed stratified nonkeratinized epithelium with goblet cells consistent with an iris stromal cyst.

**Conclusions:** Primary stromal cysts are uncommon but are more often of the congenital type. These cysts progressively enlarge and can lead to complications such as endothelial adhesion, angle closure, glaucoma, and amblyopia which warrants intervention. Recurrence is frequent, especially in cases of incomplete excision. Supplementary treatment with cryotherapy, photocoagulation, or complete excision with iridectomy may be necessary to minimize further recurrences.

Poster No.: EX1-153

Panel No.: 153

### Crouzon Syndrome with Anterior Segment Dysgenesis: A New Syndromic Association

First Author: Isha **AGARWALLA**

Co-Author(s): Nilutparna **DEORI**, Henal **JAVERI**, Fazil **KHURRUM**, Pranjal **MISHRA**, Shahinur **TAYAB**

**Purpose:** Crouzon syndrome is an autosomal dominant disorder with variable expressivity. It is a brachial arch anomaly ranging from mild to severe forms. Dysgenesis of anterior segment structures with high propensity for secondary glaucoma is the first ever documented

finding noted with Crouzon syndrome.

**Methods:** A detailed history, facial, and ocular examination, along with a battery of investigations were done.

**Results:** A 3-year-old patient reported to the OPD with the chief complaint of diminution of vision of both eyes with an abnormal head posture. Facial examination of the patient revealed mild frontal bossing and protrusion of lower jaw. The pupil was seen abnormal in with iridodysgenesis. 90D slit lamp biomicroscopy revealed no changes in the posterior pole of the fundus. The child had undergone a battery of laboratory tests to rule any metabolic insults. Gross neuromotor development impairment was noted. MRI of the brain revealed suggested of sequel of hypoxic ischemic encephalopathy. Based on these, the case was diagnosed as Crouzon syndrome with bilateral iridodysgenesis, with high likelihood of development of glaucoma. The patient was kept on regular follow-up for intraocular pressure evaluation and to note the disc changes, if any. The parents were counselled and the follow-up plan was thoroughly explained. Early diagnosis and regular follow-up decreased the propensity for glaucoma development and reduced the further risks.

**Conclusions:** Crouzon syndrome with anterior segment dysgenesis was never reported previously. This therefore calls for a more detailed study on the syndromic associations of anterior segment dysgenesis and ways to combat the associated complications.

**Poster No.: EX1-160**

**Panel No.: 160**

### Effects of Serum Ferritin Level on Visual Functions and Ocular Manifestations Between Transfusion-Dependent Thalassemia and Nontransfusion-Dependent Thalassemia Patients in Phayao Hospital, Thailand

*First Author: Tosaporn YODMUANG*

**Purpose:** To investigate effects of serum ferritin levels on visual functions and ocular manifestations in thalassemia patients in Phayao Hospital.

**Methods:** Prospective, cross-sectional study was conducted in thalassemia patients during October 2016 to February 2017. Complete systemic and ophthalmic examinations with serum ferritin level were recorded.

**Results:** All 54 thalassemia patients/108 eyes were included of 31 male and 23 female, with the ages of 1 - 23 years old. The mean age was 14.3 years old and mean serum ferritin levels was 5,107.57 ng/mL in 28 transfusion dependent thalassemia patients (TDT). The mean age was 9.2 years old and mean serum ferritin levels was 422.2 ng/mL in 26 non-dependent transfusion thalassemia patients (NTDT). Ocular involvement was found in refractive error 52.2%, dry

eye 29.8%, abnormal visual acuity 16.7%, posterior subcapsular cataract 8.3%, venous tortuosity 1.9%, disc hyperemia 2.8%, and increase CD ratio 3.8%. There was a significant difference of refractive error and dry eye between TDT and NTDT group ( $P = 0.001$  and  $P = 0.001$  respectively). Serum ferritin level over 1000 ng/mL significantly associated with refractive error ( $P = 0.013$ ), visual acuity ( $P = 0.018$ ), and dry eye ( $P = 0.004$ ). The prevalence of posterior segment abnormality was low.

**Conclusions:** Half of thalassemia patients were found an ocular involvement. Yearly eye examination is still recommended, and serum ferritin  $\geq 1000$  ng/mL should be concerned of ocular complication. Dry eye is a silent problem; their lifestyle modification is essential. Refractive error is the most common cause of visual disturbance and should be aware of amblyopia prevention.

**Poster No.: EX1-150**

**Panel No.: 150**

### Evaluation of the Spot Vision Screener for Vision Screening in 3-Year-Old Children in Japan

*First Author: Shion HAYASHI*

*Co-Author(s): Yaoko IINO, Akira INAMURA, Issaku SUZUKI, Hidetoshi YAMASHITA*

**Purpose:** One of the problems of vision screening in 3-year-old children in Japan is the fact that refractometry cannot be used, and as a result, refractive error is often overlooked. Herein, we investigated whether Spot Vision Screener (SVS) can be used to detect eye diseases such as amblyopia.

**Methods:** The participants were 122 children who underwent vision screening for 3-year-olds in Sagae City between April and August 2018. Normally, visual screening for 3-year-olds is performed visual acuity testing and health inquiry in home (primary test) and visual acuity test performed by a public health nurse (secondary test). If the secondary test results indicate some abnormality, the patient is referred to an ophthalmologist for a detailed examination. We investigated testability of SVS in secondary testing and compared its positive predictive rate with that of the conventional testing method. The criterion used to identify children requiring treatment was a corrected visual acuity in one eye of over 0.15 logMAR as indicated by the detailed examination.

**Results:** Testing was performed on 115 participants (59 boys, 56 girls). The testability rate was 100% for SVS and 76.7% for the home-use visual acuity tests. SVS had a positive predictive rate of 75%, while that of the conventional testing method was 27%.

**Conclusions:** SVS had a higher testability rate than the conventional visual acuity testing method. In addition, the positive predictive rate of SVS was also higher. We believe that SVS is useful for refractometry and eye

position measurements in order to detect eye diseases in 3-year-old children.

**Poster No.: EX1-163**

**Panel No.: 163**

### Findings of Universal Newborn Eye Screening Examination in South Korea

*First Author: So Young KIM*

*Co-Author(s): Moon Sun JUNG, Hoon Dong KIM, Eungsuk LEE*

**Purpose:** To present the findings and results of the newborn eye screening examination with wide-field digital retinal imaging system in South Korea.

**Methods:** This is a cross-sectional study of the newborns born in South Korea, between June 2012 and March 2016. Healthy newborns underwent ocular examination using wide-field digital retinal imaging system (Natus Medical System, Pleasanton, California, USA) and the images were reviewed by 1 pediatric ophthalmologist.

**Results:** A total of 55,901 healthy newborns were enrolled, and ocular abnormal findings were discovered in 14,993 cases (26.82%). Retinal hemorrhages were found in 14,668 cases (26.24%) and of these, 3514 cases had significant retinal hemorrhages, possibly amblyogenic. The other 265 cases (0.56%) with abnormal findings included congenital cataract, retinoblastoma, ocular coloboma, optic disc abnormalities, persistent pupillary membrane, retinal pigment disorder, and other retinal abnormalities including FEVR.

**Conclusions:** Ocular examination of healthy newborns leads to the detection of a significant number of ocular diseases in our study. Newborn eye screening with RetCam is a simple and effective method to detect ocular anomalies earlier, and it may be helpful to prevent the visual impairment caused by treatable eye diseases.

**Poster No.: EX1-171**

**Panel No.: 171**

### Histopathologic Features of Strabismus Fixus Convergens

*First Author: Bonifacio BUNO*

*Co-Author(s): Alvina SANTIAGO*

**Purpose:** To report an unusual case of progressive esotropia since childhood with a histopathologic correlation.

**Methods:** This is a case report.

**Results:** A 27-year-old male consulted our clinic for large angle right esotropia (> 95 PD). The deviation was noted since 4 years of age and was described as constant and progressive. Axial length was 23.1 mm in the right eye and 22.9 mm in the left eye. CT scan

of the orbits showed enlarged right medial rectus with extreme medial rotation of the right eyeball. He underwent medial orbitotomy with biopsy and hang-back recession of the medial rectus. Intraoperatively, the medial rectus was abnormally tight and friable. Histopathologic assessment showed dense areas of fibrosis in the muscle tissue. No hypertrophy of muscle fibers was noted, but there was an apparent muscle nuclei enlargement, described as boxcar in appearance.

**Conclusions:** The case presented a rare condition of strabismus fixus convergens secondary to fibrosis of the medial rectus muscle. A detailed description of the histopathologic changes in the muscle tissue is important in understanding the pathogenesis of this strabismus disorder.

**Poster No.: EX1-161**

**Panel No.: 161**

### Long-Term Observation of Eye Complications in Fukuyama Congenital Muscular Dystrophy

*First Author: Kazumi SHINOZAKI*

*Co-Author(s): Tomohiro IIDA, Yuriiko MIKAMI, Makiko OSAWA, Mei SASAMOTO*

**Purpose:** Fukuyama type congenital muscular dystrophy (FCMD) is an autosomal recessive disorder characterized by progressive muscular dystrophy. Ocular abnormalities and dysgenesis of the central nervous system with FCMD were reported. We reported long-term observation of eye complications in FCMD.

**Methods:** Thirty eyes of 15 cases were enrolled. Visual acuity, ocular complications, and electroretinogram were observed over 5 years.

**Results:** In the case of remarkable retinal abnormality, moderate myopia was present in infancy. Strabismus was observed in 60% of cases. Posterior subcapsular cataract was observed in 80%. Lens subluxation was diagnosed in 3 eyes of 2 cases, and 1 eye required surgery. The optic papilla was pale in 70%. Retinal detachment was observed in 1 eye. Retinal tear was suspected in 6 eyes of 3 cases. Electroretinography was weak in cases with retinal abnormalities. Eye abnormality was observed at infancy; progression was slow.

**Conclusions:** In FCMD, eye examination in infancy is important. It is suggested that follow-up observation is better than immediate surgery because the progression of lens and retinal complications is slow.

**Poster No.: EX1-149**

**Panel No.: 149**

### Long-Term Results of Slanted Recession of Bilateral Lateral Rectus Muscle for Intermittent Exotropia with Convergence Insufficiency

*First Author: Soo Jung LEE*

*Co-Author(s): Ji Min KWON, Jung Min PARK*

**Purpose:** To evaluate the long-term efficacy of slanted bilateral lateral rectus (BLR) recession on distance and near exodeviation and near-distance difference for intermittent exotropia (IXT) with convergence insufficiency in children.

**Methods:** The medical records of 53 patients with convergence insufficiency IXT who underwent slanted BLR recession and were followed up for more than 12 months were retrospectively analyzed. Deviation angles at 1 day, 1 week, 1 month, 3 months, 6 months, and 12 months postoperatively and at the last visit were reviewed. Surgical success was defined as postoperative residual distance and near deviation angles  $\leq 8$  PD, and near-distance difference  $\leq 8$  PD.

**Results:** The mean duration of follow-up was 23 months (range, 12–61 months). The mean angle of deviation at distance and at near were reduced significantly, from  $23.2 \pm 5.1$  PD (range, 14–40 PD) and  $33.8 \pm 5.1$  PD (range, 25–50 PD) preoperatively to  $2.6 \pm 7.6$  PD (range, -18–20 PD) and  $6.2 \pm 10.2$  PD (range, -18–30 PD) postoperatively ( $P < 0.0001$ ). The mean near-distance difference was reduced significantly, from  $10.6 \pm 1.5$  PD (range, 10–17 PD) preoperatively to  $4.0 \pm 4.4$  PD (range, 0–16 PD) postoperatively ( $P < 0.0001$ ). Surgical success was obtained in 31 patients, and none of the patients manifested limitation of eye movement or diplopia.

**Conclusions:** Slanted BLR recession is an effective surgical method for reducing distance and near exodeviation and near-distance difference for IXT with convergence insufficiency.

**Poster No.: EX1-159**

**Panel No.: 159**

### Ocular Associations and Complication of Anterior Megalophthalmos

*First Author: Devesh KUMAWAT*

*Co-Author(s): Pranita SAHAY*

**Purpose:** To describe the clinical features in cases of anterior megalophthalmos (AM).

**Methods:** A retrospective record review was performed for patients with AM who presented between June 2017 and May 2018. Clinical history, slit lamp examination, Scheimpflug imaging indices (Pentacam-HR, Oculus, GmbH), dilated fundus examination, and treatment records were reviewed.

**Results:** The study included 8 eyes of 4 male patients (mean age 6.5 years, range 4 to 10 years). Corrected distance visual acuity ranged from finger counting to 20/80. The mean horizontal corneal diameter, central corneal thickness, steep keratometry, flat keratometry, anterior chamber (AC) angle, AC depth, maximum pupil diameter, and axial length were  $13.8 \pm 0.5$  mm,  $538.7 \pm 68.9$   $\mu$ m,  $42.8 \pm 1.6$  diopters (D),  $41.4 \pm 0.9$  D,  $47.0 \pm 4.2$  degrees,  $3.8 \pm 0.3$  mm,  $3.9 \pm 0.1$  mm, and  $24.9 \pm 0.9$  mm, respectively. Posterior dislocation of crystalline lens, vitreous degeneration, and rhegmatogenous retinal detachment (consequent of retinal dialysis/atrophic hole/lattice with hole) were noted in 7, 8, and 5 eyes, respectively. Pigment dispersion glaucoma was noted in both eyes of 1 patient, which was managed with topical anti-glaucoma medication. Vitrectomy with silicone oil tamponade was successful in retinal reattachment in all 3 eyes that underwent surgery.

**Conclusions:** Scheimpflug imaging helps in demonstrating the corneal and anterior segment pathological changes in AM. AM is probably a developmental disorder of the ciliary body region with secondary changes in both the anterior and posterior segment. Coexisting lenticular abnormalities, vitreo-retinopathy, and glaucoma require a comprehensive management.

**Poster No.: EX1-168**

**Panel No.: 168**

### Ocular Complications of a Delayed Diagnosis of Incontinentia Pigmenti in a Female Filipino Infant: A Case Report

*First Author: Kaye Lani Rea LOCAYLOCAY*

*Co-Author(s): Gary MERCADO*

**Purpose:** To describe the pathophysiology, distinct characteristics, and clinical manifestations of Incontinentia Pigmenti (IP) for early recognition and prevention of severe ocular complications, as illustrated by a case of IP with total retinal detachment in a Filipino female infant.

**Methods:** This was a case report on IP in a Filipino infant with findings of total retinal detachment (RD) on the left eye and persistent hyperplastic primary vitreous (PHPV) on the right eye. Both PubMed, local databases, and a recent case seen in the same institution were used for current review of literature on IP. Data was then correlated to the patient's case to describe the epidemiology, pathophysiology, clinical manifestations, imaging findings, and the management of IP.

**Results:** IP is an X-linked dominant disorder affecting tissues of neuroectodermal origin like the skin, other dermal appendages, central nervous system, and the eyes. This is a case of a 6-month-old infant with a neonatal history of vesicular skin rashes presenting with leukocoria at 3 months of age. Ocular findings included a phthisic left eye, poor fixation, and

nystagmus. Examination under anesthesia was done and revealed total RD on the left and PHPV on the right eye.

**Conclusions:** Early recognition of IP and immediate ophthalmologic referral and evaluation is best done upon the presentation of cutaneous lesions in affected neonates. IP has been known to present with pseudo-retinopathy of prematurity, requiring prompt laser treatment to reduce the risk of total retinal detachment and to enhance visual prognosis.

**Poster No.: EX1-155**

**Panel No.: 155**

### Outcome of Retinopathy of Prematurity Networking by Using Telemedicine

*First Author: Prangchanok SAWETWONG*

*Co-Author(s): Phanthipha WONGWAI*

**Purpose:** The aim of this study was to evaluate the outcome and efficacy of retinopathy of prematurity (ROP) networking by using telemedicine, including outcome of treatment, ROP, and risk factor affected treatment outcome.

**Methods:** Study in patients who diagnosed ROP in Health area 7th northeast of Thailand. A retrospective review of network's database of all patients who have risk factors: preterm newborn, low birth weight, received oxygenation supplement, and others. Period of transferring patient to tertiary care hospital (Srinagarind Hospital) for proper treatment after diagnosis by using telemedicine and underwent treatment at Srinagarind Hospital from January 2014 to December 2016.

**Results:** There were 1828 patients enrolled in this study. All patients who diagnosed ROP in staging that needed modality treatment in Srinagarind Hospital can get treatment in 72 hours. Duration since diagnosis in Srinagarind and by network telemedicine to treatment were  $18.11 \pm 22.28$  hours and  $33.25 \pm 30.65$  hours, respectively. Outcome of treatment in 72 hours; regressed ROP 60.17%, good visual outcome 2.65%. Extremely low birth weight and gestational age of 29.97 weeks were the risk factors, which were statistically significant between treatment and non-treatment groups.

**Conclusions:** All patients who diagnosed ROP both in network health area 7th by using telemedicine and Srinagarind Hospital can get treatment in 72 hours. But the outcome of treatment wasn't what it would be, because of incomplete recording database.

**Poster No.: EX1-147**

**Panel No.: 147**

### Outcomes of Cataract Surgery in Pediatric Uveitis

*First Author: Chirakshi DHULL*

*Co-Author(s): Jyothi BALAKRISHNAN, Yogita GUPTA, Sudarshan KHOKHAR, Manish MAHABIR*

**Purpose:** To evaluate the outcomes of cataract surgery in pediatric uveitis.

**Methods:** It was an ambispective study. Patients <16 years with chronic uveitis who underwent cataract surgery from January 2005 to December 2017 after control of inflammation were included. Etiology of uveitis, best corrected visual acuity (BCVA), postoperative complications, need for secondary intervention, and immunosuppressants (IS) use were recorded.

**Results:** A total of 98 eyes of 56 children (median age 7.5 years) were included with median follow-up of 3 years. Thirty cases had juvenile idiopathic arthritis (JIA), 18 pars planitis, 3 tuberculosis, 2 of sarcoidosis, 1 each of toxoplasmosis, celiac disease, and tubulointerstitial nephritis and uveitis (TINU). Median preoperative BCVA was 5/200, which improved to 20/60 postoperatively. The final BCVA better than 20/60 was seen in 63.2% (42.3% in JIA vs 86.9% in non-JIA patients). Complications included visual axis opacification (VAO) in 18.3%, secondary glaucoma in 25.5%, retinal problems in 35.7%, and amblyopia in 21.4%. Secondary intervention was required in 23.4% (28.8% JIA vs 17.3% non-JIA). Indications for intervention were VAO in 18 eyes, glaucoma in 4 eyes, retinal detachment in 2 eyes, and intraocular lens explant for uncontrolled inflammation in 1 eye. The mean use of steroids (>5 mg)/IS was 3 months post-surgery.

**Conclusions:** Cataract surgery improved visual outcome in pediatric uveitis with optimum control of inflammation and adequate management of complications. Non-JIA children have significantly better results than JIA. Holistic approach with treatment of retinal problems, glaucoma, and amblyopia can help in improving visual outcomes.

**Poster No.: EX1-154**

**Panel No.: 154**

### Outcomes of Harada Ito Procedure for Acquired Torsional Diplopia

*First Author: Almas ABDUL AZIZ*

*Co-Author(s): Sandra CHANDRAMOULI*

**Purpose:** To evaluate the outcomes of Harada Ito procedure in patients with acquired superior oblique paresis.

**Methods:** The medical records of 5 patients who were diagnosed with acquired superior oblique paresis and underwent Harada Ito procedure in an

academic institution were reviewed. The demographic data, duration, and cause of palsy were noted. The preoperative prism cover test (9 gaze) and degree of torsion – subjective and objective – were noted and compared with the postoperative outcome. Harada Ito was combined with horizontal or oblique muscle surgery in a few cases, depending upon the case.

**Results:** Postoperatively, all the patients had good functional outcome with resolution of torsional diplopia.

**Conclusions:** Harada Ito surgery successfully treated torsional diplopia in patients with superior oblique paresis.

**Poster No.: EX1-170**

**Panel No.: 170**

### Prolonged Central Nervous System and Respiratory Depression in Preterm Neonates After Exposure to Brimonidine Tartrate-Timolol Maleate Ophthalmic Drops: A Case Series

*First Author: Corrina AZARCON*

**Purpose:** We reported 3 cases of preterm neonates who presented with central nervous system (CNS) and respiratory depression after inadvertent exposure to brimonidine tartrate 0.2% - timolol maleate 0.5% ophthalmic drops.

**Methods:** CNS and respiratory depression were observed in the 3 neonates within 2 hours of administration of brimonidine tartrate 0.2% – timolol maleate 0.5% eye drops. Respiratory support was initiated upon admission to the neonatal intensive care unit (NICU). The patients were gradually weaned from respiratory support within 24 to 48 hours from the incident.

**Results:** The effects of the drug combination lasted for a prolonged period of 24 to 48 hours, after which all 3 neonates were noted to be back to their baseline status.

**Conclusions:** This case series suggests that the drug combination of brimonidine tartrate and timolol maleate causes a prolonged depression of the central nervous and respiratory systems in preterm neonates. This period of depression is significantly longer than what was seen for older infants and children.

**Poster No.: EX1-165**

**Panel No.: 165**

### Retinopathy of Prematurity Among Premature Infants in Bali and Its Association with Neonatal Factors

*First Author: A.a. CITRADEWI*

**Purpose:** To aimed the incidence dan neonatal risk factors for retinopathy of prematurity (ROP) in

premature infants.

**Methods:** A descriptive, retrospective study of the medical records among 136 preterm infants who had been screened to ROP from January 2014 to December 2015 in general hospital in Bali, Indonesia. Sample collection was total sampling, using medical records of preterm infants for gender, gestational age, birth weight, oxygen, sepsis, blood transfusion, and hyaline membrane disease (HMD).

**Results:** The overall incidence of ROP in our study was 6.6%. Stage 1 ROP, stage 2 ROP, and AP ROP were detected in 3.7%, 2.2%, and 0.7% of the premature infants, respectively, according to the International Classification of ROP. Most of the premature infants with ROP had retinal vascular zone 2 (4.4%). The results showed that incidence of ROP higher in gestational age  $\leq 30$  weeks (8.7%), in birth weight  $\leq 1500$  grams (8.8%), oxygen therapy (6.8%), sepsis (9.0%), blood transfusion (9.8%), HMD (9.1%), and female preterm infant (7.5%).

**Conclusions:** Retinopathy of prematurity (ROP) is a major cause of childhood blindness worldwide. Gestational age under 30 weeks, low birth weight, oxygen therapy, sepsis, blood transfusion, and HMD increased risk factors of retinopathy of prematurity.

**Poster No.: EX1-221**

**Panel No.: 221**

### Risk Factors for Consecutive Exotropia and Hyperopic Changes After Bilateral Medial Rectus Recession

*First Author: Hae Jung PAIK*

**Purpose:** To define risk factors for and to analyze changes in hyperopic refractive error during development of postoperative, exotropia (XT) after bilateral medial rectus (BMR) recession to treat infantile esotropia.

**Methods:** We retrospectively examined 50 infantile esotropia pts who underwent BMR recession from January 2005 to December 2010. All were  $<10$  years of age and underwent  $\geq 36$  months of follow-up. We recorded age at operation, the preop. angle, the extent of MR recession, strabismus status pre/post-op, changes in the refractive errors, any postoperative overcorrection, DVD, and IOOA.

**Results:** Consecutive XT developed in 18 (36%) pts. The preop. refractive error was  $+0.90 \pm 0.79$  D in consecutive XT and  $+1.94 \pm 1.48$  D in the surgical success (SS) ( $P = 0.019$ ). The extent of hyperopic decrease was significantly greater in the consecutive XT than the SS ( $1.59 \pm 1.38$  D/ $2.86 \pm 1.97$  D) at POD 3 yrs ( $P = 0.008$ ). Postop. IOOA was detected in 10 (70.5%) in consecutive XT and 3 (29.55%) in the SS ( $P = 0.002$ ). No significant between-group difference in the incidence of overcorrection or DVD was apparent.

**Conclusions:** The presence of hyperopia ( $> +2.0$  D)

prior to BMR recession and a marked fall in the extent of hyperopia (–1.0 D/year) after recession may be associated with a high risk of consecutive XT. Thorough follow-up is necessary when IOOA develops after BMR recession.

**Poster No.: EX1-166**

**Panel No.: 166**

### Rubinstein-Taybi Syndrome: A Case Report

*First Author: Sidratul NAZNIN*

**Purpose:** Rubinstein-Taybi syndrome is a rare genetic syndrome characterized by post-natal growth retardation, broad thumbs and toes, short stature, distinct facial features like low hairline, thick eyebrows, high arch palate, beaked nose with columella, micrognathia, low set ears, microcephaly, heart and renal anomalies, and varying degrees of intellectual disability. Ophthalmic features include strabismus, down-slanting palpebral fissure, corneal opacities, coloboma, cataract, glaucoma, and anterior segment dysgenesis. Diagnosis is mainly clinical, based on the characteristic systemic and ophthalmic findings. Co-management with the physicians is required.

**Methods:** Not applicable.

**Results:** A 22-year-old female presented with a 7-year history of whitish discoloration over black portion of both eyes (more in the left eye) and photophobia. Her best corrected visual acuity was 6/36 in the right eye and counting fingers at 1 meter in the left eye. She had left exo-deviation of 15 prism diopters, central corneal scar, and early cataract in right eye and deeply vascularized corneal scar in left eye. General findings were short stature, mental retardation, low hairline, heavy eyebrows, beaked nose with columella, micrognathia with missing lower teeth, high arch palate, low set ears, microcephaly, scoliosis, hirsutism, brachydactyly. She was referred to the cardiologist and nephrologist for assessment of cardiac and renal status. She was also advised to have left keratoplasty followed by cataract extraction.

**Conclusions:** Early diagnosis, counseling, and management of patients with this disorder is critical for both visual and systemic rehabilitation.

**Poster No.: EX1-156**

**Panel No.: 156**

### The Facial Twist of Goldenhar: A Rare Case Report

*First Author: Meera MOHANAKUMAR*

*Co-Author(s): Mary Santhosh JOSEPH, Ansu JOHN, Uma MAHESHWARI, Krishnima RAGHU*

**Purpose:** To report a rare presentation of unilateral facial palsy with exposure keratopathy and associated limbal dermoid in a 2-year-old male child with Goldenhar syndrome.

**Methods:** A 2-year-old male child, born after a full-term normal pregnancy and uneventful prenatal and postnatal period, presented to our department with the following constellation of symptoms. General examination revealed an absent right auricle with pre-auricular tags, associated torticollis, and lumbar scoliosis. Ocular examination showed a right limbal dermoid at 9 o'clock position with associated unilateral facial palsy. Deviation of angle of mouth to the left along with good bell's phenomenon was seen, prominent on crying. Fluorescein staining of the right cornea demonstrated epithelial keratopathy inferiorly. Extraocular movements were full and free. Fundus examination was within normal limits.

**Results:** We diagnosed the patient as a case of Goldenhar syndrome on the basis of unilateral ocular dermoid, multiple accessory tragi, and skeletal abnormalities, along with unilateral facial nerve palsy and exposure keratopathy as a rare presenting feature. X-ray of lumbosacral spine done showed a lumbar scoliosis with concavity to the right. MRI brain did not demonstrate any significant lesions. Patient was conservatively managed.

**Conclusions:** Goldenhar syndrome is a constellation of multisystem manifestations, and hence its management is multidisciplinary in approach. This case is being reported to sensitize the rare occurrence of unilateral facial palsy in a case of Goldenhar and its other varied manifestations. The importance of early diagnosis and follow-up with timely interventions for a better outcome is emphasized.

**Poster No.: EX1-146**

**Panel No.: 146**

### The Effects of Using Handheld Information Devices on Visual Function in Japanese School Children

*First Author: Kanako MATSUI*

*Co-Author(s): Yasuko HAYASHI, Hiroko TAKASAKI, Michiko YONESHIMA*

**Purpose:** To study how the use of handheld information devices (HIDs) affect visual function in a large sample of Japanese elementary school children.

**Methods:** Participants were 496 Japanese elementary school children aged 6–12 years old. Written informed consent from parents was obtained. Visual acuity, autorefraction under natural conditions, cover testing, and eye movements were examined. Then, a questionnaire about use of HIDs was completed: frequency of use (per week), hours of use (per day), asthenia, use of breaks during use, and outdoor activities (hours per weekday). Multiple logistic regression was conducted in which the dependent variable was visual acuity, and the independent variables were the 5 HIDs responses and presence of myopia (defined as spherical equivalent less than –1.00 D).

**Results:** The rates for poorer visual acuity significantly increased with progression of school year from 7% to 45.5% (1st to 6th year, respectively). The presence of myopia was 69.4% overall and the average  $-1.62 \pm 1.57$  diopter (D). After adjustment for other items, the following were significantly related to visual function: frequency of use [odds ratio (OR) = 0.537,  $P < 0.01$ ], presence of asthenopia (OR = 0.531,  $P < 0.01$ ), outdoor activity time (OR = 0.502,  $P < 0.05$ ), and presence of myopia (OR = 0.224,  $P < 0.01$ ).

**Conclusions:** The most related to poorer visual acuity was presence of myopia, and next was short amounts of outdoor activity time; use frequency of HIDs was the last.

**Poster No.: EX1-164**

**Panel No.: 164**

### V Pattern Esotropia with Inferior Oblique Overaction: What to Do?

*First Author: Yulinda LAKSMITA*

*Co-Author(s): Gusti SUARDANA*

**Purpose:** To demonstrate the proper management of V pattern esotropia in presence of inferior oblique overaction by performing multiple surgeries.

**Methods:** An 8-year-old girl came with the chief complaint of squint eyes for 3 years before admission. There were 40 prism diopters (PD) esotropia in upgaze, 75 PD in primary gaze, and 90 PD in downgaze with inferior oblique overaction (IOOA) on both eyes. Diagnosis of V pattern esotropia with bilateral IOOA was established. Two-step surgeries, including anterior transposition of left inferior oblique muscle and bimedial recession, were performed.

**Results:** Two months after the second surgery, the inferior oblique overaction on left eye was eliminated and the primary position was much better. Patient was planned to undergo inferior oblique anteriorization of the right eye later on.

**Conclusions:** Inferior oblique weakening by anteriorization of the left eye was a preferred surgical procedure to overcome IOOA in this case. Bimedial recession was performed afterwards to correct the deviation in primary position. Good result was achieved with this surgical combination.

**Poster No.: EX1-158**

**Panel No.: 158**

### Visual Outcome and Surgical Outcome Following Extraocular Muscle Surgery for Nystagmus, Anomalous Head Posture, and Strabismus in Patients with Oculocutaneous Albinism

*First Author: Arcot Sadagopan KARTHIKEYAN*

*Co-Author(s): Gong HUI, Dennis LAM*

**Purpose:** To analyze the visual and surgical outcome

in albinism patients operated for 1 or more of the following: strabismus, nystagmus, and anomalous head posture (AHP) using adjustable suture strabismus surgery.

**Methods:** In a retrospective, consecutive case series review, the charts of 20 albinism children (<18 years) operated for 1 or more of the following: nystagmus, AHP, and strabismus during a 3-year period were reviewed. Patients who had a follow-up of at least 6 months were included. Patients with ocular albinism were excluded. A comprehensive ophthalmic and a complete strabismus evaluation were performed. Video recording of the nystagmus was done.

**Results:** There were 12 male children and 8 female children. The mean age at the time of surgery was 5.1 years. The mean duration of follow-up was 20.2 months. Five patients had only nystagmus. Three patients had nystagmus and AHP. Eight patients had nystagmus, strabismus, but no AHP. Four patients had strabismus, nystagmus, and AHP. PAN was seen in 10 patients (50%). AHP was seen in 7 patients. Chin down AHP was seen in 4 patients. Face turn in 1 patient, and face turn with chin down in 2 patients. Twelve patients had strabismus, 5 had esotropia, 7 had exotropia, and 3 patients had dissociated vertical deviation. Visual acuity improved in 17 patients (by 2 lines in 4 patients, by 1 line in 13 patients) and no change in 3 patients. AHP improved in all patients.

**Conclusions:** Significant improvement in visual acuity, AHP, and dampening of nystagmus can be achieved following extraocular muscle surgery.

**Poster No.: EX1-152**

**Panel No.: 152**

### Visual Outcome of Horizontal Strabismus After Occlusion Therapy and Strabismus Surgery: A Hospital-Based Study

*First Author: Sidratul NAZIN*

*Co-Author(s): Mohammad MOSTAFA HOSSAIN*

**Purpose:** To evaluate the visual outcome of patients with horizontal strabismus after occlusion therapy and surgery at a tertiary eye hospital.

**Methods:** A prospective study of 120 patients with horizontal strabismus from July 2016 to December 2017. Patients of 3 to 15 years who had horizontal strabismus with amblyopia without vertical and oblique deviation were included. Excluded were patients with nystagmus, paralytic strabismus, organic amblyopia, and other vision-reducing ocular pathologies. Preoperative assessment included history, visual acuity, cycloplegic refraction, orthoptic evaluation, and funduscopy. All patients had amblyopia therapy with proper correction of ametropia if needed. The patients underwent squint surgery; followed up from 1st week, 1 month, 3 months, and 6 months postoperatively.

**Results:** Out of a total of 120 patients, 45 (37.5%) were

male and 75 (62%) were female. Mean age was  $10 \pm 2$  years. Seventy-two (60%) patients were ametropic. Thirty-four (28.3%) patients had deviation up to 30 prism diopters (pd), while 56 (46.6%) had between 30-50 pd and 30 (25%) patients had >50 pd. Full correction of deviation was possible for 35 (29.2%) of patients. Final visual acuity was improved in 13 (10.8%) patients from (6/60-counting finger) to (6/24-6/60) and 37 (30.8%) patients from (6/24-6/60) to (6/6-6/18). Twenty-two (18.3%) patients had deep amblyopia. Non-compliance of treatment was in 36 (30%) patients. Remaining 12(10%) patients did not attend for follow-up.

**Conclusions:** Spectacle use, amblyopia therapy, and surgery may improve the visual acuity of patients with horizontal strabismus.

## Prevention of Blindness

**Poster No.: EX1-172**

**Panel No.: 172**

### Analysis of Avoidable Blindness: Free Villages Under Hospital-Based Community Eye Health Program

*First Author: Anshul SINGH*

*Co-Author(s): Harsha BHATTACHARJEE*

**Purpose:** Rapid assessment of cataract blindness has been accepted as a robust tool to help planners in developing countries, including India. With the launch of Vision 2020 global initiative, the focus has shifted to all causes of avoidable blindness. Hence, this project was taken up in collaboration with Operation Eyesight Universal, a Canadian based INGO. HBCEHP is for 4 years (2014-2018).

**Methods:** The process included seven crucial steps: 1. Prioritization of the village 2. Community mobilization 3. Re-survey and validation 4. Screening by an ophthalmologist 5. Behavior change communication 6. Documentation 7. Declaration.

**Results:** Out of the total villages included in the project, 20 (n = 142) accounting to 14% were declared as avoidable blindness free. More than 32% of identified blind people due to cataracts received good quality surgical interventions, and many others received health awareness.

**Conclusions:** With this project taken up in collaboration with Operation Eyesight Universal, a Canadian based INGO, HBCEHP helped to find out avoidable blindness free villages.

**Poster No.: EX1-173**

**Panel No.: 173**

### Boom and Blast! Firecracker Eye Injuries During a Festive Season in Malaysia

*First Author: Kee RONGSHENG*

*Co-Author(s): Zabri BIN KAMARUDIN, Jane FOO*

**Purpose:** To report cases of firecracker-related ocular injuries managed at a tertiary referral center during a festive season (2018 Hari Raya Aidilfitri) in Malaysia.

**Methods:** A retrospective case series of patients with firecracker-related ocular injuries referred to ophthalmology team at Hospital Selayang, Malaysia, during Aidilfitri season (June 3 to June 28, 2018). Patient demographics, ocular injury characteristics, relevant clinical features, investigations, and outcome of management were reviewed.

**Results:** There were a total of 8 eyes with firecracker-related injuries in 7 patients (6 unilateral and 1 bilateral). Age range was between 6 and 43 years old, children (<12 years old) being the majority (5, 71.4%), predominantly male (6, 85.7%), bystanders (non-primary handler of firecrackers (4, 57.1%). None of the patients wore protective eye goggles. Majority presented to the hospital within 24 hours (6, 85.7%), while 1 presented more than 24 hours after presenting first to a general practitioner. Visual acuity on presentation of 6/60 or worse (5, 71.4%). Injury pattern varied. Burned eyelashes and periorbital thermal injury without cornea involvement (1, 14.3%), cornea-scleral penetration requiring toilet and suturing (T&S) (5, 71.4%), intraocular foreign body (IOFB) (5, 71.4%), traumatic cataract (4, 57.1%), dislocated lens (1, 14.3%), iridodialysis (1, 14.3%), retinal detachment (3, 42.9%), and vitreous hemorrhage (4, 57.1%). Two patients underwent vitreoretinal intervention (2, 28.6%) with visual improvement of  $\geq 1$  line (Snellen). One patient with presenting vision of light perception, whom parents refused computed tomography (CT) scan or admission was treated with medications; eventually underwent evisceration due to complication of endophthalmitis with retained IOFB.

**Conclusions:** Firecrackers - a legally restricted item in Malaysia, being a preventable cause of blindness, still cause significant morbidity, especially in children, resulting in hospitalization and loss of vision during a festive celebration.

Poster No.: EX1-174

Panel No.: 174

## Ocular Injuries from Fireworks: The 5-Year Experience of a Tertiary Eye Care Center in India

First Author: Saurabh **DESHMUKH**

Co-Author(s): Harsha **BHATTACHARJEE**, Debajit **DEKA**, Krati **GUPTA**, Henal **JAVERI**

**Purpose:** To form a profile of ocular firework injury patients, to evaluate the cause, nature, and place of the injury and to establish a correlation between time lag to surgery, ocular trauma score (OTS) score, the zone of injury, and final visual outcome.

**Methods:** Hospital-based, prospective, interventional study. 110 patients with ocular firework injuries over a 5-year period were included. Detailed history, comprehensive ocular examination, and grading by OTS was done. Cases were managed with medical and surgical interventions. The cases were followed for 6 months.

**Results:** A total of 113 patients were enrolled in the study. The mean age was 28.66 years. Ninety-three males and 20 females. Most injuries were seen in the students. Most common cause of injury was bomb, followed by rockets. The data were analyzed in terms of time of presentation, type of firework, use of protective glasses, the presence of attendant, visual acuity, detailed ocular examination, treatment advised, calculation of OTS, and its correlation with the final visual acuity. Statistically significant correlation was found between presenting visual acuity, time lag to reach the hospital, type of injury (open or closed globe), the zone of injury, OTS score, and the final visual outcome.

**Conclusions:** This study is one of its kind documenting the firework associated injuries over such a long period in India and its correlation with the final visual outcome with OTS score. It provides data that may help guide public policy to decrease the frequency of these devastating injuries.

## Refractive Surgery

Poster No.: EX1-179

Panel No.: 179

## Comparative Evaluation of Visual Quality, Ocular Surface, and Corneal Biomechanics with Small Incision Lenticule Extraction and Femtosecond-Laser Assisted In Situ Keratomileusis

First Author: Jeewan **TITIYAL**

Co-Author(s): Anand **BRAR**, Manpreet **KAUR**, Namrata **SHARMA**

**Purpose:** To compare visual and anatomical outcomes of femtosecond laser assisted in situ keratomileusis (FS-LASIK) and small incision lenticule extraction (SMILE) in moderate-high myopia.

**Methods:** Prospective, comparative evaluation of 80 eyes undergoing FS-LASIK (n = 40) or SMILE (n = 40). Primary outcome measures were visual acuity and quality. Secondary outcome measures were ocular surface stability, corneal biomechanics, and subbasal nerve fiber density (SNFD). Follow-up was performed on day 1, 30, and at 6 months.

**Results:** At 6 months, uncorrected visual acuity was comparable in both groups (P = 0.65). Visual quality (higher order aberrations) was significantly better with SMILE (P < 0.001). Tear-film breakup time (P < 0.001), Schirmer test (P = 0.02), and SNFD (P < 0.001) was significantly better in SMILE group at all follow-up visits. Ocular hysteresis was better in SMILE group (P < 0.001).

**Conclusions:** SMILE leads to better visual quality, ocular surface, and biomechanical stability as compared with FS-LASIK.

Poster No.: EX1-178

Panel No.: 178

## Comparing Phakic Intraocular Lenses: Hybrid Hydrophilic Acrylic vs Collamer

First Author: Karan **BHATIA**

Co-Author(s): K V Satyamurthy **KODUR**, Ruchita **MANAKTALA**, Renuka Rati **RATI**, Aniket **SHASTRI**

**Purpose:** To compare results of hybrid hydrophilic acrylic-based PIOL and collamer-based phakic intraocular lens (PIOL) as a safe and effective strategy for the management of myopia.

**Methods:** A total of 59 and 33 consecutive myopic eyes of patients aged 18 - 42 years underwent hybrid hydrophilic acrylic-based PIOL (Implantable Phakic Contact Lens; IPCL @ Care Group) and collamer-based PIOL (Implantable Collamer Lens; ICL @ STAAR Surgical) implantation respectively at a tertiary level teaching hospital in India. Primary outcome was

improvement in uncorrected distance visual acuity (UCVA) and lens vault at 6 months. Vault >250  $\mu$  was good and <250  $\mu$  was low. Secondary outcome were complications.

**Results:** Preoperatively, spherical equivalent was -2.5 to -25.5 diopters in 2 comparable groups. UCVA improved equally in both groups (Improvement in ICL-82%, IPCL-81%,  $P = 1$ ). Average lens vault was 615  $\mu$  (IPCL) and 629  $\mu$  (ICL), with almost all >250  $\mu$  at 6 months. One eye had small vault of 87  $\mu$  (IPCL) at 1 month, which was exchanged with a larger one. At 6 months, 2 eyes had low vault (IPCL-173, ICL-188). Two eyes of 1 patient had raised intraocular pressure (steroid responder), which was managed medically. Two eyes had minimal cataractous changes (IPCL) and were observed.

**Conclusions:** IPCL is as safe and effective an option as ICL for correction of myopia. The added advantage of low cost with IPCL makes it a more affordable option than ICL.

**Poster No.: EX1-175**  
**Panel No.: 175**

### Refractive Outcomes, Contrast Sensitivity, HOAs, and Patient Satisfaction in Moderate Myopia: Wavefront-Optimized Versus Tissue-Saving PRK

*First Author: Nader NASSIRI*

*Co-Author(s): Farinaz MAHMOODI KHOSRAVI, Kourosh SHEIBANI*

**Purpose:** To compare refractive outcomes, contrast sensitivity, higher-order aberrations (HOAs), and patient satisfaction after photorefractive keratectomy for correction of moderate myopia with 2 methods: tissue saving versus wavefront optimized.

**Methods:** In this prospective, comparative study, 152 eyes (80 patients) with moderate myopia with and without astigmatism were randomly divided into 2 groups: the tissue-saving group (Technolas 217z Zyoptix laser; Bausch & Lomb, Rochester, NY) (76 eyes of 39 patients) or the wavefront-optimized group (WaveLight Allegretto Wave Eye-Q laser; Alcon Laboratories, Inc., Fort Worth, TX) (76 eyes of 41 patients). Preoperative and 3-month postoperative refractive outcomes, contrast sensitivity, HOAs, and patient satisfaction were compared between the 2 groups.

**Results:** The mean spherical equivalent was  $-4.50 \pm 1.02$  diopters. No statistically significant differences were detected between the groups in terms of uncorrected and corrected distance visual acuity and spherical equivalent preoperatively and 3 months postoperatively. No statistically significant differences were seen in the amount of preoperative to postoperative contrast sensitivity changes between the 2 groups in photopic and mesopic conditions. HOAs and Q factor increased in both groups postoperatively ( $P = 0.001$ ), with the tissue-saving method causing

more increases in HOAs ( $P = 0.007$ ) and Q factor ( $P = 0.039$ ). Patient satisfaction was comparable between both groups.

**Conclusions:** Both platforms were effective in correcting moderate myopia with or without astigmatism. No difference in refractive outcome, contrast sensitivity changes, and patient satisfaction between the groups was observed.

**Poster No.: EX1-176**  
**Panel No.: 176**

### Surgical Management of Lenticular Astigmatism

*First Author: Dilruwani ARYASINGHA*

*Co-Author(s): Don Saliya PATHIRANA*

**Purpose:** Three brothers of the same family aged 18, 25, and 28 years presented with progressive visual deterioration over a period of 4 years. During one year, 25 year old's refraction had changed from -7.75 DSphere (DS) -3.00 DCylinder (DC) at 170° to -20.00 DS -13.00 DC at 155° in his right eye and -9.75 DS -3.00 at 170° to -18.00 DS -7.00 DC at 155° in his left eye. Keratometry readings were 44.87 at 06° and 48.37 at 96° in his right, 45.12 at 180° and 48.12 at 90° in his left eye. Two other brothers also had similar increases in myopic astigmatism over time. The visual failure was due to the development or exacerbation of bilateral anterior lenticonus. We evaluated the success of clear lens phacoemulsification and intraocular lens (IOL) implantation in these 3 patients. No financial disclosures.

**Methods:** All 3 brothers had clear lens phacoemulsification and foldable, hydrophobic IOL implantation under general anesthesia with informed written consent. Postoperative period was uneventful.

**Results:** Second brother's preoperative Snellen's visual acuity with spectacles were 6/60 right eye and 6/24 left eye and improved to 6/6 in both eyes with a refraction of Plano - 2.25 DC at 05° in right eye and Plano - 2.00 DC x 05° in his left eye postoperatively. Other two brothers' vision improved similarly postoperatively.

**Conclusions:** This is the first reported case of isolated anterior lenticonus in Sri Lanka where 3 members of the same family are affected. Clear lens phacoemulsification is an excellent surgical procedure for the treatment of anterior lenticonus, allowing rapid visual rehabilitation.

Poster No.: EX1-177

Panel No.: 177

### Tetracaine-Assisted Debridement in PRK with Intraoperative Mitomycin-C

First Author: Kourosh **SHEIBANI**

Co-Author(s): Nader **NASSIRI**

**Purpose:** To compare corneal stromal and endothelial cells after photorefractive keratectomy with intraoperative mitomycin C in tetracaine assisted versus mechanical epithelial debridement using confocal microscopy.

**Methods:** This prospective, randomized, comparative study was performed on 88 eyes (44 patients) with myopia up to -6.00 diopters. The right eye of each patient was randomly assigned to either mechanical or tetracaine assisted groups, and the left eye was assigned to the alternate group. Confocal microscopy was performed preoperatively and at 3 months postoperatively. The main outcome measures were epithelial thickness; number of keratocytes in the anterior, mid, and posterior stroma; as well as characteristics of the central corneal endothelial cells including density, mean cell area, and polymegathism and hexagonality.

**Results:** Three months after surgery, no statistically significant difference was noted between the study groups in terms of epithelial thickness. We also found no statistically significant difference in central corneal endothelial cells regarding cell density, mean cell area, hexagonality, or polymegathism. Compared with baseline values, the density of mid and posterior stromal keratocytes showed no significant change in either group, whereas it decreased significantly in the anterior stroma in both groups 3 months after surgery ( $P < 0.001$ ).

**Conclusions:** We found that the adverse effects of photorefractive keratectomy with mitomycin C on central corneal endothelial cells were comparable between the mechanical and tetracaine assisted epithelial debridement groups, and the significant decrease in postoperative keratocyte density in anterior stroma was comparable between the 2 groups.

## Retina (Medical)

Poster No.: EX1-191

Panel No.: 191

### Assessing Relationship Between Plasma 25-Hydroxyvitamin D Levels and Age-Related Macular Degeneration in Yogyakarta, Indonesia: Final Result

First Author: Supanji **SUPANJI**

Co-Author(s): Angela **AGNI**, Muhammad **SASONGKO**, Dian Caturini **SULISTYONINGRUM**, Firman **WARDHANA**, Tri Wahyu **WIDAYANTI**

**Purpose:** Age-related macular degeneration (AMD) is an irreparable, progressive chronic disease that causes central vision problems due to macular damage. Inflammation is known as a potential risk factor for AMD. Plasma 25-hydroxyvitamin D (plasma 25-OHD) has anti-inflammatory properties, suggesting a biologically plausible role in the pathogenesis of AMD. This study was conducted to determine the relationship between plasma 25-OHD levels and AMD disease.

**Methods:** This study uses a case-control involving 22 AMD patients and 19 non-AMD patients. All subjects were examined by the vitreoretinal specialist to have ophthalmoscopy, fundus photograph, and ocular coherence tomography (OCT) examination to rule the diagnosis of AMD. We collected the information related to medical history as well as the blood samples. Plasma 25-OHD was examined using DRG Elisa kit. The data were analyzed statistically using Stata/IC 13.0 software to determine the odds ratios (ORs) with 95% confidence intervals (CIs) for the association of plasma 25-OHD and AMD.

**Results:** The levels of plasma 25-OHD (mean  $\pm$  SD) were higher in AMD patients ( $35.34 \pm 17.3$  ng/mL) compared to non-AMD ( $22.9 \pm 13.7$  ng/mL; OR 3.49;  $P = 0.175$ ). The levels of plasma 25-OHD were classified into 3 groups (sufficient  $\geq 30$  ng/mL, insufficient 20-30 ng/mL, and deficient 10-20 ng/mL). Most AMD patients had sufficient level of 25-OHD (40.91%), while non-AMD patients had deficient (42.11%) and insufficient level (42.11%).

**Conclusions:** There was an inverse relationship between plasma 25-OHD and AMD in the population of Yogyakarta, Indonesia.

Poster No.: EX1-192

Panel No.: 192

### Bartonella Neuroretinitis Mimicking Central Serous Chorioretinopathy

First Author: Alex **YEE**

Co-Author(s): Goh **CHON HAN**, Seng Fai **TANG**

**Purpose:** To describe a rare presentation of Bartonella

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neuroretinitis which mimicked central serous chorioretinopathy (CSCR).

**Methods:** Case report.

**Results:** A 45-year-old lady presented with right eye sudden onset central scotoma without eye pain or redness. Her right eye vision was 6/60 and left eye was 6/6 without relative afferent pupillary defect (RAPD). Right eye fundus showed a localized oval shape, subretinal fluid at the macula affecting the fovea, and temporal optic disc swelling. Left eye appeared normal. Optical coherence tomography (OCT) of right macula revealed subretinal fluid at the macula, and it tracked along the maculopapillary bundle to the temporal part of the optic disc. She was treated as CSCR based on the clinical and OCT findings. However, macula star appeared 2 weeks later. Further history revealed she had fever prior to the ocular complaint and close contact with cats at home, with multiple scratch marks on both arms. Diagnosis was revised to Bartonella neuroretinitis and oral antibiotic was started. Bartonella henselae serology was positive. After 6 weeks of oral antibiotic, her vision improved to 6/6, with the resolution of temporal optic disc swelling, macula star, and subretinal macula fluid evidenced by OCT.

**Conclusions:** Bartonella neuroretinitis can have a rare clinical presentation and can mimic CSCR as demonstrated in this case. Hence, a high index of suspicion after good history-taking and serology tests are crucial in the prompt diagnosis and treatment of Bartonella neuroretinitis.

**Poster No.: EX1-181**

**Panel No.: 181**

### Clinical Trial of Dexamethasone Intravitreal Implant and Intravitreal Bevacizumab vs Intravitreal Bevacizumab for Diabetic Macular Edema

*First Author: Kuidong KANG*

*Co-Author(s): Su Ah KIM*

**Purpose:** To compare visual and anatomical outcomes of intravitreal bevacizumab combined with the dexamethasone intravitreal implant 0.7 mg and bevacizumab monotherapy in eyes with macular edema secondary to diabetic retinopathy.

**Methods:** We retrospectively reviewed 40 eyes of 40 patients with diabetic macular edema who underwent intravitreal bevacizumab (1.25 mg) administered monthly on a pro re nata (PRN) basis (20 eyes, IVB group) or simultaneous treatment with an intravitreal injection of bevacizumab (1.25 mg) and an intravitreal implant of dexamethasone (0.7 mg) followed by a bevacizumab PRN injection (20 eyes, IVD group). Patients were evaluated at baseline and at each subsequent visit with a complete ophthalmological examination and spectral-domain optical coherence

tomography (OCT) scans. They were examined 24 hours after the treatment, and then followed up after 3 and 6 months.

**Results:** Both groups showed significant improvement in best corrected visual acuity (BCVA) and significant reduction in CMT. However, BCVA in the 3-month was significantly better in the IVD group (logarithm of the minimum angle of resolution, IVD group  $0.23 \pm 0.30$  vs IVB group  $0.38 \pm 0.27$ ,  $P = 0.041$ ) and the 3-month CMT was thinner in the IVD group (IVD group  $255.38 \pm 32.89$   $\mu\text{m}$  vs IVB group  $312.18 \pm 55.72$   $\mu\text{m}$ ,  $P = 0.044$ ), but no significant between-group difference was apparent 6 months after injection. There were no other ocular or systemic complications for the duration of this study.

**Conclusions:** Simultaneous therapy combining a dexamethasone implant plus bevacizumab for diabetic macular edema may be an attractive treatment regimen with an acceptable safety profile.

**Poster No.: EX1-182**

**Panel No.: 182**

### Combined Central Retinal Vein, Central Retinal Artery, and Cilioretinal Artery Occlusion with Ischemic Macular Hole Secondary to Severe Orbital Cellulitis After Black Fly Bite

*First Author: Narumon KEOROCHANA*

*Co-Author(s): Raveewan CHOONTANOM, Sritatath VONGKULSIRI*

**Purpose:** To describe some severe rare complications of orbital cellulitis.

**Methods:** Patient's information was collected from reviewed medical record.

**Results:** A case of a 32-year-old female presented with acute severe progressive orbital cellulitis on right eye after black fly (Simuliidae spp.) bite. Orbital imaging with computed tomography and magnetic resonance imaging showed eyelid abscess with orbital abscess formation and superior ophthalmic vein thrombosis. She was promptly treated with intravenous vancomycin, piperacillin, and had surgical procedures to release orbital pressure including lateral canthotomy, lateral cantholysis, and eyelid with orbital abscess drainage. Pus collection culture was positive for *Staphylococcus aureus*. Even though she responded well to antibiotics treatment, the progression of severe orbital inflammation with marked increased orbital pressure, her visual acuity was no light perception. Combined central retinal vein, central retinal artery, and cilioretinal artery occlusion were identified. Fundus examination showed retinal whitening at posterior pole and a few scatter flame-shaped retinal hemorrhage. The cilioretinal artery presented with perivascular retinal whitening. Fundus fluorescein angiogram revealed cilioretinal and retinal artery filling delay and also delayed arteriovenous transit time. She

also developed ischemic macular hole after a week of treatment. We demonstrated optical coherence tomography image showing intact posterior hyaloid membrane that represented no traction on macula to support the ischemic cause.

**Conclusions:** Multiple retinal vascular occlusion and ischemic macular hole could be an early complication of severe orbital cellulitis from increased orbital pressure, therefore close monitoring of visual acuity with intraocular pressure and prompt treatment when indicated might reduce the risk of consequent blindness.

**Poster No.: EX1-190**

**Panel No.: 190**

### Correlation Between Total Number of Bevacizumab Intravitreal Injections and Treatment Duration with Intraocular Pressure Changes in Neovascular Age-Related Macular Degeneration Patients

*First Author: Eka SETYARINI*

*Co-Author(s): Tri Wahyu WIDAYANTI*

**Purpose:** To investigate the effects of multiple bevacizumab IVTs on intraocular pressure (IOP) in patients with neovascular age-related macular degeneration.

**Methods:** A retrospective study from January to June 2017. All patients above 50 years old with neovascular AMD without glaucoma who underwent bevacizumab IVT were included. IOP measurements were performed at baseline prior to injection and compared with IOP measurement at 1 week after last IVTs. Correlations between total number of bevacizumab IVTs and treatment duration with mean IOP change were analyzed.

**Results:** A total of 87 eyes from 83 patients were analyzed (mean age of  $66 \pm 9.64$  years, 60.9% women). The mean IOP was increase from baseline  $13.8 \pm 2.76$  mm Hg became  $15.5 \pm 3.03$  mm Hg at the last follow-up ( $P < 0.001$ ). The mean IOP increment was  $1.7 \pm 2.86$  mm Hg. There were statistically significant correlations between total number of IVTs bevacizumab ( $r = 0.368$ ,  $P < 0.001$ ) or treatment duration ( $r = 0.373$ ,  $P < 0.001$ ) with IOP changes.

**Conclusions:** This study demonstrated a subtle but statistically significant IOP increase associated with repeated injections of intravitreal bevacizumab.

**Poster No.: EX1-219**

**Panel No.: 219**

### Effect of Intravitreal Dexamethasone Implantation in Diabetic Macular Edema Refractory to Intravitreal Anti-Vascular Endothelial Growth Factor Treatment

*First Author: Sungrae NOH*

*Co-Author(s): Eung-Suk KIM, Kiyoungh KIM, Jong In YU, Seung Young YU*

**Purpose:** The purpose of this study was to evaluate the efficacy and safety of intravitreal dexamethasone (DEX) implantation for diabetic macular edema (DME) that did not respond to previous anti-VEGF treatments.

**Methods:** This was a prospective, interventional series of 91 eyes with persistent or recurrent diabetic macular edema after previous anti-VEGF treatments. All patients were followed for at least 12 months. Best corrected visual acuity (BCVA), central macular thickness (CMT), macular volume, and intraocular pressure (IOP) were measured at baseline and bimonthly after DEX implantation.

**Results:** Mean number of intravitreal DEX implantation was  $2.1 \pm 0.8$ , prior anti-VEGF treatment was  $4.9 \pm 5.0$ . Twenty-six eyes (28.9%) received 1, 31 eyes (34.4%) received 2, and 34 eyes (36.7%) received 3 injections for 12 months. BCVA was significantly improved in the first 6 months (58.9 letter) after DEX implantation (55.7 letter). Both CMT ( $374$  vs  $307$   $\mu\text{m}$ ) and macular volume ( $11.6$  vs  $10.8$   $\text{mm}^3$ ) were significantly decreased after DEX implantation and maintained until 12 months. Two and 3 DEX received group had significantly more prior anti-VEGF injection than 1 DEX received group ( $6.0$  and  $5.5$  vs  $3.0$ ).

**Conclusions:** Two-thirds of refractory DME cases required less than 2 DEX implantation to maintain dry macula for 12 months. To obtain optimal effect of DEX implantation, early switching from anti-VEGF is recommended in persistent DME.

**Poster No.: EX1-185**

**Panel No.: 185**

### Evaluation of the Visual Function Test of Central Serous Chorioretinopathy After Intravitreal Bevacizumab

*First Author: Chunu SHRESTHA*

*Co-Author(s): Sabina BIJUKACHHE*

**Purpose:** Central serous chorioretinopathy (CSCR) is a condition of unknown origin characterized by a serous detachment of the macula. It afflicts young healthy adults, mostly men between the ages of 20 - 50 years. It is postulated to occur secondary to a leak from the choriocapillaries through the retinal pigment epithelium (RPE).

**Methods:** This was a hospital-based, prospective,

interventional, non-comparative study conducted in Nepal Eye Hospital from 2016 January to 2017 January. The study included 15 eyes of 15 patients with central serous chorioretinopathy. All patients were injected with intravitreal Avastin (IVA) 1.25 mg (0.05 mL). At baseline and follow-up visits, patients had contrast sensitivity, stereopsis, color vision, best corrected visual acuity (BCVA), intraocular pressure assessment, fundus fluorescein angiography, dilated fundus examination, and optical coherence tomography imaging was used for measurement of central macular thickness.

**Results:** The mean age of patients was 35 years (26–47 years), 12 (80%) patients were male and 3 (20%) were female. Thirteen out of 15 subjects received 1 injection, while the remaining 2 cases had 2 injections. All eyes had gained 2 or more lines improvement in BCVA at the end of follow-up. The mean baseline CRT for all patients was  $533 \pm 79.5$   $\mu\text{m}$  (range, 412 – 677), decreased to  $253 \pm 39.2$   $\mu\text{m}$  (range, 192 – 343) after 3 months with statistical significance ( $P < 0.001$  Wilcoxon sign rank test). Contrast sensitivity by Wilcoxon sign rank test was statistically significant with a P value of 0.003.

**Conclusions:** Bevacizumab was associated with visual function improvement and reduced neurosensory detachment without adverse events in patients with CSCR.

**Poster No.: EX1-187**  
**Panel No.: 187**

### Going Green: Treatment Outcome and Safety Profile of Chronic Central Serous Chorioretinopathy Treated with Subthreshold Green Laser

*First Author: Anadi KHATRI K C*

**Purpose:** Subthreshold lasers have gained popularity in the treatment of chorioretinopathy (CSCR) and yellow (577 nm) lasers have completely revolutionized the treatment. However, there is very little literature regarding the use of a more common and conventional – green (532 nm) subthreshold laser for treatment of chronic CSCR. We reported the use of green lasers (532 nm) for treatment of chronic CSCR and its outcome.

**Methods:** Eyes with non-resolving CSCR were treated with green subthreshold laser and evaluated at the end of 5 months. Visual acuity, central macular thickness, and macular volume at baseline and at 5 months following treatment were evaluated.

**Results:** Thirteen eyes with chronic CSCR were treated with green laser in SP-Mode. The mean duration of CSCR was  $7.64 \pm 3.77$  months at the time of treatment. The median age of the patients was 41 years (35 – 57). The baseline mean best corrected visual acuity (BCVA) was  $0.96 \log\text{MAR} \pm 0.17$ , with mean baseline central macular thickness (CMT) of  $503.8 \mu\text{m} \pm 181.9$  and macular volume (MV) of  $12.8 \text{ mm}^3 \pm 3.81$ . The

mean CMT at 5 months was  $211 \mu\text{m} \pm 31.7$ , and mean macular volume was  $9.65 \text{ mm}^3 \pm 0.60$ , correlating to a mean decrease of  $292 \mu\text{m} \pm 79$  of CMT and mean decrease of  $3.18 \text{ mm}^3 \pm 1.87$  in the MV from baseline ( $P < 0.05$ ). The mean BCVA after treatment was  $0.18 \log\text{MAR} \pm .09$  ( $P < 0.05$ ). Two cases of CSCR with pigment epithelial detachment (PED) also had complete resolution.

**Conclusions:** Subthreshold green laser (532 nm) is a safe and effective modality for the treatment of chronic CSCR, with very good and stable outcomes. It may also be beneficial in the treatment of PEDs.

**Poster No.: EX1-180**  
**Panel No.: 180**

### Intraocular Sustained Release of Antibody Using a Gas-Filled Hollow Core Device

*First Author: Noriaki TAKASE*

*Co-Author(s): Aki KATO, Soichiro KUWAYAMA, Yuichiro OGURA, Hideaki USUI, Tsutomu YASUKAWA*

**Purpose:** Recent advance in medical engineering enabled molecular targeted therapy, exemplified by anti-vascular endothelial growth factor (VEGF) therapy. Anti-VEGF drugs, however, often require repeated intravitreal injections. To overcome this problem, we have developed a hollow core device. A sustained release of antibodies from the device filled with lyophilized antibodies and gas was evaluated.

**Methods:** A hollow core device was molded with ultraviolet curable acrylic resin using a 3D printer. The device had a connecting tube for drug release. The solution of cetuximab (170 mg/mL, 10  $\mu\text{L}$ ), a monoclonal anti-epidermal growth factor receptor antibody, was injected into the device and lyophilized. A device was filled with C3F8 gas ( $n = 4$ ), SF6 gas ( $n = 3$ ), or air ( $n = 4$ ) and placed onto the surface of the eyeball underneath the conjunctiva and the tube portion was inserted into the anterior chamber. Aqueous humor was collected in months 1, 2, and 3 to measure the concentration of cetuximab by ELISA.

**Results:** Mean cetuximab concentrations ( $\mu\text{g/mL}$ ) in months 1, 2, and 3 were  $2.3 \pm 1.1$ ,  $2.7 \pm 1.5$ , and  $5.2 \pm 5.8$  in the C3F8 gas group,  $1.0 \pm 0.07$ ,  $0.8 \pm 0.45$ ,  $2.8 \pm 1.9$  in the SF6 gas group, and  $2.5 \pm 3.3$ ,  $4.5 \pm 7.3$ , and  $6.2 \pm 6.0$  in the air group, respectively. In all groups, sustained release over 3 months were confirmed. No adverse events were noted.

**Conclusions:** A gas-filled hollow core device could release antibodies over 3 months into the rabbit eyes.

**Poster No.: EX1-188**

**Panel No.: 188**

### Macular Star in Nonarteritic Anterior Ischemic Optic Neuropathy Mimicking Neuroretinitis Treated with Intravitreal Aflibercept

*First Author: Yin-Yang LEE*

**Purpose:** To report a case of a regression of macular star and optic disc edema in nonarteritic anterior ischemic optic neuropathy (NA-AION) with intravitreal injection of aflibercept.

**Methods:** Retrospective case review of a female patient treated with intravitreal aflibercept for NA-AION with macular star, which was previously diagnosed as neuroretinitis in local medical department. Best corrected visual acuity (BCVA), visual field, fluorescein angiography (FA), color fundus, and optical coherence tomography (OCT) were compared during the 6-month treatment period.

**Results:** Six months after the 5 injections of aflibercept (2 mg), the BCVA had improved to 6/6.7 from 6/12. The macular star and optic disc edema had regressed significantly. The FA and OCT revealed that macular edema subsided.

**Conclusions:** Intravitreal aflibercept could be a treatment option for patients with macular star of NA-AION.

**Poster No.: EX1-186**

**Panel No.: 186**

### Radiation-Induced Cystoid Macula Edema: Experience in Managing Challenging Cases

*First Author: Siti Zaitihani HAMDAN*

*Co-Author(s): Hanizasurana HASHIM, NorAin RAWI*

**Purpose:** To report 2 cases of radiation-induced cystoid macula edema (CMO) with different outcomes post-treatment.

**Methods:** Retrospective case series.

**Results:** Case 1: A 70-year-old lady with nasopharyngeal carcinoma (NPC) treated with radiotherapy presented with bilateral non-proliferative retinopathy with cystoid macula edema 6 years post-treatment. Presenting vision were 6/36 in both eyes. Initial treatment with orbital floor triamcinolone injection (OFTA) showed great response. However, it lasted for 4 months where vision declined to 6/60. A total of 6 intravitreal dexamethasone implants were administered with 'see-saw' effect. Final vision at 4 years follow-up was 3/60 in both eyes. Vision was hampered by foveal atrophy over the right eye, while the left eye had chronic CMO. Case 2: A 52-year-old lady, post-radiotherapy for NPC, presented with bilateral proliferative retinopathy and right eye CMO 8 years following treatment. Presenting vision was 6/9 bilaterally. Promising initial response towards 4 injections of OFTA was halted by recurrence

of CMO, with vision of 6/12. She responded well to 6 intravitreal anti-vascular endothelial growth factors injections (anti-VEGF) which were 4 intravitreal Ranibizumab, later switched to Aflibercept, with final vision of 6/9 bilaterally.

**Conclusions:** Radiation-induced CMO remains a significant clinical challenge. Currently, there has been limited success regarding effective treatment. Interestingly, intravitreal anti-VEGF injections in our case showed a promising result.

**Poster No.: EX1-184**

**Panel No.: 184**

### Sigmoid Sinus Dural Arteriovenous Fistula: The Culprit for Central Retinal Vein Occlusion and Neovascular Glaucoma. A Case Study and Review of Literature

*First Author: Hayatulrizal MUHAMMAD*

*Co-Author(s): Martina Vendargon FRANCESCA, Gayathri GOVINDASAMY, Nagamuthu PRAGALATH*

**Purpose:** To report a case of sigmoid sinus dural arteriovenous fistula malformation as an unusual cause of central retinal vein occlusion and neovascular glaucoma.

**Methods:** Case report.

**Results:** A 60-year-old man with underlying diabetes mellitus and hypertension presented with headache, decreasing vision, redness and proptosis of his left eye over 5 months. He was referred from another institution after being diagnosed with left eye central retinal vein occlusion and neovascular glaucoma. Visual acuity of the left eye was 20/80. Ocular examination revealed a 5 mm left-sided non-pulsatile proptosis. Left eye conjunctival vessels were dilated with corkscrew tortuosity. Gonioscopy of the left eye revealed neovascularization in angle. Dilated fundus examination revealed prominent flame-shaped hemorrhages with macular edema. Auscultation of left eye revealed absent carotid bruit. Brain and orbit magnetic resonance angiography and cerebral angiography revealed a left sigmoid sinus dural arteriovenous malformation at level of internal jugular vein bifurcation. Intraocular pressure (IOP) of the left eye was controlled with topical anti-glaucoma and inferior transscleral cyclophotocoagulation. Panretinal photocoagulation was started for the left eye. This patient underwent successful embolization of the arteriovenous fistula. Within 2 months, his proptosis and IOP were noted to be gradually decreasing. However, his vision remained poor despite intravitreal ranibizumab given in view of persistent macular edema.

**Conclusions:** This case highlights sigmoid dural arteriovenous fistula as a rare cause of central retinal vein occlusion that leads to irreversible vision loss if remain undiagnosed.

Poster No.: EX1-189

Panel No.: 189

## Uncommon Presentation of Central Serous Chorioretinopathy with Branch Retinal Vein Occlusion

First Author: Awaneesh **UPADHYAY**

Co-Author(s): Pritam **BAWANKAR**, Chintan **DESAI**, Pushkar **DHIR**, Diva **MISRA**, Ronel **SOIBAM**

**Purpose:** To report a case of central serous chorioretinopathy leak with branch retinal vein occlusion (BRVO).

**Methods:** Case report.

**Results:** A 51-year-old lady presented with defective vision in the right eye (OD). Fundus OD showed superio-temporal BRVO and a small oval sensory detachment at posterior pole. Optical coherence tomography showed subfoveal-neurosensory detachment with subretinal fluid. Fundus fluorescein angiography (FFA) revealed classical ink blot leak of central serous chorioretinopathy (CSCR). Focal laser with intravitreal ranibizumab of 3 doses at monthly intervals lead to resolution of subretinal fluid.

**Conclusions:** There is a scarcity of literature regarding the association of vein occlusions with CSCR. A single population-based study by Chang et al documented the incidence rate of RVO in CSCR patients to be 3.07 times that of control patients. A common inflammatory process in the pathogenesis of both the entities might explain this relationship. Clinical visualization of well-circumscribed posterior pole subretinal fluid in a RVO patient should raise suspicion towards a possible CSCR, and should be further confirmed on FFA and indocyanin green angiography. This case report emphasizes the fact that clinicians should be aware of this possible association and use discretion while prescribing steroid-based treatment in vein occlusion patients.

## Retina (Surgical)

Poster No.: EX1-208

Panel No.: 208

## 8-Year Review of Culture-Proven Cases of Endophthalmitis at a Sydney Tertiary Hospital

First Author: Adrian **FUNG**

Co-Author(s): Samantha **BOBBA**, Jay **CHANDRA**, Jane **FOO**, Christopher **GO**

**Purpose:** To describe the clinical outcomes and microbiological data of culture-proven endophthalmitis cases.

**Methods:** Microbiology records were reviewed of all vitreous samples at Westmead Hospital, sent between

September 2009 and August 2017.

**Results:** A total of 234 vitreous samples were received during this period. Forty-five had positive microscopy. Ten cases were excluded after reviewing medical records; 3 were not endophthalmitis clinically, 1 was an anterior chamber tap, and 6 did not have growth after incubation. Thirty of the 35 included cases had exogenous causes, and 5 were endogenous. In the exogenous group, 21 were intravitreal injection related, 8 have had ocular surgery, and 1 had an associated keratitis. In the endogenous group, 2 were septic, 2 were immunosuppressed, and 1 was an intravenous drug user. At presentation, 4 had visual acuity better than 6/60, 22 were CF/HM, 8 were LP, and 1 NPL. All 35 cases had vitreous sampling on day of presentation; 34 from tap-and-inject and 1 from vitrectomy. The most common organism was coagulase negative staphylococcus (n = 16). Other organisms included strep species (n = 5), staphylococcus aureus (n = 4), candida species (n = 2), mixed species (n = 2), and other species (n = 6). At 1 year follow-up, 13 had visual acuity greater than 6/60, 8 were 6/60 or worse, 7 were NPL, and 9 were lost to follow-up.

**Conclusions:** The number of presentations of culture-positive endophthalmitis to Westmead Hospital is low, totaling only 35 cases over an 8-year period. The most common cause was following intravitreal injections. The most common organisms were coagulase negative staphylococcus followed by *Streptococcus* species.

Poster No.: EX1-196

Panel No.: 196

## Anatomical Closure and Visual Outcomes of Large Idiopathic Macular Holes (Diameter >1000 µm) Surgery Following Inverted Internal Limiting Membrane Flap Technique with Short-Term Follow-Up

First Author: Kiran **SHAKYA**

**Purpose:** To find out the technique of inverted internal limiting membrane (ILM) flaps for the management of large macular holes.

**Methods:** All five macular holes (diameter >1000 µm) were treated with pars plana vitrectomy with inverted ILM flap technique. The procedure for macular hole surgery was pars plana vitrectomy, posterior vitreous removal, internal limiting membrane (ILM) peeling with brilliant blue assisted, filling of the vitreous cavity with a gas bubble (C3F8), and postoperative face-down positioning for 1 week. SD OCT images were taken preoperative and postoperative 1 month and 3 months follow-up to assess the anatomical outcome of surgery, and best corrected visual acuity (BCVA) was used to evaluate the functional outcome during each visit. The BCVA was recorded using the Snellen chart and was converted to the logarithm of the minimum angle of resolution (logMAR) equivalents.

**Results:** All 5 eyes had complete anatomical closure. The mean age of patients was  $68.2 \pm 4.71$  years. The mean macular hole base diameter was  $1267.2 \mu\text{m}$  ( $1052 - 1526 \mu\text{m}$ ). Mean BVCA preoperatively was  $1.44 \log\text{MAR} \pm \text{SD } 0.28$ . Postoperatively, mean BCVA was  $0.99 \log\text{MAR} \pm \text{SD } 0.142$  ( $P = 0.042$ ). There were no intraoperative or postoperative complications. All the patients were followed up for a period of 3 months.

**Conclusions:** Inverted ILM flaps for large macular holes is effective for closure of the hole and restoration of functional vision.

**Poster No.: EX1-205**

**Panel No.: 205**

### Comparison of Surgical Performance of Internal Limiting Membrane Peeling Using 3D Visualization System with Conventional Microscope

*First Author: Naresh KANNAN*

*Co-Author(s): Piyush KOHLI, Obuli N*

**Purpose:** To compare the surgical performance of internal limiting membrane (ILM) peeling in idiopathic macular hole using digitally-assisted vitreoretinal system (DAVS) vis-à-vis analog microscope (AM).

**Methods:** Patients were operated using AM (Group A) and DAVS (Group B). The data analyzed included surgical time required to complete ILM peeling, number of attempts to initiate ILM flap and to complete ILM peeling, and intraoperative complications.

**Results:** Each group included 20 patients. The average surgical time for ILM peeling in group A and B was  $123.05 \pm 42.23$  and  $142.35 \pm 31.49$  seconds, respectively ( $P = 0.109$ ). The mean surgical attempts to initiate ILM flap were  $1.05 \pm 0.22$  and  $1.70 \pm 1.22$ , respectively ( $P = 0.008$ ). The mean surgical attempts to complete ILM peeling were  $22.85 \pm 9.95$  and  $27.20 \pm 7.16$ , respectively ( $P = 0.121$ ). Retinal touch occurred in 1 and 3 patients, respectively.

**Conclusions:** DAVS provides similar surgical performance to AM. However, initiating the ILM flap is difficult with DAVS.

**Poster No.: EX1-195**

**Panel No.: 195**

### Comparison of Temporal Inverted Internal Limiting Membrane Flap Technique with Classic Inverted Internal Limiting Membrane Flap Technique in Large Macular Holes

*First Author: Diva MISRA*

*Co-Author(s): Pushkar DHIR, Ronel SOIBAM, Awaneesh UPADHYAY*

**Purpose:** To evaluate the efficacy of standard inverted flap technique in comparison to temporal inverted internal limiting membrane flap technique for the

treatment of large idiopathic macular hole ( $>700 \mu$ ).

**Methods:** In this prospective, comparative and interventional study, patients with idiopathic macular holes larger than 700 microns were included. In group 1, 15 eyes of 15 patients underwent standard inverted flap technique. In group 2, 15 eyes of 15 patients underwent a modification of the standard technique, called the temporal inverted internal limiting membrane (ILM) flap technique. We compared changes in best corrected visual acuity (BCVA) before and after surgery and closure rates of MH between both groups.

**Results:** Preoperative mean visual acuity was  $1.059 \pm 0.22 \log\text{MAR}$  in group 1 and  $1.055 \pm 0.29 \log\text{MAR}$  in group 2. Macular hole closure was observed in 94% of patients in group 1 and in 87% of patients in group 2. The morphology of hole closure was documented in detail in both of the groups.

**Conclusions:** The temporal inverted ILM flap technique was found to be as effective as the classic inverted ILM flap technique in the management of large ( $>700 \mu$ ) macular holes.

**Poster No.: EX1-204**

**Panel No.: 204**

### Effectiveness of Prophylactic 360° Laser Retinopexy in Complicated Rhegmatogenous Retinal Detachment

*First Author: Putthigorn PROMMAJAREE*

*Co-Author(s): Chavakij BHOOMIBUNCHOO, Supat SINAWAT, Thuss SANGUANSAK, Suthasinee SINAWAT, Yosanan YOSPAIBOON*

**Purpose:** To compare the reattachment rate after vitrectomy and silicone oil tamponade between 360-degree versus focal laser retinopexy in complicated RRD.

**Methods:** A retrospective, comparative study. Medical records of 169 patients with a minimum of 6 months follow-up were reviewed. Both univariate and multiple variable analyses were used to identify significant risk factors of retinal redetachment.

**Results:** A total of 169 patients with a mean age of  $49.93 \pm 15.34$  years were studied. Mean duration of follow-up was  $17.72 \pm 13.83$  months. Fifty-two patients had undergone additional intraoperative 360-degree laser prophylaxis, while 117 patients had not. The demographic and ocular characteristics; macular detachment, traumatic RRD, and proliferative vitreoretinopathy (PVR) in other conditions than primary RRD were found statistically significant higher in 360-degree laser treatment group. Although RRD in study group seem to be more severe, the initial reattachment rates were not a statistically significant difference between groups ( $\text{OR} = 0.69$ ,  $95\% \text{ CI: } 0.31 - 1.57$ ,  $P = 0.38$ ). Multiple logistic regression analysis showed retinectomy and heavy silicone oil were

significantly associated with retinal redetachment,  $P = 0.002$  and  $P = 0.012$  respectively. The initial retinal reattachment rate was 55.03%. Seventy-six of 93 patients with total retinal reattachment underwent silicone oil removal, but only 54 patients were followed up more than 3 months. There was no significant difference between groups in retinal reattachment rate after silicone oil removal, 92.3% in 360-degree laser treatment group and 88.6% in control group ( $P = 0.68$ ).

**Conclusions:** Prophylactic intraoperative 360-degree laser retinopexy may have the benefit in complicated RRD. Further controlled clinical trial is required for conclusion.

**Poster No.: EX1-203**

**Panel No.: 203**

### Efficacy of Pars Plana Vitrectomy with Conventional Internal Limiting Membrane for Large Macular Hole

*First Author: Sukita JUMPAWONG*

*Co-Author(s): Tanapat RATANAPAKORN, Supat SINAWAT, Suthasinee SINAWAT, Yosanan YOSPAIBOON*

**Purpose:** To evaluate anatomical and visual outcomes of pars plana vitrectomy with internal limiting membrane for patients with large macular hole (MH).

**Methods:** Medical charts and optical coherence tomography images of consecutive patients with large macular hole ( $>500 \mu\text{m}$ ) from 2008 to 2017 in Srinagarind hospital were retrospectively reviewed.

**Results:** A total of 126 eyes of 119 patients with a mean age of  $63.06 \pm 7.86$  years were studied. Median duration of symptoms was 12 months (2 weeks - 16 years). Mean minimal hole size was  $668.66 \pm 120.69 \mu\text{m}$ . Mean preoperative visual acuity (VA) was  $1.33 \pm 0.42$  logMAR. Phacovitrectomy was performed on 53 eyes of 105 phakic eyes. At 12 weeks postoperative follow-up, MH closure rate was 51.59% (65/126) and mean postoperative VA was  $1.12 \pm 0.40$  logMAR (2-line visual improvements). Multiple logistic regression analysis showed the anatomical success was significantly associated with age  $<60$  years ( $P < 0.001$ ) and duration of symptom  $<12$  months ( $P = 0.049$ ); while visual success was significantly associated with preoperative VA ( $P < 0.001$ ), preoperative MH size ( $P = 0.003$ ), and preoperative and postoperative ellipsoid defect ( $P = 0.028$  and  $P < 0.001$ ). Although the closure rate was not significantly different between large MH group ( $500 - 800 \mu\text{m}$ ) and extra-large MH group ( $>800 \mu\text{m}$ ) in subgroup analysis, postoperative VA was significantly better ( $P = 0.004$ ) and foveolar thickness was significantly higher in large MH group ( $P = 0.024$ ). Most common complication was secondary cataract (21.15%). Serious complication was found in one patient who developed rhegmatogenous retinal detachment (0.008%).

**Conclusions:** Pars plana vitrectomy with conventional

internal limiting membrane had relative low closure rate. Technological improvements in vitrectomy techniques may be able to improve the surgical outcomes.

**Poster No.: EX1-220**

**Panel No.: 220**

### Endophthalmitis After Pars Plana Vitrectomy in a Thai Population: A 13-Year Retrospective Study

*First Author: Sukhum SILPA-ARCHA*

*Co-Author(s): Kwanchanoke KUMSIANG*

**Purpose:** To describe clinical characteristics and treatment outcome of endophthalmitis after pars plana vitrectomy (PPV) in Thai population.

**Methods:** Retrospective study was conducted at Rajavithi Hospital from 2005 - 2017. Charts of patients with endophthalmitis after PPV were reviewed and reported by descriptive manner. Pars plana vitrectomy indicated for recent trauma or endophthalmitis was excluded. The data collected included demographics, potential risk factors, clinical characteristics, and treatment outcome.

**Results:** Over the past 13 years, a total of 12,681 operations of PPV were included. Of these, ones performed by 20G, 23G, and 25G experienced endophthalmitis after PPV. These occurred in 0.12% for 20G PPV, compared with 0.10% for 23G PPV and 0.08% for 25G PPV. The indications of PPV were lens-related complications (39%), epiretinal membrane (38%), and diabetic TRD (23%). Median best corrected visual acuity (BCVA) before PPV at initial presentation of endophthalmitis and at 1 month after endophthalmitis treatment was 2.00, 2.30, and 0.90 logMAR, respectively. 23% of patients had BCVA greater or equal to 0.5 logMAR at 1 month after treatment. Causative pathogens were positive by culture in 3 cases (23%): gram positive and gram negative. All patients received IVT antibiotic injections of vancomycin and ceftazidime. 15% of patients developed phthisis bulbi in a median follow-up period of 6 months.

**Conclusions:** The rate of endophthalmitis after small gauge (23- and 25-gauge) PPV was comparable to that after 20-gauge PPV. The onset of endophthalmitis was within 2 weeks. Most of the patients had better visual outcome after treatment of endophthalmitis.

**Poster No.: EX1-199**

**Panel No.: 199**

### Improved 27-Gauge Flow Performance of Dual-Pneumatic 10,000 cpm Cutters

*First Author: Ishaq MOHAMEDY*

*Co-Author(s): Dina Joy ABULON, Helaine GARIEPY*

**Purpose:** To measure the flow of buffered saline solution (BSS) through 27-Gauge dual-pneumatic

vitrectomy probes, with a maximum cut rate of 10,000 cuts per minute (cpm), at various vitrectomy system settings, and to compare the flow performance of these Advanced UltraVit probes at 10,000 cpm with the previous generation of UltraVit probes at their maximum cut rate of 7500 cpm.

**Methods:** Change in BSS weight during probe aspiration was measured using a precision balance, and volumetric flow rate was calculated by measuring change in weight, duration of aspiration, and BSS density. Cut rates of 500, 2500, 5000, 7500, and 10,000 cpm were evaluated using three duty cycle modes: Core, 50/50, and Shave. Each combination was tested at least 3 times and averaged. BSS flow rates of the vitrectomy probes were compared at their maximum cut rates.

**Results:** BSS flow was highest in the Core mode ( $5.10 \pm 0.19$ – $7.41 \pm 0.24$  cc/min), lowest in the Shave mode ( $2.88 \pm 0.22$ – $5.13 \pm 0.13$  cc/min) and intermediate in the 50% mode ( $5.16 \pm 0.20$ – $5.29 \pm 0.27$  cc/min). At their respective maximum cut rates, the 10,000 cpm probes generated 21–24% greater BSS flow than the previous generation, 7500 cpm probes in the Core ( $+0.79$  cc/min), 50% ( $+0.95$  cc/min) and Shave ( $+1.0$  cc/min) modes ( $P < 0.05$  each).

**Conclusions:** The 27-Gauge dual-pneumatic probes at their maximum cut rate of 10,000 cpm generated significantly greater BSS aspiration than previous generation probes at 7,500 cpm). Dual pneumatic probes operating at 10,000 cpm offer more effective aspiration than previous generation probes and may optimize surgical efficiency.

**Poster No.: EX1-200**

**Panel No.: 200**

### Influence of Macular Condition on the Outcome After Vitrectomy for Diabetic Macular Edema

*First Author: Atsuhide TAKESUE*

*Co-Author(s): Toshiyuki YOKOTAMA*

**Purpose:** To investigate the influence of macular condition on visual acuity (VA) improvement after vitrectomy for diabetic macular edema (DME).

**Methods:** This study involved 30 eyes of 28 patients who underwent vitrectomy with inner limiting membrane (ILM) peeling using Brilliant Blue G for DME between 2010 and 2018. First, those subjects whose preoperative optical coherence tomography (OCT)–measured macular Cube Volume (CV)  $<14.0$  mm<sup>3</sup> were classified into mild group ( $n = 15$ ) and the CV  $>14.0$  were classified into heavy group ( $n = 15$ ). Between the 2 groups, CV reduction rate and VA improvement were compared. Secondly, the subjects were divided into cystoid macular edema (CME) group ( $n = 10$ ) or sponge macular edema (SME) group ( $n = 20$ ) based on the shape of OCT-measured macula. Between the 2 groups,

VA improvement was compared. Finally, to confirm if there was correlation between preoperative CV and VA improvement, and between CV reduction rate and VA improvement, correlation diagrams and approximate curve were drawn.

**Results:** CV reduction rates were  $-14.4 \pm 10.5\%$  in the mild group, and  $-28.6 \pm 8.2\%$  in the heavy group ( $P < 0.01$ ). VA improvement were  $-0.37 \pm 0.32$  and  $-0.41 \pm 0.28$ , respectively ( $P = 0.73$ ). Similarly,  $-0.40 \pm 0.47$  in the CME group and  $-0.39 \pm 0.19$  in the SME group ( $P = 0.95$ ). Correlation between preoperative CV and VA improvement were not acknowledged ( $R^2 = 0.003$ ). Correlation between CV reduction rate and VA improvement were not also acknowledged ( $R^2 = 0.028$ ).

**Conclusions:** Even if the condition of macula is worse, VA could be improved in several cases. The condition of pre-and postoperative macula had almost no influence on VA improvement.

**Poster No.: EX1-194**

**Panel No.: 194**

### Intravitreal Gas Injection for Management of Tractional Diabetic Macular Edema with Central Foveal Cysts

*First Author: Roshija KHANAL RIJAL*

*Co-Author(s): Anadi KHATRI K C, Deepesh MOURYA*

**Purpose:** To demonstrate the efficacy of intravitreal gas to release the adherence of posterior hyaloid responsible for central cysts in inner retina, which is mostly refractory to multiple number of intravitreal anti-VEGFs or steroid injections. Though release of vitreomacular traction using intravitreal ocriplasmin and gas has been known to the world for a long time now, there has never been any report of using intravitreal gas for treating tractional DME with central foveal cysts which are refractory to treatment. Using this technique, the cost of multiple injections, visits, and compliance risks related to multiple intravitreal procedures can be avoided.

**Methods:** Eyes with optical coherence tomography (OCT) evidence of central cysts in inner retina that were refractory to prior treatment with anti-VEGFs and steroids were selected. AC paracentesis was done and 0.3cc SF6 gas was injected as day care procedure in office. Patients were asked to go into a head down position with a gentle sweeping movement of the head after the procedure in a way that gas bubbles would act on the vitreous and on the center and cause the release from the fovea. Repeat OCT was done to see the changes in vitreomacular interface and inner retina.

**Results:** Seven eyes treated with intravitreal gas showed the release of adherent posterior hyaloid from the attachments on the center responsible for cysts, starting as early as 10 minutes to 7 days after the procedure.

**Conclusions:** Intravitreal gas bubble is an effective way of treating DME with central foveal cysts refractory to treatment, when cases are carefully selected depending upon the pathophysiology.

**Poster No.: EX1-193**  
**Panel No.: 193**

### Posterior Segment Complications Following Valve Surgery in Vitrectomized Eyes

*First Author:* Bhuvan **CHANANA**  
*Co-Author(s):* Sudhank **BHARTI**

**Purpose:** To describe vision-threatening posterior segment complications and discuss its management, following Ahmed Glaucoma Valve (AGV) in eyes with previous vitreous surgery.

**Methods:** AGV surgery was performed in 2 vitrectomized eyes with intractable glaucoma. The first case was an 8-year-old boy with angle-recession glaucoma, who had previously undergone pars plana vitrectomy for dense vitreous hemorrhage in his right eye, following injury with a cricket ball. The intraocular pressure (IOP) in his right eye was not controlled despite maximal medical therapy. The second case was a 63-year-old female who underwent vitrectomy in her right eye for a non-resolving vitreous hemorrhage following complicated cataract surgery. The best corrected visual acuity was 20/80, and IOP was 42 mm Hg on maximum anti-glaucoma drugs and oral acetazolamide.

**Results:** Both eyes had severe hypotony (IOP <4 mm Hg) on the first postoperative day. The first case developed pre-macular sub-ILM bleed, which clotted and became more organized with thickening and wrinkling of overlying ILM after 4 weeks. In the second patient, kissing choroidal detachment developed, which did not resolve with systemic and periocular steroids. Both cases required further surgical intervention. The thick, firmly adherent ILM was removed successfully in the first case, and in the second case suprachoroidal fluid was drained using a modified sclerotomy technique.

**Conclusions:** AGV surgery in vitrectomized eyes can lead to severe vision-threatening complications. The absence of vitreous support in such eyes could be the possible cause of sudden decompression and severe hypotony, leading to posterior segment complications. Both the cases in our study were managed successfully.

**Poster No.: EX1-202**  
**Panel No.: 202**

### Postoperative Endophthalmitis: Intravitreal Antibiotics vs Early Vitrectomy

*First Author:* Vinod **SINGH**  
*Co-Author(s):* Basant **KUMAR SINGH**, Arun **SINGH**, Satya **SINGH**

**Purpose:** To study the role of early pars plana vitrectomy (PPV), as compared with intravitreal antibiotics in the treatment of postoperative endophthalmitis.

**Methods:** In this study, we compared the clinical outcomes after intravitreal antibiotics and early vitrectomy in a case of acute postoperative endophthalmitis after cataract surgery, in the Indian population. Our study included 36 patients. Early vitrectomy was done in 23 (64%) patients (Group 1) having vision less than FC 1m. 13 (36%) patients with vision better than FC 1m received intravitreal antibiotics (vancomycin 1.0 mg and ceftazidime 2.5 mg). These 13 patients were followed up for 3 days, PPV was done in 7 (19%) patients (Group 2) with vision less than 3/60 and repeat intravitreal antibiotics was given in 6 (17%) patients (Group 3) with vision better than 3/60. All the patients were followed for 3 months and the was analysed.

**Results:** A total of 36 eyes of 36 patients of postoperative patients were followed for 3 months. Group 1 had mean best corrected visual acuity (BCVA) of 6/18 after 3 months. Group 2 had mean BCVA of 6/36 while Group 3 had 6/60.

**Conclusions:** Postoperative endophthalmitis is a complex and multifaceted entity with potentially grave visual consequences. Early diagnosis and aggressive treatment with early vitrectomy gave best results after postoperative endophthalmitis.

**Poster No.: EX1-197**  
**Panel No.: 197**

### Preretinal Glial Membrane with Rock Activation After Internal Limiting Membrane Peeling

*First Author:* Hideaki **USUI**  
*Co-Author(s):* Aki **KATO**, Yuichiro **OGURA**, Hideyuki **SHIMIZU**, Hiroko **TERASAKI**, Tsutomu **YASUKAWA**

**Purpose:** While internal limiting membrane (ILM) peeling is an essential procedure for macular hole (MH) surgery, the mechanism of MH closure is still unknown. The purpose of this study is to investigate the behavior of glial cells after ILM peeling performed in cynomolgus monkey eyes.

**Methods:** Pars plana vitrectomy and ILM peeling were performed in 2 primate eyes. Immediately after the surgery, 1 eye underwent intravitreal injection of

rock inhibitor (Y27632: 20  $\mu$ L, 1mM) and another eye phosphate buffered saline. Twenty-four hours later, the monkeys were euthanized and eyes were enucleated, processed for immunohistochemistry, stained for glial fibrillary acidic protein (GFAP), vimentin, and nestin, and observed by a confocal fluorescein microscope.

**Results:** We compared the eye with ILM peeling and a sham injection (group 1), the eye with ILM peeling and intravitreal rock inhibitor (group 2), and the eye without ILM peeling (group 3). Preretinal glial processes with actin fiber and expression of GFAP and vimentin were observed in the area with ILM peeling in group 1, while no cellular processes were observed in groups 2 and 3. The eye with ILM peeling and rock inhibitor (group 2) showed faint expression of GFAP and vimentin. Nestin was not expressed in any groups.

**Conclusions:** The retinal surface after ILM peeling was covered by glial processes with actin fibers, which were inhibited by rock inhibitor. The preretinal glial membrane and actin stress fiber by rock activation may drive a mechanical force to close MH.

**Poster No.:** EX1-207

**Panel No.:** 207

### Scleral Buckle Implant Mimicking Orbital Tumor in a Patient Post-Retinal Detachment Surgery

*First Author:* Lee Jerome Iii **BRIONES**

*Co-Author(s):* Mark Anthony **IMPERIAL**

**Purpose:** Hydrogel scleral buckles were introduced in the early 1980s as a better alternative to solid silicone rubber and silicone sponges for the surgical treatment of retinal detachment. However, late complications consisting of orbital swelling, limitations in eye movement, and diplopia began to be reported in the early 1990s. This case report aimed to evaluate the etiology, treatment, and outcome of a patient treated for right eye retinal detachment with scleral buckling 28 years prior, who exhibited symptoms mimicking an orbital tumor.

**Methods:** This was a case report.

**Results:** A 75-year-old male treated for retinal detachment with scleral buckling 28 years ago, presented with restricted extraocular movement of the right eye. With clinical evaluation mimicking an orbital tumor, MRI (Magnetic Resonance Imaging) was done revealing a right supero-temporal mass. Hence, he was scheduled for lateral orbitotomy with excision biopsy of the mass. Intraoperatively, exploration revealed an encapsulated mass located at the supero-temporal region which was noted to be adherent to the globe. Upon further dissection, a friable gel-like translucent material was noted and carefully extracted. Surgical excision of the expanded buckle eventually relieved the symptoms.

**Conclusions:** Hydrogel scleral buckles are designed

to expand in a controlled fashion, though long-term complication is over-expansion. Patients who have undergone scleral buckling with hydrogel implant should be frequently checked due to the risk of developing these complications. Symptoms of progressive diplopia, pain, and restriction of extraocular muscle movement in these patients should raise the possibility of explant expansion.

**Poster No.:** EX1-198

**Panel No.:** 198

### Treatment of Large Macular Holes Using a Multilayered Inverted Internal Limiting Membrane Flap Technique

*First Author:* Jung Min **PARK**

*Co-Author(s):* Soo-Jung **LEE**, Song **DONG HUN**

**Purpose:** To describe a multi-layered inverted internal limiting membrane (ILM) flap technique, and to evaluate the surgical outcomes of this surgery in patients with macular holes >800  $\mu$ m in base diameter.

**Methods:** The medical records of patients who received a multi-layered ILM flap technique were retrospectively studied and patients with macular holes >800  $\mu$ m were included in the analyses. Visual acuity before and after surgery, preoperative hole size, and hole closure after surgery were checked using spectral domain optical coherence tomography. Pars plana vitrectomy was performed and the ILM was stained using indocyanine green and peeled with the base attached at the hole margin. The ILM flap was inverted over the macular hole with 2-3 layers, and gas injection was performed.

**Results:** The mean age of 12 patients was  $65.2 \pm 12.3$  years. The mean best corrected visual acuity (BCVA) (logMAR) was  $1.27 \pm 0.61$ . The mean hole base size was  $1182.8 \pm 298.5 \mu$ m. The mean follow-up period was  $174.4 \pm 143.3$  days. Nine macular holes were closed after surgery, but 3 macular holes were not closed. The postoperative mean BCVA (logMAR) was  $0.21 \pm 0.51$ . Eight eyes showed visual improvement, while 3 eyes did not show visual improvement after macular hole surgery.

**Conclusions:** The macular hole was closed successfully, and the visual acuity improved after the multi-layered, inverted ILM flap technique. The multi-layered, inverted ILM flap technique is therefore considered the treatment of choice for large macular holes.

**Poster No.: EX1-206**

**Panel No.: 206**

### Unraveling the Macular Mysteries Using Intraoperative Optical Coherence Tomography

*First Author: Srinivas JOSHI*

*Co-Author(s): Guruprasad AYACHIT, Apoorva AYACHIT, Amit RAJAN, Pavan SHROFF*

**Purpose:** To study the influence of intraoperative optical coherence tomography (iOCT) on the management of dense vitreous hemorrhage (VH) and retinal detachment (RD).

**Methods:** Prospective, cross-sectional study between December 2017 and August 2018. Inclusion criteria: preretinal hemorrhage involving macula, where preoperative OCT was not possible; VH due to any cause; RD where preoperative OCT was not possible iOCT was done for all the cases during PPV. Any macular pathology detected was treated. Surgeon's feedback grading was acquired. Time taken for iOCT was noted.

**Results:** Out of 40 eyes, 10 eyes had center involving diabetic macular edema (DME), 9 had epiretinal membrane (ERM), 3 had macular hole, 1 had subfoveal fluid, and 1 had macular atrophy. Others had normal foveal contour. Unnecessary surgical intervention was prevented in normal eyes. iOCT influenced diagnosis and management of 24 eyes (60%). Surgeon's grading showed iOCT had an impact in diagnosis and management of macular pathologies. The mean iOCT time was 3.46 minutes.

**Conclusions:** iOCT has a role in intraoperative diagnosis and management of the macular pathologies in VH and RD. Screening all PPV cases of VH with iOCT is recommended. Increase in surgical time due to iOCT is not statistically significant.

**Poster No.: EX1-201**

**Panel No.: 201**

### Vitreoretinal Intervention for Submacular Hemorrhage: Experience at Department of Ophthalmology, Hospital Selayang

*First Author: Seng Hong YEOH*

*Co-Author(s): Norlelawati ZAINOL*

**Purpose:** To evaluate the clinical outcomes of pars plana vitrectomy (PPV) with subretinal recombinant tissue plasminogen activator (rTPA) for managing submacular hemorrhage (SMH).

**Methods:** This was a retrospective case series study of 16 eyes of 16 patients in Hospital Selayang, Malaysia who had PPV with subretinal rtpa with or without gas tamponade from January 2014 to December 2016. Major outcome parameters are visual acuities (VA), displacement of submacular hemorrhage, and

postoperative complications over 1 month, 3 months, and 6 months postoperatively.

**Results:** Polypoidal choroidal vasculopathy (PCV) (n = 11) is the main etiology of SMH in this study. Submacular bleed reported good displacement in 81.3% of (n = 13) cases and moderate displacement (n = 2) in 12.5% cases. All cases but 5 [postoperative vitreous hemorrhage (n = 2), subretinal fibrosis (n = 1), history of breakthrough vitreous hemorrhage (n = 1), defaulted follow-up (n = 1)] experienced improvement in VA postoperative 1/12. The mean VA improved from  $2.17 \pm 1.02$  logMAR at presentation to  $1.33 \pm 0.88$  at 1 month,  $1.15 \pm 0.73$  at 3 months, and  $1.08 \pm 0.77$  at 6 months postoperatively. Complications included 1 eye breakthrough vitreous hemorrhage, 1 eye 8 ball hyphaema, 2 eyes pigment epithelial detachment (PED) with subretinal fluid.

**Conclusions:** PPV with subretinal rtpa with or without gas tamponade may improve patients' visual acuity and enable accelerated detection of underlying etiologies by allowing clinical examination and meaningful angiogram.

## Translational Research in Ophthalmology

**Poster No.: EX1-209**

**Panel No.: 209**

### Application of TeraHertz Scanning System as a Quantitative Tool in the Evaluation of Corneal Edema

*First Author: Yu-Chi LIU*

*Co-Author(s): Lin KE, Jodhbir MEHTA, Ercia TEO*

**Purpose:** To evaluate the feasibility and accuracy of using the Terahertz (THz) scanning system as a quantitative tool in the evaluation of corneal edema.

**Methods:** Fifty fresh porcine corneas and 10 human cadaveric corneas with different extents of corneal edema resulting from different time durations after procurement were used. All the corneas were scanned with the TPS Spectra 3000 Teraview Terahertz scanning system, as well as the anterior segment optical coherence tomography systems for the central corneal thickness (CCT). The porcine corneas were further scanned for 5 consecutive days. The THz peak intensity and the area under the curve (AUC) from the spectral domain was recorded and correlated with the CCT measurements.

**Results:** For the 50 porcine eyes, the THz peak intensity and AUC, as well as the CCT, increased with time. The mean peak signal intensity was  $159,951 \pm 5122$ ,  $177,338 \pm 5012$ ,  $224,761 \pm 6223$ ,  $250,290 \pm 5665$ , and  $327,236 \pm 6368$  atomic units, mean AUC was  $72,978$

$\pm 4689$ ,  $77,368 \pm 6522$ ,  $80,913 \pm 5651$ ,  $80,914 \pm 7815$ , and  $153,146 \pm 6790$ , and mean CCT was  $682 \pm 45$ ,  $745 \pm 68$ ,  $836 \pm 48$ ,  $1006 \pm 66$ , and  $1225 \pm 62 \mu\text{m}$ , for the corneas with the procurement time of 0, 1, 2, 3, and 4 days, respectively. The correlation was stronger between the AUC and CCT ( $r = 0.80$ ,  $P = 0.028$ ), than between the peak intensity and CCT ( $r = 0.75$ ,  $P = 0.034$ ). For the human cadaveric corneas with different extents of corneal edema, the AUC was positively and strongly correlated with the CCT ( $r = 0.81$ ,  $P = 0.014$ ).

**Conclusions:** The Terahertz scanning system has the potential to be used a novel tool to quantitatively evaluate corneal edema. It may be helpful in monitoring the disease progression in patients with corneal edema.

**Poster No.: EX1-212**

**Panel No.: 212**

### Flavonoid, Anthocyanin Oligomer is Effective at Blunting the Negative Influence of Ischemia/Reperfusion to the Rat Retina In Situ

*First Author: Su Ah KIM*

*Co-Author(s): Kuidong KANG*

**Purpose:** The purpose of the present study was to determine whether the flavonoid, anthocyanin oligomer is effective at blunting the negative influence of ischemia/reperfusion to the rat retina in situ and of various insults to a retinal precursor cells (R28) in culture.

**Methods:** R28 cells were given 1 of 3 different insults, light (1000 lux for 2 days),  $\text{H}_2\text{O}_2$  (200  $\mu\text{M}$  for 24 hours), or serum deprivation (48 hours). Cell survival and reactive oxygen species (ROS) formation was assayed. Lipid peroxidation assay was used to compare the antioxidant capacity of anthocyanin oligomers. In animal studies, anthocyanin oligomers was administered intraperitoneally just before and after an ischemic insult, and ischemia was delivered by raising the intraocular pressure above the systolic blood pressure (50 mins).

**Results:** Ischemia/reperfusion to the retina affected the localization of Thy-1 and choline acetyltransferase (ChAT), and the content of various proteins (optic nerve and retina) and mRNAs (retina). Importantly, anthocyanin oligomers statistically blunted most of the effects induced by ischemia/reperfusion. Anthocyanin oligomers also attenuated significantly the negative insult of light, hydrogen peroxide, and serum withdrawal to R28 cells. In the lipid peroxidation studies, anthocyanin oligomers were also found to be equally effective as EGCG to act as an antioxidant. Significantly, the negative insult of serum withdrawal on R28 cell survival was blunted by anthocyanin oligomers but not by EGCG, revealing the different properties of the 2 flavonoids.

**Conclusions:** Our results demonstrate the powerful antioxidant characteristics of anthocyanin oligomers. Together with the anti-apoptotic effects of anthocyanin oligomers suggest its potential use for the treatment of various ocular diseases.

**Poster No.: EX1-210**

**Panel No.: 210**

### Improved Arterial Stiffness After Sleep Apnea Treatment Depended on Ocular Microcirculation Shown by Laser Speckle Flowgraphy

*First Author: Mao TAKAHASHI*

*Co-Author(s): Tomoaki SHIBA*

**Purpose:** Recently, obstructive sleep apnea (OSA) is reported as a risk factor for cardiovascular disease (CVD). But it is difficult to predict responder of sleep apnea treatment for CVD. Arterial stiffness was reported as important risk factor for CVD. We examined whether there are differences in effects of OSA treatment on arterial stiffness by ocular microcirculation.

**Methods:** Subjects were 145 patients with sleep apnea diagnosed with attend polysomnography in Japan. All subjects were treated with continuous positive airway pressure (CPAP) for 1 year. Influence of CPAP treatment for arterial stiffness were defined by change of cardio-ankle vascular index (CAVI). All subjects had eye check on ocular microcirculation using laser speckle flowgraphy before CPAP treatment. Ocular microcirculation was estimated by mean blow rate (MBR).

**Results:** CAVI were correlated positively to age, gender, and severity of OSA at first health check data. CAVI was not decreased significantly after 1-year CPAP treatment. There were no relationships for change of CAVI in age, blood pressure, and estimate glomerular filtration rate (eGFR). Correlating factors for change of CAVI were high CAVI, Hba1c, MBR, and severity of OSA ( $r = -0.32$ ,  $r = -0.17$ ,  $r = 0.19$ ,  $r = -0.16$ ,  $P < 0.05$  respectively.).

**Conclusions:** Change of CAVI after 1 year CPAP treatment correlated to Hba1c, microcirculation, and severity of OSA before CPAP treatment for OSA. These results suggested that responder of OSA treatment for arterial stiffness could be predicted by measuring ocular microcirculation shown by laser speckle flowgraphy.

**Poster No.: EX1-211**

**Panel No.: 211**

### **Pumping Function of Corneal Endothelial Cells can be Enhanced by Novel Ca<sup>2+</sup>/Nucleotide Nanocomplex by Increasing the Activity of Na<sup>+</sup>/K<sup>+</sup> Dependent ATPase**

*First Author: Kuidong KANG*

*Co-Author(s): Su Ah KIM, Byung-Su LIM*

**Purpose:** Na, K-ATPase exist in the membrane of the corneal endothelial cell and control the corneal hydration through the pump function. In this study, we investigated the effect of Ca<sup>2+</sup>/Nucleotide (NT) nanocomplex (NC) on Na, K-ATPase and the pump function of the corneal endothelial cells.

**Methods:** Bovine corneal endothelial cells were used, and the cells were treated with Ca<sup>2+</sup>/Nucleotide (NT) nanocomplex (NC) formulation after various insults. Na, K-ATPase activity was measured by the spectrophotometric measurement of phosphate released from ATP with the use of ammonium molybdate. The Na, K-ATPase activity was calculated as the difference in ATPase activity between cells exposed to ouabain and those not exposed.

**Results:** The Ca<sup>2+</sup> NT NCs were prepared at a [Ca<sup>2+</sup>]:[NT]:[bPEI 1.8kDa] ratio of 0.25 mM: 0.5 mM: 1.0 mM and these preparations significantly and gradually increased the activity of Na, K-ATPase in cultured cells. These effects were effectively blocked by the PKC inhibitor. In addition, Ca<sup>2+</sup> NT NCs (0.25mM and 0.5mM) increased the viability of cells exposed to a low temperature (4°C) for 4 hours in a serum containing medium (P < 0.05). WB indicated that Ca<sup>2+</sup> NT NCs formulation significantly decreased the ratio of inactive Na, K-ATPase  $\alpha$ 1 subunit. Immunocytochemistry reveals that Ca<sup>2+</sup> NT NCs formulation increased the cell surface expression of the Na,K-ATPase  $\alpha$ 1 subunit.

**Conclusions:** This study demonstrates that the Ca<sup>2+</sup> NT NC formulation increases the activity of Na, K-ATPase and our results imply a potential therapeutic strategy that the pumping function of the cells can be improved by the administration of Ca<sup>2+</sup> NT NC formulation.

**Poster No.: EX1-213**

**Panel No.: 213**

### **Usability and Safety of Innovative Eye Shield Devices for Gas-Filled Eyes**

*First Author: Sopit PRAIWATTANA*

*Co-Author(s): Pear PONGSACHAREONNONT, Chusak THANAWATTANO, Adisai VARADISAI*

**Purpose:** Our purpose was to assess the usability and safety of an innovative eye shield that sensed the head position via a built-in 3-axis accelerometer and its smartphone application. The main outcome was the safety and satisfaction score.

**Methods:** This was a prospective, descriptive study. Five healthy volunteers were applied these innovative eye-shields and instructed to keep face-down positioning for 3 days consecutively. They were instructed to maintain a defined head posture within 15 degrees error-tolerance. Then the participants completed the safety and satisfaction questionnaires in a 5-point Likert scale. The questionnaires reviewed following 3 aspects: appearance, comfort, and safety. The continuous position monitoring was done.

**Results:** The mean age of volunteers was 51.8 years old (range, 26 - 64). A median score of good-looking appearance was 5. The figures of comfort in lightweight, notification-vibrating level, and set-up instruction were 5, 4, and 4, respectively. The device's safety, evaluated under any event of heat, skin irritation, exploration, or electrical discharge revealed just one mild skin irritation. The mean head position maintenance in error-tolerance 15 degrees at daytime and nighttime were 23.4% and 7.7%. Mean head posture within 15, 20, and 30 degrees error-tolerance were 19.8%, 30.1%, and 47.6%, respectively.

**Conclusions:** This innovative eye shield was safe to monitor postoperative head posturing. Volunteers were satisfied in its appearance, light weight, and comfort. There was no seriously adverse event found, but mild skin irritation was a complaint. Positioning compliance in daytime was better than nighttime.

## **Visual Sciences**

**Poster No.: EX1-214**

**Panel No.: 214**

### **Change of Neutralizing Antibodies Against AAV After AAV Intravitreal Injection in Cynomolgus Monkeys**

*First Author: Kazuhiro TAKAO*

*Co-Author(s): Tsutomu IGARASHI, Maika KOBAYASHI, Takashi OKADA, H TAKAHASHI, Kazuhisa TAKAHASHI*

**Purpose:** The adeno-associated virus (AAV) vector is an ideal tool for retinal gene therapy. Intravitreal administration of AAV vector is safe because of no need of intentional retinal detachment. However, the transduction efficiency in the primates is extremely low. We have already reported that inner limiting membrane peeling before intravitreal AAV administration induced strong transduction in cynomolgus monkeys. In this study, serum neutralizing antibodies (NAb) against AAV before and after intravitreal administration was measured. In addition, AAV mediated gene expression in the trabecular meshwork (TM) was evaluated.

**Methods:** 50  $\mu$ L of triple-mutated self-complementary AAV2 vector ( $1.9 \times 10^{13}$  v.g./mL) encoding green

fluorescent protein (GFP) was injected into the vitreous of 6 eyes of 3 female cynomolgus monkeys using 30-G needle. NAb in the serum was measured before, 2 and 6 weeks after administration. GFP expression in TM was examined at 19 weeks after administration.

**Results:** Average NAb titer was 15.9 before administration, 310.7 and 669.4 at 2 and 6 weeks after administration, respectively. GFP expression in TM was not detected in all eyes.

**Conclusions:** No GFP expression was found in TM, nevertheless intravitreal administration of AAV induced significant increase of serum Nab, suggesting that AAV vector can be recognized by ocular immune system. The measurement of NAb may offer a key to successful ocular gene therapy by AAV intravitreal injection.

**Poster No.: EX1-216**

**Panel No.: 216**

### Factors Associated with Poor Eye Drop Administration Technique and the Role of Patient Education Among a Local Elderly Population

*First Author: Bonnie Nga Kwan CHOY*

*Co-Author(s): Joseph KWAN, Jimmy LAI, Chun Sum PANG, Mingming ZHU*

**Purpose:** To evaluate the factors associated with poor eye drop instillation technique among elderly population over 60 years old, and how patient education may improve the technique.

**Methods:** Questionnaires assessing the cognitive and executive functions, activities of daily living, and functional status, as well as patient demographics, were used to correlate with eye drop application technique (before and after patient education), which was videotaped and assessed by 2 independent investigators blinded to the demographic data and questionnaire scores.

**Results:** Twenty-six Chinese subjects were recruited, mean age was 72. After providing clear instructions, the score on eye drop instillation technique improved from 5.42 at baseline to 7.33. FRAIL (Fatigue, Resistance, Ambulation, Illnesses, Loss of weight) score was found to be an independent predictor of baseline score, as well as the improvement after patient education on the instillation technique. However, age, sex, education level, visual acuity, MoCA (Montreal Cognitive Assessment) score, Barthel index, and Lawton's instrumental activities of daily living score were not found to be correlated with eye drop instillation technique, before or after patient education.

**Conclusions:** In patients with poor functional status as reflected by FRAIL score, eye drop application is prone to be ineffective. Eye drops should not be prescribed to these patients without provision of education, or assistants should be available to help apply the medication at home. Even in those with initial poor

technique, clear step-by-step instructions could effectively improve the success of eye drop application, which can reduce bottle contamination and wastage of medication while maximizing drug effectiveness and compliance.

**Poster No.: EX1-215**

**Panel No.: 215**

### Glucose Exposure Affects Expression of Brain Aromatase and Retina Regeneration

*First Author: Zulvikar ULHAQ*

**Purpose:** Teleost fish, including zebrafish, exhibit high brain aromatase (AroB) expression and a robust regenerative response to retinal injury. In contrast, limited regenerative response is observed in mammalian retina. Therefore, zebrafish are a suitable model to evaluate the significant role of AroB and neural estrogen in neuroregeneration. Previously, we showed that glucose exposure decreased the expression of AroB. Therefore, in this study we investigated the effects of glucose exposure on the function of AroB in retina regeneration.

**Methods:** Adult zebrafish were exposed to 3% glucose for 18 days, and immunocytochemistry for brain aromatase was conducted. Double immunohistochemistry staining indicates that AroB was co-localized with glutamine synthetase (GS) in the retina. To understand the role of AroB in retina regeneration, a retinal injury was performed, and cell proliferation and apoptotic cells were analyzed.

**Results:** The number of cell proliferation was increased in an injured group compared with an uninjured group. No significant differences between injured retina in unexposed and exposed fish in cell proliferation. However, the number of apoptotic cells was significantly increased in injured retina exposed to glucose compared with unexposed control.

**Conclusions:** Taken together, the data indicate that glucose exposure inhibits the regeneration process by increasing apoptotic cells in injured retina.

# E-POSTERS

## Academia, Research, Teaching and Education in Ophthalmology

### Accuracy Evaluation of Diabetic Retinopathy Grading by Final-Year Medical Students

First Author: Saksakul **ENGCHUAN**

Co-Author(s): Charaspong **UBOLSING**

**Purpose:** We assessed accuracy of Diabetic Retinopathy (DR) grading and referring decisions in final-year medical students who will become primary care physicians in the upcoming year.

**Methods:** All 22 final-year medical students in a tertiary hospital were enrolled. To complete questionnaires which consisted of 20 images demonstrating varied stages of DR, participants were assigned to grade DR and make referring decisions. The images were selected from standard photographs displayed in reliable publications. DR classification system by American Academy of Ophthalmology which classified DR into no DR, mild nonproliferative DR (NPDR), moderate NPDR, severe NPDR, and proliferative DR (PDR) was used as a gold standard classification. Sensitivity and specificity of DR grading were analyzed. Referring scores would be assessed if DR staging was correctly marked.

**Results:** Average DR staging and referring scores were respectively 8.36 and 7.59 out of 20. Given that a passing level of staging and referring scores was 80%, no students achieved this level. Average grading sensitivity of mild NPDR, moderate NPDR, severe NPDR, and PDR were 45.45%, 40.90%, 30.68%, and 48.86% respectively. DR diagnosis specificity was 43.18%.

**Conclusions:** To provide early DR diagnosis, prevent DR complication, and reduce numbers of patients in tertiary care centers, the impediment of medical students' retaining long-term knowledge and making referring decisions properly should be figured out. Moreover, medical students' obstacles of DR grading should be promptly interpreted in further study.

### Cultural Competence as a Driver of Good Quality Care

First Author: Noela **PRASAD**

**Purpose:** To understand commonalities between traditional and western medicine approaches, from the

perspective of eye care.

**Methods:** A narrative review of literature from Africa, Asia, and Australia was conducted. This, supplemented by information gathered from patient interviews are used to understand how cultural competence impacts quality of care and access to healthcare.

**Results:** Many patients receive or seek traditional cures alongside Western medicine. In fact, access to traditional healthcare is often better than access to modern Western medicine. Trust in traditional healers' ability to understand symptomatology is crucial to the healing process. When cultural competence is an objective of training for healthcare providers, it is possible to deliver care in collaboration with traditional healers.

**Conclusions:** The eye is sacrosanct in both traditional and Western medicine schools of thought. Where Western medicine practitioners have co-care arrangements with traditional healers, as is evident from the experience in community eye health, both access to care and the quality of care are enhanced.

### Development of a Retinal Vascular Occlusion Model in Mice and Analysis of the Pathophysiological Roles of Adrenomedullin

First Author: Kazutaka **HIRABAYASHI**

Co-Author(s): Akira **IMAI**, Toshinori **MURATA**, Takayuki **SHINDO**, Masaaki **TANAKA**

**Purpose:** We developed a photodynamic retinal vascular occlusion model in mice and analyzed the pathophysiological roles of adrenomedullin (AM), an endogenous peptide which possesses various functions, including vasoprotective and anti-inflammatory functions.

**Methods:** Nine to 12-week-old male AM knockout mice (KO) and wild-type mice (WT) were used. After anesthesia, 1 mg of Rose Bengal was intraperitoneally injected, photocoagulation was performed in the central retinal vein and artery, and blood vessels were occluded. After 7 days, fluorescein isothiocyanate (FITC) was injected into the heart, and retinal flat mount was prepared. The vascular area ratio was measured by Angio tool, and the expression of each gene in the retina was analyzed by real-time PCR. Retinal volume was also measured by OCT after the photocoagulation.

**Results:** FITC-perfused vascular area ratio was 53% in control mice without photocoagulation and significantly decreased to 30% after treatment in the WT and 13%

in the KO group. After treatment, coagulation factor PAI-1, inflammatory factor CD68 and VCAM-1, and oxidative stress markers p47phox and p67phox were elevated, and KO showed higher gene expression than WT. In control mice, retinal volume measured by OCT was  $7.0 \text{ mm}^3$ . Retinal edema was most prominent on day 1 after photocoagulation and reached 1.4 times higher than the baseline level. After that it gradually decreased, and retinal atrophy was observed on day 7. In KO, retinal edema was significantly worsened on day 2 and 3 days compared with WT.

**Conclusions:** In AM KO mice, pathological conditions due to retinal vascular occlusion were exacerbated. AM is expected as a promising therapeutic target.

### Intraocular Oxidative Stress and Accumulation of Advanced Glycation End Products in Diabetic Eyes

*First Author:* Yuichi **TORIYAMA**

*Co-Author(s):* Takao **HIRANO**, Akira **IMAI**, Yorishige **MATSUDA**, Toshinori **MURATA**, Masumi **WAKABAYASHI**

**Purpose:** To examine the intraocular oxidative stress and the accumulation of advanced glycation end products (AGEs) in diabetic eyes.

**Methods:** A total of 36 patients who planned to undergo intraocular surgery at Shinshu University Hospital between June 2017 and April 2018 were enrolled. Aqueous humor samples were obtained from 23 eyes of patients with diabetes mellitus (DM) and 13 eyes of non-DM control patients. The intraocular oxidative stress was determined by measuring aqueous static oxidation–reduction potential (sORP) using RedoxSyS. The accumulation of AGEs was determined by measuring the lens fluorescence ratio (FR) using ClearPath DS-120.

**Results:** The aqueous sORP was significantly higher in the DM group ( $-10.7 \pm 12.9 \text{ mV}$ ) than in the non-DM group ( $-23.2 \pm 11.1 \text{ mV}$ ;  $P < 0.01$ ). Likewise, the lens FR was significantly higher in the DM group ( $0.31 \pm 0.08$ ) than in the non-DM group ( $0.22 \pm 0.07$ ;  $P < 0.005$ ). Both the sORP and lens-FR tended to be higher as the severity of diabetic retinopathy (DR) progressed. No significant correlation was found between the aqueous sORP and the lens FR. In the DM group, no significant correlation was found between the single measurement of HbA1c and the sORP or lens FR.

**Conclusions:** The lens FR reflecting the accumulation of AGEs and the aqueous sORP reflecting the intraocular oxidative stress may serve as a new screening tool for DR and may have a correlation with DR severity.

### I $\kappa$ B Kinase $\beta$ Inhibitor IMD-0354 Attenuates Laser-Induced Choroidal Neovascularization in Mice

*First Author:* Yosuke **IDA**

*Co-Author(s):* Fumihito **HIKAGE**, Haruka **IDA**, Yayoi **MARUMO**, Hiroshi **OHGURO**

**Purpose:** The purpose of the present study was to evaluate the effect of selective IKK- $\beta$  inhibition by IMD-0354, a non-ATP binding competitive selective IKK- $\beta$  inhibitor in laser-induced choroidal neovascularization (CNV) in mice.

**Methods:** Nine-week-old C57BL/6 male mice were used for the present study. Mice were randomly assigned to IMD-0354 30 mg/kg treated or untreated groups (5 mice, 10 eyes per each group). CNV was induced by a 532-nm laser (power; 250 mW, spot size; 100  $\mu\text{m}$ , time of exposure; 50 ms) created in each eye using a slit lamp delivery system. Its efficacy of IMD0354 was compared with another group of mice treated intraperitoneally with 1.5 mg/kg of ranibizumab anti-VEGF antibody fragments. For ameliorative effects toward CNV development, inhibition of NF $\kappa$ B activation, CD45 positive cell infiltration, apoptotic signaling by cleaved caspase-3, and retinal production of vascular endothelial growth factor (VEGF) were analyzed.

**Results:** Systemic administration of IMD-0354 for 7 days in CNV mice caused significant reduction in the size of CNV area, apoptotic signaling, CD45 positive cells infiltration, and VEGF expression.

**Conclusions:** The present data indicates that NF $\kappa$ B activation is crucially involved in the development of laser CNV in mice, and its suppression by IMD-0354 might be an alternative therapy for wet AMD in humans.

### Motivation and Course Value of Ophthalmology Posting Among Malaysian Medical Students

*First Author:* Wan Haslina **HALIM**

*Co-Author(s):* Malisa **AMI**, Norshamsiah **MD DIN**, Othmaliza **OTHMAN**

**Purpose:** The ophthalmology posting is a compulsory module for the fourth-year medical students in Universiti Kebangsaan Malaysia. This was a preliminary study to investigate (1) the level of intrinsic motivation, extrinsic motivations, and course value and (2) the level of correlations between intrinsic motivation, extrinsic motivations, and course value among Malaysian medical students at Universiti Kebangsaan Malaysia Medical Center (UKMMC) of Malaysia.

**Methods:** This study was done during the ophthalmology posting. This quantitative study used a questionnaire adapted from The Motivated Strategies for Learning Questionnaire (MSLQ). The sample of this

study consisted of 57 students who were chosen based on the purposive sampling technique.

**Results:** The study found that (1) descriptively the level of all components among students was high, (2) using Spearman correlation test, at the significant level of 0.01, extrinsic motivation was not significantly correlated with intrinsic motivation while course value was positively and significantly correlated with both extrinsic and intrinsic motivations.

**Conclusions:** This study suggests some recommendations to be implemented with regard to students' motivations and course value in ophthalmology posting such as introductory lecture prior to clinical session.

### Outcome of Retina Eye Care of Nepal Project

*First Author:* Arjun **SHRESTHA**

*Co-Author(s):* Pratap **KARKI**

**Purpose:** To strengthen retina eye care services in Nepal by training ophthalmic human resources and conducting retina-screening camps through RECON project with support from Japanese International Cooperation Agency.

**Methods:** Four Master eye doctors (MED) from 4 different retina centers of Kathmandu and Pokhara were trained in Tokushima University of Japan for a month. These MEDs prepared training materials on retina management for a different cadre of ophthalmic human resources and prepared Information and Education Material (IEC) on retinal diseases to be distributed in outreach retina-screening camps. Continuing Medical Education (CME) on retina management was also conducted for targeted ophthalmologists.

**Results:** These MEDs already provided short-term retina training to 20 ophthalmologists, 18 optometrists, 30 ophthalmic assistants, and 10 ophthalmic nurses from different eye institutes of Nepal. Pre-test and post-test examinations were carried out for different levels of ophthalmic manpower and showed improved levels of knowledge and skill after the training. Many retina patients are referred to the training center from these trained ophthalmic health staff after the training. Three retina camps were conducted with a total of 230 patients screened for retinal diseases.

**Conclusions:** The project is a novel approach to strengthen retina services in Nepal. The aim of the project is to ultimately benefit the needy retina patients who otherwise are going to miss this retina care. The project is focusing on training the retina care workforce, enhancing retina care by easy access, and improving services and awareness at even the grassroots level in the community by conducting retina-screening camps.

### Reduced Total Operation Time in Cataract Surgery by the Standardization of Perioperative Protocol According to the Joint Commission International Accreditation

*First Author:* Yuichi **OKUMURA**

*Co-Author(s):* Atsushi **AMANO**, Takenori **INOMATA**, Masao **IWAGAMI**, Ju **MIZUNO**, Akira **MURAKAMI**

**Purpose:** To investigate the impact of standardization of the perioperative protocol based on Joint Commission International (JCI) accreditation guidelines for operating time in cataract surgery.

**Methods:** Patients were classified as before and after the JCI accreditation on December 12, 2015. We compared 3 time periods comprising the pre-procedure time (prePT), procedure time (PT), post-procedure time (postPT), and total procedure time (TPT) of cataract surgery between patients before and after JCI accreditation, by regression analysis adjusted for age, sex, best corrected visual acuity (BCVA), intraocular pressure (IOP), and complications associated with cataract surgery.

**Results:** A total of 3127 patients were enrolled in this study, including 2581 (82.5%) and 546 patients (17.5%) before and after JCI accreditation, respectively. prePT ( $19.8 \pm 10.5$  vs  $13.9 \pm 8.5$  mins,  $P < 0.001$ ), postPT ( $3.5 \pm 4.6$  vs  $2.6 \pm 2.1$  mins,  $P < 0.001$ ), and TPT ( $40.1 \pm 13.4$  vs  $32.8 \pm 10.9$  mins,  $P < 0.001$ ) were significantly decreased after the JCI accreditation, while PT did not significantly change ( $16.8 \pm 6.7$  vs  $16.2 \pm 6.3$  mins,  $P = 0.065$ ). After adjusting for age, sex, BCVA, IOP, and complications, prePT ( $\beta = -5.82$  mins, 95% CI -6.75 to -4.88,  $P < 0.001$ ), PT ( $\beta = -0.76$  mins, 95% CI -1.34 to -0.17,  $P = 0.011$ ), postPT ( $\beta = -0.847$  mins, 95% CI -1.24 to -0.45,  $P < 0.001$ ), and TPT ( $\beta = -7.43$  mins, 95% CI -8.61 to -6.24,  $P < 0.001$ ) were significantly shortened after JCI accreditation.

**Conclusions:** Standardization of the perioperative protocol in the operating room according to the JCI accreditation shortened the total operation time in cataract surgery under local anesthesia.

### Safety and Efficacy of Consultant-Supervised Phacoemulsification Cataract Surgeries Performed by Trainees in the Basic Surgical Training Programme

*First Author:* Tze Lin **WEE**

*Co-Author(s):* Allan **FONG**

**Purpose:** To ascertain the safety and efficacy of consultant-supervised phacoemulsification cataract surgeries performed by trainees in the Basic Surgical Training (BST) Programme. This paper also shares the considerations to minimize complications and optimize outcomes for these cases.

**Methods:** All eyes with phacoemulsification cataract surgeries performed by BST trainees at an accredited

Institution from 2011 to 2014 inclusive were analyzed. These eyes represented early phacoemulsification cases performed by each of these trainees. All surgeries were performed under the supervision of a consultant surgeon. All eyes with intraoperative and postoperative complications were documented. Results of all surgeries were subjected to audit and are presented.

**Results:** A total of 1708 eyes had phacoemulsification cataract surgeries performed by trainees in the BST programme at an accredited Institution from 2011 to 2014. Best-corrected visual acuity (BCVA) of 6/12 or better was achieved in 99.3% (range, 98.6%-99.5%) of eyes. Posterior capsule rupture rates averaged 2.5% annually (range, 2.1%-3.2%), while eyes complicated by zonulysis averaged 0.725% (range, 0.5%-0.9%) annually. 100% of eyes with complications achieved BCVA of 6/12 or better. There were no cases of endophthalmitis in this series.

**Conclusions:** Training residents for phacoemulsification cataract surgery addresses an important professional and societal need. A robust training platform is needed to ensure excellent surgical outcomes during this training process. Early phacoemulsification cataract surgeries performed by BST trainees under consultant supervision is safe with good outcomes. Timely intervention by the guiding consultant surgeon during and after surgery is important. Regular cataract review rounds are useful to reinforce lessons learned.

## Cataract

### 1-Year Clinical Outcomes of Presbyopia Patients Using Multifocal Diffractive Posterior Chamber Phakic IOL

*First Author: Minoru TOMITA*

**Purpose:** In order to improve visual acuity caused by presbyopia and refractive error, we have done a study of 1-year clinical outcomes of presbyopia patients using multifocal IPCL (Implantable Contact Lens: EYEOL, UK). IPCL is a single piece posterior chamber Phakic IOL, made by hybrid hydrophilic acrylic material. Presbyopia correcting multifocal diffractive IPCL interacts with the crystalline lens to enhance patient's residual accommodation.

**Methods:** The study showed 104 presbyopia patients of which 208 eyes were performed multifocal Phakic IOL implantation. Mean of preoperative Uncorrected Distance Visual Acuity [UDVA (logMAR)] was  $0.69 \pm 0.61$ , Uncorrected Near Visual Acuity [UNVA (logMAR)] was  $0.44 \pm 0.40$ , and Manifest Refraction Spherical Equivalent (MRSE) was  $-3.94 \pm 4.11$  diopters (D). All patients were followed up for 1 year at postoperative, where the data of UDVA, UNVA, MRSE, and corneal endothelial counts were statistically analyzed.

**Results:** After following up for 1 year, the mean of UDVA and UNVA in postoperative were significantly improved. UDVA (logMAR) was  $-0.13 \pm 0.06$ , UNVA (logMAR) was  $0.22 \pm 0.11$ , and MRSE was  $0.16 \pm 0.44$  D at postoperative 1 year. No difference was found in corneal endothelial counts between preoperative and 1 year postoperative.

**Conclusions:** The clinical results of presbyopia patients using multifocal IPCL showed significant improvement of UDVA and UNVA. There were no cases of cataract and infections shown in patients within 1 year of follow-up. The multifocal Phakic IOL implantation was highly effective for presbyopia patients.

### 1st Q Basis V Intraocular Lens: A Mini Review

*First Author: Khalilah Mastura ZAHARI*

*Co-Author(s): Fiona Lm CHEW, Nuratiqah ZAINAL ABIDIN*

**Purpose:** To assess the visual outcome of 1st Q Basis V intraocular lens (IOL) for uncomplicated phacoemulsification in terms of visual acuity (VA) and targeted final spherical equivalent (SE).

**Methods:** This retrospective study collected data of all consecutive patients who underwent uneventful phacoemulsification performed by a single surgeon from July 2017 to July 2018. Patients were excluded if they defaulted postoperative ophthalmic follow-up. All patients underwent phacoemulsification with implantation of monofocal 1st Q Basis V IOL using Comport Trimo 2.2 mm injector. Demographic data, preoperative, and postoperative ophthalmic findings at 4 weeks were recorded. Categorical data was analyzed using Chi-square test.

**Results:** A total of 54 patients were included in the study. Mean patient age was 66 years [standard deviation (SD), 8.20]. Majority of the patients (33/54, 61.1%) were males. Mean targeted postoperative SE was  $-0.31$  (SD, 0.11). Biometry machines used were IOL Master (38/54, 70.4%), Nidek (10/54, 18.5%), and immersion (6/54, 11.1%). Mean axial length was 23.76 mm (SD, 1.34). Postoperatively, most patients (49/54, 90.7%) had VA equal or better than 6/12. For the patients with VA worse than 6/12, 80% (4/5) had ocular co-morbidities ( $P = 0.022$ ). Mean postoperative final SE was  $-0.47$  (SD, 0.51). Postoperatively, 49/54, 90.7% (49/54) of patients had final SE within 1.0 diopters (D) of targeted SE. On further analysis of patients with SE beyond 1.0 D of targeted SE, it was noted that 3/5 (60.0%) had abnormal axial length ( $P = 0.007$ ) and 80.0% (4/5) had ocular co-morbidities ( $P = 0.037$ ). Biometry machine type did not affect the final SE ( $P = 0.594$ ).

**Conclusions:** 1st Q Basis V IOL shows promise as a monofocal IOL for uncomplicated phacoemulsification.

## A Case of Chronic Recurrent Methicillin-Resistant *Staphylococcus haemolyticus* Endophthalmitis After Cataract Surgery

First Author: Dea Sung **KIM**

Co-Author(s): Hee Yoon **CHO**, Yong Un **SHIN**

**Purpose:** To report the case of chronic recurrent methicillin-resistant *Staphylococcus haemolyticus* endophthalmitis after phacoemulsification and posterior chamber intraocular lens (IOL) implantation.

**Methods:** A 76-year-old female visited our out-patient with decreased vision 40 days after uncomplicated cataract surgery in her right eye. At the time of visit, anterior chamber inflammation and fluid between the posterior capsule and IOL were seen. Uveitis due to residual cortex of lens or capsular block syndrome was suspected, YAG laser capsulotomy and subconjunctival injection of dexamethasone were done. Two days later, hypopyon and vitreous opacity were seen. The patient underwent an emergency vitrectomy and intravitreal antibiotics injection with suspicion of bacterial endophthalmitis. The culture in vitreous and in anterior chamber fluid were negative. Twenty days after vitrectomy, anterior chamber inflammation and vitreous opacity were developed.

**Results:** The recurrence of endophthalmitis was suspected to be due to infection by bacteria in the surrounding tissue of the IOL, then the patient underwent IOL with lens capsule removal and intravitreal antibiotics injection. At this time, culture revealed methicillin-resistant *Staphylococcus haemolyticus*. Then, systemic and topical vancomycin were administered and inflammation decreased. Twenty days after IOL removal, decreased vision, anterior chamber inflammation, and vitreous opacity developed. This time, endophthalmitis was improved by intravitreal antibiotics injection and topical antibiotics treatment. Four months after IOL removal, anterior chamber inflammation was not seen, and scleral fixation of IOL was done.

**Conclusions:** Methicillin-resistant *Staphylococcus haemolyticus* should be considered in the differential diagnosis of chronic recurrent endophthalmitis after cataract surgery.

## A Multicenter Approach to Patients' Perspectives on Barriers to Cataract Surgery in Indonesia and Their Relationship to Surgery Waiting Time

First Author: Randy **SARAYAR**

Co-Author(s): Arnes Tasya Citra **ANGGINI**, Yeni **LESTARI**, Annisa Nindiana **PERTIWI**, Herdanti Rahma **PUTRI**, Nur **RAHMAWATI**

**Purpose:** To identify barriers perceived by patients undergoing cataract surgery and how these relate to the surgery waiting time.

**Methods:** This was a retrospective study involving 160 patients who had undergone their first-eye cataract surgery at 7 hospitals in Indonesia. Questionnaire-based direct interview was conducted to investigate perceived barriers to surgery, such as access to the hospital, social support, belief and cultural values, self and mental readiness, cost, physical conditions, and health worker-related factors. The number of days between the initial diagnosis and surgery was examined based on the patients' medical records. Bivariate analysis was performed to find statistical relation between barriers and waiting time for surgery.

**Results:** The median waiting time was 52 days (0-3719). Patients with issues on self and mental readiness, specifically those who postponed surgery due to various affairs had longer waiting time [median 162.50 days (21-675)], compared to those who did not [median 64.60 days (0-1419),  $P = 0.045$ ]. Longer waiting time was found in patients with certain physical conditions as well, in those whose surgery was postponed due to comorbid diseases [median 61.00 days (1-1419),  $P = 0.020$ ] and those who had been told to wait for the cataract to be mature [median 68.50 days (3-608),  $P = 0.006$ ].

**Conclusions:** Patients' self and mental readiness and physical conditions were related to a longer cataract surgery waiting time in the Indonesian population. These barriers should be prioritized and addressed to reduce the waiting time for surgery.

## An Evaluation of the Success Rate of Canine Cataract with the Use of Long-Term Oral Chloramphenicol and Ciprofloxacin Eye Drop Therapy

First Author: Shobhath **WIJERATNE**

Co-Author(s): Vindya **PERERA**

**Purpose:** Surgery is the only treatment available for cataracts in dogs, but it is associated with post-surgical complications and not cost effective. The objective of this study was to determine the success rate of long-term use of oral Chloramphenicol with Ciprofloxacin eye drops as a treatment for cataract.

**Methods:** A total of 60 dogs and 109 eyes that presented with cataract from January 31, 2015 to August 1, 2018 were included in this study. Dogs were treated 2 times daily with chloramphenicol (250 mg) capsules combined with Ciprofloxacin HCL eye drops (3 mg/mL 3 times/day) for a period of 4 months. These dogs were examined prior to treatment and every 3 weeks during treatment on changes in hematological parameters, eye opacity, response to light, and vision.

**Results:** We evaluated 109 eyes, 36 with stage 1 cataract (incipient), 43 with stage 2 cataract (immature), 19 with stage 3 cataract (mature), and 11 with stage 4 cataract (hypermaturation). Stage 1 responded very well to the treatment with a 100% success rate.

The cloudiness of the eyes disappeared within 3 months resulting in complete vision. 74.4% of stage 2 eyes got cleared and gained complete vision. Stage 3 eyes could not obtain clearance but were sensitized to light beam. Stage 4 eyes remained with blindness. There were no significant changes in hematological parameters.

**Conclusions:** This study signifies that early treatment with the above method is associated with favorable outcomes: disappearing cloudiness and gaining complete vision. Further, this study may be helpful for humans as an alternative for surgical intervention.

### Aqueous Humor Levels of Perioperative Application of Topical 0.5% Levofloxacin in Cataract Patients

*First Author: Jing FENG*

*Co-Author(s): Yong TAO*

**Purpose:** To investigate the aqueous humor levels of levofloxacin after a specific perioperative topical drop according to Chinese guidelines.

**Methods:** Thirty patients undergoing phacoemulsification surgery were administered 3 preoperative drops of 0.5% levofloxacin, 6 times a day for 1 day (1-day group,  $n = 10$ ), 4 times a day for either 2 days (2-day group,  $n = 10$ ), or 3 days (3-day group,  $n = 10$ ). Sixty patients were administered drops of 0.5% levofloxacin 7.5 mins to 120 mins prior to surgery. Aqueous humor levels of levofloxacin were measured at the start of surgery. Samples from individual patients were collected at the time of surgery and analyzed using a liquid chromatography–tandem mass spectrometry assay.

**Results:** The aqueous humor level of levofloxacin of 1-day group ( $0.26 \pm 0.11$  mg/mL) was higher than that of 2-day ( $0.18 \pm 0.07$  mg/mL) and 3-day ( $0.18 \pm 0.11$  mg/mL) groups ( $P = 0.233$ ). The levofloxacin produced the highest concentration at 60 min ( $0.84 \pm 0.88$  mg/mL,  $P < 0.001$ ).

**Conclusions:** Compared with Chinese guideline recommended dosing schedules, higher aqueous humor levels of levofloxacin were found at 60 mins after administration of preoperative drops on the day of surgery, which were higher than the MIC90 values against some common pathogens of postoperative endophthalmitis.

### Benefits of an Enhanced Depth of Focus Intraocular Lens to Aspheric IOLs vs Optical Quality and Visual Side Effect Comparison: Are Monofocal IOLs Still Standard of Care?

*First Author: Matthias GERL*

*Co-Author(s): Salah ABDASSALAM, Detlev BREYER, Detlef HOLLAND, Florian KRETZ*

**Purpose:** The aim of this study was the comparison

of functional and refractive results, defocus curve, disphotopic phenomena, and questionnaire results in patients binocularly implanted with either an enhanced depth of focus (EDOF) intraocular lens (IOL) (Oculentis Comfort, Oculentis Germany) or an aspheric IOL (CT Asphina 409, Carl Zeiss Meditech, Germany).

**Methods:** In a prospective clinical trial, patients binocularly implanted with either an EDOF IOL or an aspheric IOL targeted emmetropia were included 3 to 9 months after an uncomplicated cataract surgery. Refractive outcome, functional results (UDVA, CDVA, DCIVA), Defocus curve, HD Analyzer, Halo and Glare Simulator, and subjective questionnaire results for both groups were evaluated.

**Results:** Mean spherical equivalent showed no significant difference in both groups. The EDOF group showed a higher depth of focus in the defocus curve analysis compared to the aspheric IOL group. The Halo and Glare assessment showed an equal distribution of Halo and Glare strength in both groups with actually less strength in the EDOF IOL group of patients. Optical quality evaluation with the HD Analyzer showed a similar optical quality of both IOL groups.

**Conclusions:** The rotational asymmetric design of EDOF IOL shows similar to less disphotopic phenomena incidence to the aspheric IOL group with a comparable optical quality, while still offering patients a wider range of vision.

### Bilateral Electrical Cataract Following a Very High Voltage Shock (20,000 Volts)

*First Author: Devi SWADAYANI*

*Co-Author(s): Herwindo PUTRANTO*

**Purpose:** The aim of this study was to report a rare case of survival isolated bilateral electrical cataract with minimal body complications and its management.

**Methods:** We had examined a 26-year-old man presented to a cataract and refractive surgery outpatient clinic. History-taking, Snellen visual acuity, and an anterior and posterior segment examination were used to establish the diagnosis of Electrical Cataract.

**Results:** A 26-year-old man presented with rapid progress blurred vision in both eyes, after a serious work-related accident of a very high electrical shock of 20,000 volts 7 months before. Visual acuity before operation was 1/300 for right eye and 1/60 for left eye. He had an isolated stellate like bilateral lens homogenous opacity with fibrotic anterior capsule, the funduscopy difficult to evaluate and neither anterior nor posterior segment complications. The patient had bilateral phacoemulsification and posterior chamber intraocular lens implantation, achieving a satisfactory result of visual acuity that was 20/20 for right eye and 20/25 that after correction became 20/20 for the left eye.

**Conclusions:** We had reported a rare case of survival

isolated bilateral electrical cataract following a very high voltage shock of 20,000 volts. Fibrotic over the anterior capsule may disturb lens nutrition and permeability changes, leading to cataract formation. The outcomes after cataract surgery are excellent provided the other anterior segment, posterior segment, and optic nerve examinations are normal.

### Blended Vision of Refractive Rotational Asymmetric Intraocular Lens Oculentis Mplus X MF30 and Oculentis Mplus MF20

*First Author: Alan KOH KOK KHIANG*

**Purpose:** To assess the 1-month postoperative visual performance and subjective patient satisfaction in 100 patients with bilateral implantation with Oculentis Mplus X MF30 and Oculentis Mplus MF20.

**Methods:** This study comprised 100 patients (200 eyes) who had successful bilateral femtosecond laser-assisted cataract / clear lens surgery with implantation of Oculentis MplusX 30 in the non-dominant eye and Oculentis Mplus MF20 in the dominant eye. The surgery on each eye had been done on consecutive days. Parameters analyzed included binocular uncorrected visual acuity for distance, intermediate and near, spectacle independence, photic phenomena, and patient satisfaction.

**Results:** At post-op 1 month, the mean bilateral UCDVA was  $0.03 \pm 0.06$  logMAR with 94% (94 patients) achieving 20/25 (6/7.5) or better ( $P < 0.001$ ), mean bilateral UCIVA was  $-0.04 \pm 0.07$  logMAR with 100% (100 patients) achieving 20/25 or better ( $P < 0.001$ ) and mean bilateral UCNVA was  $0.04 \pm 0.06$  logMAR with 100% (100 patients) achieving J3 (N5) or better ( $P < 0.001$ ). Most of the patients did not wear glasses for daily activities and reported high satisfaction, especially less glares and no haloes in overall performance.

**Conclusions:** The study showed that with bilateral implantation of Oculentis Mplus X MF30 and Oculentis Mplus MF20 provides very good uncorrected visual acuity for distance, intermediate and near. This blended vision approach has achieved very high patient satisfaction, and most patients have been practically spectacle independent with minimal to no visual disturbances reported.

### Challenging Management of Refractive Surprises Following Phacoemulsification with Intraocular Lens Implantation: A Case Series

*First Author: Amelya SARI*

*Co-Author(s): Yudianil KAMAL, Amir SHIDIK*

**Purpose:** To emphasize the importance of accurate intraocular lens (IOL) power calculation, to know what could happen if there is a miscalculation, and how to manage the refractive surprises.

**Methods:** There were 2 patients with refractive

surprises after phacoemulsification with IOL implantation. First case, 19-year-old female, complained of glare and blurry vision on left eye (LE) after refractive lens exchange. Her visual acuity (VA) was 6/6 with S-4.00 C-1.50x10. She had a history of high myopia (S-18.00 D). Second case, 39-year-old female, complained of blurry vision on right eye (RE) after cataract surgery. Her VA was 6/12 with S+8.00. She had non-proliferative diabetic retinopathy. Both patients underwent biometry reexamination with IOL Master.

**Results:** The first patient underwent limbal relaxing incision and piggyback IOL implantation with the best corrected visual acuity (BCVA) result 6/6. Unfortunately, the piggyback IOL was decentered and the IOL was explanted for further plan to other management. The second patient underwent IOL exchange and postoperatively the BCVA was 6/7.5. Pathological of the eye such as staphyloma posterior, density of the lens, posterior segment abnormality may affect the accuracy in IOL power calculation.

**Conclusions:** Refractive surprises after phacoemulsification with IOL is related to IOL power miscalculation. Although choosing the IOL power might seem simple, it is actually a complex process. Management of refractive surprises to achieve patient satisfaction may be challenging because further surgical correction can be more difficult, and the result will be more unpredictable.

### Changing Trends in Community Cataract Surgery Techniques

*First Author: Amarendra DEKA*

**Purpose:** To compare the outcome of phacoemulsification vs small incision cataract surgery for community mass cataract surgeries.

**Methods:** Community mass cataract cases were divided into 2 groups. In group A, phacoemulsification with foldable intraocular lens were implanted under topical anesthesia in 300 cases. In group B, small incision cataract surgery was performed with PMMA intraocular lens under peribulbar block in 348 cases. Cost vs outcome was compared, and questioner was asked to assess outcome. Cases were followed up for a period of 6 months.

**Results:** Small incision cataract surgery is cheaper than phacoemulsification, costing about \$5 vs \$9 respectively per case. However, when we compared the outcome of the surgery, phacoemulsification is far ahead with very good compliance. Visual improvement and patient recovery are faster with phacoemulsification.

**Conclusions:** Phacoemulsification should be the gold standard technique for cataract surgery. It can be performed routinely for mass cases.

## Clinical Outcomes in Asymmetrical Pathological Myopia with Posterior Polar Cataract: A Rare Clinical Entity

First Author: Sharah **RAHMAN**

Co-Author(s): Rahima **BHUIYA**, Ahsanul **HUQ**, Dilara **KHATUN**, Shahrina **MAHFOOZ**, Nusrat **NIZAM**

**Purpose:** To evaluate the clinical outcomes in patients with asymmetrical pathological myopia along with posterior polar cataract (PPC) and their association with amblyopia.

**Methods:** It was a prospective interventional case series that included 5 eyes with 1 eye having asymmetrical pathological myopia with PPC and the other eye normal. All 5 cases underwent uneventful phacoemulsification surgery. The preoperative and 3 months postoperative best corrected visual acuity (BCVA), dilated indirect ophthalmoscopy with scleral indentation, axial length (AL), anterior chamber depth (ACD), colour fundus photography (CFP), optical coherence tomography (OCT) macula, along with surgical and Intraocular lens (IOL) power calculation difficulties were measured.

**Results:** The mean ages were  $26 \pm 2$  years. The average preoperative BCVA in affected eyes and normal eyes in logMAR chart were  $1 \pm 0.2$  (6/60) and  $0 \pm 0.2$  (6/6) respectively. The final BCVA in affected eyes were  $0.48 \pm 0.2$  (6/18). All patients had characteristic tessellated fundus, paripapillary atrophy, lattice degeneration, OCT macula that showed posterior staphyloma in one eye and normal fundus and OCT in other eye. The average AL were  $28 \pm 2$  mm and the ACD were  $4.1 \pm 0.2$  mm in affected eyes and  $23.0 \pm 2$  mm and  $3.2 \pm 0.2$  mm in the normal eyes respectively. The average IOL power using Haigis method were  $8.0 \pm 2$  D in affected eyes and  $19.0 \pm 2$  D in normal eyes. The amblyopia was significantly associated with postoperative final visual outcome,  $P < 0.05$ .

**Conclusions:** The clinical outcome in asymmetric pathological myopia with PPC were encouraging. Amblyopia was the main association to decreased vision rather than surgical or IOL power calculation difficulties.

## Clinical Outcomes of Trifocal Intraocular Lenses Using the Sinusoidal Pattern with Enhanced Depth of Focus

First Author: Toshihiko **YOSHIMURA**

Co-Author(s): Minoru **TOMITA**

**Purpose:** Trinova lens (VSY Biotechnology, Netherland) is the new model of trifocal lens with sinusoidal pattern and Enhanced Depth of focus (EDOF). To evaluate clinical outcomes of Trinova lens, we analyzed clinical outcome of Trinova.

**Methods:** In this study, 50 eyes were implanted with Trinova lenses. The outcomes of Uncorrected Distance

Visual Acuity (UDVA), Uncorrected Intermediate Visual Acuity (UIVA), Uncorrected Near Visual Acuity (UNVA), Corrected Distance Visual Acuity (CDVA), Corrected Near Visual Acuity (CNVA), and Manifest Refraction Spherical Equivalent (MRSE) were measured and compared preoperatively and 3 months postoperatively. The preoperative UDVA (logMAR), CDVA (logMAR), UNVA (logMAR), CNVA (logMAR), and UIVA (logMAR) were  $0.95 \pm 0.46$ ,  $0.10 \pm 0.22$ ,  $0.65 \pm 0.38$ ,  $0.18 \pm 0.24$ , and  $0.70 \pm 0.39$ . Preoperative MRSE was  $-3.82 \pm 4.57$  D. All surgeries were used FLACS (femtosecond laser-assisted cataract surgery) with Femto LDVZ8 (Ziemer, Switzerland) and Centurion (Alcon, USA).

**Results:** At postoperative 3 months, UDVA (logMAR), CDVA (logMAR), UNVA (logMAR), CNVA (logMAR), and UIVA (logMAR) were  $-0.09 \pm 0.07$ ,  $-0.12 \pm 0.07$ ,  $0.21 \pm 0.14$ ,  $0.03 \pm 0.05$ , and  $0.04 \pm 0.05$ . Postoperative MRSE was  $0.74 \pm 0.50$  D. No intraoperative or postoperative complications were observed. There was a significant improvement in the data at postoperative 3 months.

**Conclusions:** The clinical outcomes of Trinova lens showed significant improvement of UDVA, UNVA, and UIVA. This study showed the sinusoidal pattern with EDOF lens was safe and effective for cataract patients.

## Comparative Outcome of Various Pupil Expansion Devices Used During Phacoemulsification in Small Pupil

First Author: Bhupesh **SINGH**

Co-Author(s): Sudhank **BHARTI**, Neha **BHARTI**

**Purpose:** Phacoemulsification requires a dilated pupil for successful completion of cataract removal. Pupil expansion devices may damage the sphincter pupillae leading to a semi dilated pupil postoperatively causing photophobia and an unhappy patient.

**Methods:** Eyes of 25 patients were taken into this study. Various pupil expansion devices – Iris hooks, Malyugin ring, Assia pupil expander, Oasis pupil expander, and B-Hex pupil expander were used in a minimum of 3 cases for cataract surgery. A postop pupil size, visual acuity, and inflammation were noted.

**Results:** In eyes receiving Iris Hooks (pupil dilation 6-7.5 mm) the mean pupil diameter preoperatively was 3.91 mm and postoperative mean pupil diameter was 4.98 mm. In eyes in which a Malyugin ring was used, mean preoperative pupil diameter was 3.74 preoperatively and 3.99 postoperatively.

**Conclusions:** The Iris hooks are most damaging to the iris muscle and they stretch the pupil at the points of touch causing depigmentation and a large pupil.

## Comparison of Corneal Endothelial Cell Loss by Specular Microscopy Between Manual Small-Incision Cataract Surgery and Phacoemulsification

First Author: Darshana **RATHOD**

Co-Author(s): Hasamukh **AHIR**

**Purpose:** To compare the endothelial cell loss between manual small-incision cataract surgery and phacoemulsification with posterior chamber intraocular lens (PCIOL) implantation.

**Methods:** A total of 100 eyes of 100 patients were included in the study. Cases were randomly divided into 2 equal groups. Group A had undergone manual SICS and Group B had undergone phacoemulsification. Corneal endothelial cell count was measured by using a noncontact specular microscope.

**Results:** Mean endothelial cell loss (cells/mm<sup>2</sup>) in Group A was 276.80 at 1st week and 358.79 at 1 month postoperatively. In Group B, it was 244.87 at 1st week and 322.25 at 1 month postoperatively. There was no clinical statistically significant difference ( $P > 0.05$ ) between the 2 groups at 1 week and 1 month postoperatively.

**Conclusions:** There was no clinically or statistically significant difference in visual acuity and endothelial cell loss between manual SICS and phacoemulsification postoperatively.

## Comparison of Corneal Higher Order Aberrations Between Phacoemulsification vs Small Incision Cataract Surgery

First Author: Pawan **PRASHER**

**Purpose:** To compare the astigmatism (anterior and posterior) and higher order aberrations of the cornea after phacoemulsification versus small incision cataract surgery.

**Methods:** This clinical study included 60 eyes which had undergone either phacoemulsification or SICS. Corneal astigmatism and higher order aberrations to the sixth order were measured using the Pentacam Schiempflug camera. Statistical analysis assessing the difference between groups was carried out using the independent  $t$  test.

**Results:** The mean corneal astigmatism was significantly lower after phacoemulsification surgery compared with small incision cataract surgery ( $0.78 \pm 0.38$  D versus  $1.29 \pm 0.68$  D respectively;  $P < 0.001$ ). Statistically significant differences were found between the 2 groups for the root-mean-square value of total high order aberrations or individual high order aberrations for spherical aberration, coma, and trefoil.

**Conclusions:** Phacoemulsification surgery generates statistically significantly less corneal astigmatism and better HOAs profile compared with small incision

cataract surgery.

## Comparison of Optical Biometry and Immersion Ultrasound Measurements of the Axial Length of the Eye: A Quest for Precision

First Author: Lakshmi **SREEDHARAMURTHY**

Co-Author(s): Deepti **JOSHI**, Anjana Kuri **KURI**, Krishnaprasad **R**

**Purpose:** To investigate the relationship between optical biometry and immersion ultrasound measurement of the axial length of the eye.

**Methods:** This prospective study enrolled 100 (131 eyes) consecutive patients scheduled for cataract surgery at a tertiary eye care center in India. The sample size Every eye underwent 2 measurements each with an optical biometer (IOL Master 7) and with applanation ultrasound. Patients with only cataracts and no other ophthalmic pathology or disease were included and the rest were excluded. Comparison, correlation, and repeatability of axial length with both devices were analyzed. Agreement between devices was evaluated. A regression formula to convert measurements between devices was investigated.

**Results:** There was strong repeatability (99.4%) and agreement ( $r = 0.983$ ) between both devices at a confidence interval of 95% ( $P < 0.001$ ). However, at a confidence interval of 99%, a conversion factor of 0.306 added to immersion biometry axial length measurements approximates the readings by IOL master (optical biometry).

**Conclusions:** In developing countries, due to economic factors ophthalmologists prefer immersion ultrasound biometry over optical biometry, and we have found that both measurements correlate well. However, the quest for precision showed us that a simple correction factor will enable us to achieve better results.

## Comparison of Visual Outcomes of a Trifocal IOL with a +3D Bifocal IOL: A Prospective, Interventional Study

First Author: Bhupesh **SINGH**

Co-Author(s): Sudhank **BHARTI**

**Purpose:** To compare the clinical performance between trifocal and bifocal Intraocular lenses in bilateral cataracts at a single eye care center in New Delhi, India.

**Methods:** Prospective interventional study was carried out on 25 patients (50 eyes) with grade 2 or 3 nuclear sclerosis cataract. Mics was done on all of them using Infiniti Phaco system by Alcon. Data was analyzed for UCDVA, UCNV, and UCIVA at 1 week, 1 month, and 3 months postoperatively. Glass independence and reading speed was also assessed in postoperative period.

**Results:** Bifocal lens was implanted in 28 eyes and trifocal lens was implanted in 22 eyes. There was no

statistically significant difference between the mean binocular UCDVA at 1 and 3 months post op between the 2 groups. Uncorrected near and intermediate visual acuity was significantly better in the trifocal group. A higher percentage of patients with complete glass independence (93%) and normal reading speed (90%) were found in the trifocal group.

**Conclusions:** Trifocal IOL technology [especially diffractive fine vision IOL (physiol, Liège, Belgium)] had a clear advantage over bifocal IOLs in near and intermediate visual acuity, while both showed excellent performance in distance visual acuity. Trifocal IOLs are better accepted by patients for their need of spectacle independence.

### Comparison of the Visual Performance After Bilateral Implantation of Trifocal or Bifocal IOL

*First Author:* Yong **WANG**

*Co-Author(s):* Bichao **CHEN**, Xueting **LI**, Tan **QIAN**

**Purpose:** To compare the visual performance after bilateral implantation of a bifocal (ReSTOR +3.0D) or trifocal (AT Lisa tri. 839MP) intraocular lens (IOL).

**Methods:** This prospective, non-randomized, controlled study involved patients who had cataract surgery with bilateral implantation of bifocal or trifocal IOLs. The near, intermediate, and distance visual acuities, defocus curve, contrast sensitivity, optical quality including MTF and intraocular aberrations, ocular aberrations at 3 mm and 5 mm pupil diameter, VF-14-CN, spectacle independence, and patient satisfaction were assessed in all patients.

**Results:** Fifty-two eyes (26 patients) were implanted with a trifocal IOL and 52 eyes (26 patients) with a bifocal IOL. The follow-up was 3 months. No statistically significant difference was found in UDVA, UNVA, BCDVA, DCIVA, DCNVA, and UIVA was significantly better in the trifocal IOL group. In the binocular defocus curve, the visual acuity (VA) was also significantly better for defocus at -1.0, -3.0, 3.5 and 4.0 diopter (D). No significant difference was found in mean postoperative CSF under photopic and photopic with glare conditions. At 3 mm PD, intraocular higher-order, coma, trefoil and total ocular higher-order, trefoil aberrations were significantly lower in trifocal IOL group; at 5 mm PD, intraocular higher-order, coma, trefoil, spherical and total ocular higher-order, trefoil aberrations were significantly lower in trifocal IOL group. But no significant difference was found in MTF at 3 mm and 5 mm PD. The level of satisfaction was similarly high.

**Conclusions:** Trifocal IOLs can provide significantly better intermediate vision and equivalent distance and near visual performance compared to bifocal IOLs and do have the same level of overall satisfaction.

### Complications After Surgery for Juvenile Cataract

*First Author:* Lotta **LOWGREN ELMER**

*Co-Author(s):* Maria **KUGELBERG**, Anna **LUNDVALL**

**Purpose:** Juvenile cataracts presents in 3-4 per 10,000 children in Sweden. The most important complications are glaucoma and VAO (visual axis opacification), where glaucoma is the most threatening to final visual outcome. An important challenge is how to estimate the needed postoperative refraction in the growing eye in order to obtain emmetropia when the patient is an adult. We have investigated the rate of complications after cataract surgery for juvenile cataracts as well as the visual outcome and refraction in children from 1 to 15 years of age in our department.

**Methods:** We carefully reviewed the medical records of all patients between 1 and 15 years having surgery for juvenile cataracts performed between 1998 and 2015 at St. Erik Eye Hospital. The parameters we recorded were age at primary surgery, ocular and systemic comorbidity, uni- or bilateral cataract, anterior vitrectomy or not, axial length, corneal diameter, and planned refraction. We also recorded if and when the patient postoperatively had surgery for VAO or secondary glaucoma, the type of surgery, and the visual outcome and refraction.

**Results:** Results from the review above will be presented.

**Conclusions:** Preliminary results so far show that in order to obtain emmetropia in the adult, we should probably aim for a certain degree of hyperopia even in the older child with juvenile cataracts.

### Correlation and Predictability of Refractive Indexes and the Visual Outcome After Quadrifocal Intraocular Lens Implantation

*First Author:* Chia-Yi **LEE**

**Purpose:** To evaluate the correlating and predicting factors of visual outcome after newly developed diffractive quadrifocal intraocular lens (IOL) implantation.

**Methods:** A retrospective longitudinal study was conducted. Patients undergone phacoemulsification and diffractive quadrifocal IOL implantation with a follow-up period longer than 6 months and records of wavefront aberrometer within 1 week preoperatively and postoperatively were enrolled. Then a total of 73 eyes from 73 patients were included. The postoperative distance and near visual acuity, refractive status indexes and postoperative symptoms were collected. The correlation and predictability between refractive indexes and the postoperative visual outcome were evaluated in statistical model.

**Results:** The corrected distance visual acuity (CDVA) 1 month postoperatively was significantly better,

and further improvement was found 6 months postoperatively. The preoperative Tracey refraction spherical equivalent (TRSE), angle alpha, and spherical aberration (SA) were significantly correlated with the postoperative CDVA and near corrected visual acuity (NCVA). For the postoperative refractive indexes, the TRSE, angle alpha, and SA were significantly correlated with the CDVA six months postoperatively and the NCVA, while the trefoil, internal HOA and total HOA were associated with the NCVA. Regarding predictability, the preoperative angle alpha could predict all postoperative visual performances, while the postoperative TRSE and angle alpha could predict the CDVA six months postoperatively and the NCVA.

**Conclusions:** The angle alpha preoperatively and postoperatively was correlated with the postoperative visual acuity and could predict visual outcome in patients who received diffractive quadrifocal IOL implantation. Furthermore, the majority of refractive indexes were also associated with certain postoperative vision.

### Efficacy and Safety of Subconjunctival Triamcinolone Acetonide to Control Postoperative Inflammation of Diabetic Patients After Phacoemulsification

*First Author: Fang LIU*

**Purpose:** To determine the triamcinolone (TA) concentration in the aqueous humor after anterior subconjunctival injection (ASI) versus posterior subconjunctival injection (PSI) for diabetic retinopathy (DR) patients before cataract surgery and complications.

**Methods:** Prospective case series. A total of 46 DR patients were included in the study. Patients were separated into 2 groups, ASI (A group) and PSI (B group). 20 mg TA were given 3 days before surgery. The aqueous humor was sampled and TA quantitated after injection in a cohort of patients. Patients' IOPs were measured before and up to 3 months after TA injection.

**Results:** The mean BCVA (decimal) improved from a baseline of  $0.15 \pm 0.10$  to  $0.71 \pm 0.25$  in group A and from  $0.10 \pm 0.08$  to  $0.65 \pm 0.33$  in group B ( $P = 0.56$ ). The mean aqueous humor TA concentration was significantly higher after an ASI than after a PSI (group A  $133.8 \pm 149.2$  ng/mL and group B  $10.2 \pm 10.9$  ng/mL, respectively) ( $P < 0.0001$ ). After ASI and PSI, the mean IOP was significantly at 1 month and 3 months than at baseline ( $P < 0.05$  and  $P > 0.05$ , respectively). The levels of TA in the aqueous humor had a significant positive association with the elevation in IOP ( $\beta = 0.12$ ,  $P = 0.026$ ).

**Conclusions:** Subconjunctival injection of TA is a safe and efficacious route of steroid delivery before phaco surgery in patients with diabetic retinopathy. PSI might significantly reduce steroid-associated IOP elevation.

### Evaluation of Biometry and Corneal Astigmatism in Cataract Surgery Patients From Northern United Arab Emirates

*First Author: Eui Seok HAN*

*Co-Author(s): Taiseer Ali Suliman AL-QWAZEH, Ali Hassan Mustafa ALQATOU, Moon Jung KIM, Ahmed Ibrahim Abdou MOHAMED*

**Purpose:** To analyze biometric parameters and the patterns of corneal astigmatism using partial coherence interferometry in Northern United Arab Emirates (UAE).

**Methods:** Axial length (AL), keratometry values, anterior chamber depth (ACD) and horizontal corneal diameter (white to white, WTW) were optically measured before cataract surgery between 2015 and 2018 by partial coherence interferometry (Aladdin) in UAE. Corneal astigmatism result was compared with studies in Europe, Korea, and China.

**Results:** The study evaluated 216 eyes of 112 cataract patients (mean age  $67.2 \pm 9.42$  years; range 20 to 89 years). The mean AL, ACD, and WTW were  $23.20 \pm 1.00$  mm; range 20.90 to 27.92 mm,  $3.05 \pm 0.35$  mm; range 1.21 to 4.33 mm and  $11.15 \pm 0.49$  mm; range 9.19 to 12.37 mm, respectively. The average flat and steep keratometry value were  $43.81 \pm 1.87$  Diopters (D) and  $45.10 \pm 1.89$  D, respectively. Mean corneal astigmatism was  $1.28 \pm 0.95$  D. Corneal astigmatism less than 1.00 D was 44.9%, 1.00-2.00 D at 37.5%, and greater than 2.00 D at 17.1%. With the rule, astigmatism was in 59.6% of eyes, against the rule in 27.9%, and oblique in 12.5%. There was a tendency of higher corneal astigmatism in Northern UAE than those in Europe (0.90 D), Korea (1.07 D), and China (1.01 D to 1.15 D, various reports).

**Conclusions:** The profile in this analysis can provide normative data for cataract surgery and a useful reference in Northern UAE, Middle East. This study showed higher corneal astigmatism in Northern UAE than those in Europe and Far East.

### High Volume Manual SICS: Outcomes of a Community Cataract Service at a Tertiary Care Hospital

*First Author: Anshul SINGH*

*Co-Author(s): Harsha BHATTACHARJEE*

**Purpose:** To assess the outcome of high-volume, high-quality cataract surgery at a tertiary care hospital in North East India.

**Methods:** A retrospective study was done and data was collected from the case files of patients who had undergone cataract surgery as camps cases in tenure of 6 months. Visual outcome was determined by comparing the pre- and postoperative visual acuity.

**Results:** Of the 840 patients operated on, 507 (60%) had a visual acuity of greater than or equal to 6/18 postoperatively after the final review. A visual acuity of greater than or equal to 6/9 was obtained in 102

patients after correction. A total of 161 patients failed to turn up for the final review. Postoperative corneal oedema was seen in 48 cases. A total of 15 patients had to be kept aphakic because of intraoperative complications. The major cause of decreased visual outcome was found to be due to pre-existing retinal conditions and uncorrected refractive errors.

**Conclusions:** The outcome of cataract surgery in this study is significantly good as per the WHO recommendations.

## Hydrogen Prevents Corneal Endothelial Damage in Cataract Surgery

*First Author: Masashi YAMAZAKI*

*Co-Author(s): Takeshi ARIMA, Tsutomu IGARASHI, Maika KOBAYASHI, H TAKAHASHI, Hisaharu SUZUKI*

**Purpose:** In phacoemulsification, free radicals cause corneal endothelial damage. H<sub>2</sub> acts as a free radical scavenger. We have already reported that H<sub>2</sub> dissolved in ocular irrigating solution and prevented corneal endothelial damage during phacoemulsification in an animal model. In this study, we examined the effect of H<sub>2</sub> gas in clinical cases.

**Methods:** Phacoemulsification was performed in 64 eyes of 32 patients (age: 75.4 ± 7.68; Male: 17, Female: 15) using H<sub>2</sub> dissolved solution in 1 eye and conventional solution in the opposite eye. The endothelial cell density (ECD) was measured at the center of the cornea using non-contact specular microscopy pre-op, 1 day, 1 week, and 3 weeks post-op. This study was approved by the institutional review board of Nippon Medical School Hospital.

**Results:** The reduction rate of ECD was 11.6 ± 2.2% at 1 day, 14.3 ± 2.6% at 1 week, and 16.8 ± 3.0% at 3 weeks in the control group, while 6.0 ± 1.9% at 1 day, 7.8 ± 2.0% at 1 week, and 7.8 ± 1.9% at 3 weeks in the H<sub>2</sub> group. The rate was significantly small in the H<sub>2</sub> group at all time points.

**Conclusions:** H<sub>2</sub> dissolved in the ocular irrigating solution evidently reduced corneal endothelial damage during phacoemulsification, suggesting that the considerable part of the damage associated with phacoemulsification is oxidative stress.

## Intracameral Moxifloxacin vs Levofloxacin: Postoperative Outcomes in Patients Undergoing Phacoemulsification with In-the-Bag Intraocular Lens Implantation

*First Author: Pik Sha CHAN-UY*

*Co-Author(s): Franz-Marie CRUZ, Richard NEPOMUCENO, Carlo RUBIO, Harvey UY*

**Purpose:** Endophthalmitis remains a rare but potentially devastating complication of cataract surgery. Recent evidence supports the safety and efficacy of using intracameral administration of

prophylactic antibiotics with increased utilization of 3rd and 4th generation fluoroquinolones. This study evaluated patient outcomes associated with the use of either intracameral moxifloxacin or levofloxacin in patients undergoing cataract surgery.

**Methods:** Open-label, randomized clinical trial. We included 104 eyes, without other ocular pathology, that underwent phacoemulsification with in-the-bag intraocular lens implantation and were randomized to receive either intracameral unpreserved levofloxacin, 0.5 mg in 0.1 mL (n = 52) or moxifloxacin 0.5 mg in 0.1 mL (n = 52). Eyes were evaluated preoperatively for cataract density, signal strength, central retinal thickness (CRT), retinal volume, endothelial cell density (ECD), and corneal thickness (pachymetry). Follow-up assessments were performed at day 1, week 1, and month 1 postoperative time points. Statistically significant differences between the means of the 2 treatment groups were determined using Student's t-test.

**Results:** Baseline parameters were similar between the 2 groups. On day 1, week 1, and month 1 postoperative follow-up visits, the mean CRT (SD) in the moxifloxacin group was 243.5 (25.8), 248.3 (26.0), and 257.3 (29.2), respectively, while that of the levofloxacin group was 251.7 (19.6), 256.3 (21.8), and 268.2 (29.5), respectively. These changes were not statistically significant. In addition, postoperatively, we found no statistically significant differences in the endothelial cell density, corneal thickness by pachymetry and retinal volume at day 1, week 1, and month 1.

**Conclusions:** In patients undergoing phacoemulsification with in-the-bag intraocular lens implantation, intracameral moxifloxacin and levofloxacin have similar postoperative outcomes.

## Keratoconus and Cataract: How to Prepare for Surgery?

*First Author: Dian Dwi PURNOMO*

*Co-Author(s): Herwindo PUTRANTO, Anny SULISTIYOWATI*

**Purpose:** To report management of keratoconus before cataract surgery as a rare case.

**Methods:** Diagnosis was established based on history-taking, best corrected visual acuity (BCVA), slit lamp examination, applanation tonometry, funduscopy examination, ocular USG, optical coherence tomography (OCT), contrast sensitivity test, ischi-hara test and perimetry, Computerized Corneal Topography, MRI head, and orbita.

**Results:** A 25-year-old man presented with blurring and double vision in both eyes for 10 years. His BCVA was 0,4 ph(-) for the right eye and 0,63 with S-5.00 C-3.00X 160° for the left eye. There were Vogt striae, Munson's sign, and lens opacity in the anterior segment examination on the right and left eyes. Intraocular

pressure, funduscopy, and ocular USG revealed normal for both eyes. OCT nervus II showed thinning on inferior segment on right eye. Corneal topography examination revealed irregular astigmatism. MRI head and orbita showed normal. According to the examination above, patient was diagnosed with RLE keratoconus and Cataract Burrato Grade I-II. RGP (Rigid Gas Permeable) contact lens usage was planned to be performed on his right and left eyes before the cataract surgery. After using the RGP contact lens, visual acuity improved 0,7 with S-6.75 for the right eye and 1,0 with S-4.75 for the left eye, and the usage of RGP will be continued after surgery.

**Conclusions:** RGP contact lens is one of the preoperative management choices to estimate the results of postoperative visual acuity.

### Microspherophakia with Acute Primary Angle Closure: An Alternative Management

*First Author: Anelisa KOH*

**Purpose:** To share a case of a patient with microspherophakia with acute primary angle closure given a nonconventional method of treatment for temporary relief of symptoms.

**Methods:** Case report.

**Results:** We had a 42-year-old female who came in with a chief complaint of eye pain in the left eye. This was accompanied by blurred vision, pain, tearing, nausea, and vomiting. Consult was done. Visual acuity was hand motion. On slit lamp biomicroscopy, it showed grade 3 corneal edema with DM folds, shallow chamber, anterior subluxed microspherophakia. Fundoscopy showed presence of red orange reflex with hazy media. Other eye findings were normal. Intraocular pressure was 56 mm Hg for the affected eye. Gonioscopy findings showed closed angles 360 degrees. Systemic evaluation showed no abnormality. Family history was unremarkable. Topical timolol eyedrops and oral acetazolamide were started to control the pressure. Topical mydriatic agent was instilled and upon full dilation, manual repositioning using a goniolens was done. Upon successful repositioning, miotic drops were started to prevent resubluxation. Patient felt almost instant relief of symptoms, specifically pain. Patient was scheduled for emergency phacocemulsification with transscleral intraocular lens. Patient underwent surgery and tolerated it well. Patient was comfortable. One week after surgery, patient noted relief of blurred vision OS.

**Conclusions:** Manual repositioning with goniolens followed by miotics drops is an alternative option for temporary relief of symptoms for patients with secondary angle closure due to subluxed lens secondary to microspherophakia.

### Mix-Match of Lentis M Plus (X) Lentis Comfort, M Plus (X) Toric, and Comfort Toric to Achieve Visual Improvement and Higher Satisfaction

*First Author: Magda RAU*

**Purpose:** Mix of multifocal IOLs of Lentis to satisfy the individual demands, improve visual acuity, and reduce the optical side phenomenon.

**Methods:** In the retrospective study 126 patients were included, 252 eyes. 1. Group Patients with Comfort in one eye wishing improvement of near visual acuity Lentis M plus(x) in the other eye. 2. Group Lentis M Plus(X) one eye, Lentis M plus toric X fellow eye. 3. Group Comfort toric wishing improvement of near visus Lentis M plus (X)Toric. We evaluated the postoperative uncorrected (UCVA) for distance, intermediate, and near vision monocular and binocular. The quality of vision, glare, halos, and the personal satisfaction of the patients was assessed with a validated questionnaire.

**Results:** All 3 groups achieved comparable binocular visual acuity for distance, intermediate, and near vision. 90% of the first group, 100% of the second group, and 92% of the last group were independent of the glasses. 78% of patients in the first group, 88% of the second group, and 80% of the third group were completely satisfied with the achieved results. In 82% of the patients, satisfaction after implantation of the other Lentis MFIOL was higher.

**Conclusions:** Patients of all the mix Lentis MFIOLs 3 groups achieved excellent binocular visual acuity in distance, intermediate, and near vision. Mix is the opportunity to react to patients' wishes or complaints after implantation in the first eye. Mix is an ideal solution to improve visual acuity and individually respond to the demands of the patients.

### Modification of Technique for Performing Manual Small Incision Cataract Surgery by Left-Handed Surgeons: It's Different

*First Author: Charudutt KALAMKAR*

*Co-Author(s): Amrita MUKHERJEE*

**Purpose:** To present modifications in manual small incision cataract surgery (MSICS) technique by left-handed surgeons (LHS), and to highlight differences from standard procedure performed by right-handed surgeons (RHS).

**Methods:** A total of 215 adult eyes underwent MSICS by LHS. Instead of copying steps as done by RHS, customization of each step was done to suit dominant left hand. Major modifications: scleral tunnel (starting left and extend to right), capsulorhexis (initial nick: opposite direction, flap rotation: clockwise rather than traditional anti-clockwise), irrigation-aspiration, IOL holding, and dialing (instead of starting from 12 o'clock, bring trailing haptic to 6 o'clock and dialing into bag).

**Results:** There were no major intraoperative complications. All 215 eyes gained best corrected visual acuity of 20/40 or more. Limitation: increased difficulty in performing tunnel in right eyes. Increased the ease of doing surgery and reduced surgical time.

**Conclusions:** Use of modified techniques by LHS would improve ease of doing surgeries and postoperative outcomes.

## More Than 10 Years of Registration in the Swedish Pediatric Cataract Register

*First Author: Maria KUGELBERG*

*Co-Author(s): Gunilla MAGNUSSON, Alf NYSTRÖM, Annika ROSENSVÄRD, Kristina TORNQVIST*

**Purpose:** To report data from the Swedish Pediatric Cataract Register (PECARE).

**Methods:** Data from cataract extractions in children below 8 years of age has been collected in PECARE since 2006. Follow up data at 1, 2, 5, and 10 years of age was also collected.

**Results:** Until August 2018, 779 eyes have been registered in PECARE. Data from the surgeries and follow-ups will be presented. 37% were unilateral and 63% were bilateral. Of the eyes, 18% had lamellar cataract, 24% nuclear, 28% posterior subcapsular, 3% anterior subcapsular cataract. Traumatic cataract was the reason for surgery in 3% of the eyes, 1% had uveitic cataract. In 4% of the surgeries, the parents were related, most often cousins. PFV as comorbidity was present in 24% of the eyes and these eyes had a higher frequency of secondary glaucoma than eyes without PFV. 30% were operated before 2 months of age, 46% were 2 years old or more at surgery. A posterior capsulorhexis was performed in 85% and an anterior vitrectomy at surgery in 72%. 4% had severe microphthalmus with an axial length less than 15 mm, and 19% had between 15 and 17 mm. 42% had been operated or received YAG for visual axis opacification at follow-up. 12% had received surgery for secondary glaucoma, and trabeculotomy was the most frequent surgery performed.

**Conclusions:** Since cataract in children is a rare condition, it is good to gather the results in a register.

## Outcomes of LISA Trifocal Intraocular Lens in Long Eyes with Axial Length Above 25 mm in 3 mm and 5 mm Diameter Pupils

*First Author: Yong WANG*

*Co-Author(s): Bichao CHEN, Xueting LI, Tan QIAN*

**Purpose:** To evaluate refractive and visual parameters related to distance, intermediate, and near vision after cataract surgery and the optical quality in 3 mm and 5 mm diameter pupil of LISA tri. 839MP trifocal intraocular lens (IOL).

**Methods:** Patients had refractive lens exchange

and multifocal diffractive IOL (AT Lisa tri. 839MP) implantation. A complete ophthalmology examination was performed preoperatively and postoperatively. The follow-up was 3 months. The main outcomes measures were uncorrected distance (UDVA), intermediate (UIVA), near (UNVA), corrected distance (CDVA), distance-corrected intermediate (DCIVA), and distance-corrected near (DCNVA) visual acuity; manifest refraction; and aberrations (total, corneal, internal, coma, trefoil, spherical).

**Results:** There was significant improvement in UDVA, UIVA, UNVA, CDVA, DCIVA, and DCNVA. The postoperative refractive status was within the range of -1.5 to 0.50 D. In 3 mm and 5 mm diameter pupil, total internal, total high-order internal, total, total high-order, and total spherical aberrations decreased significantly ( $P < 0.05$ ).

**Conclusions:** The trifocal IOL improved near, intermediate, and distance vision and optic quality in high myopic patients with AL longer than 25 mm.

## Phacocoele Presenting as Localized Hematoma in a Suspected Case of Traumatic Occult Scleral Rupture

*First Author: Mrudula P M*

*Co-Author(s): Jyothi P T, Padma B PRABHU, Babitha V*

**Purpose:** To study one of the rarest documented effects of blunt trauma to the eye and evaluate its outcome.

**Methods:** A 60-year-old lady presented with pain and defective vision of the right eye following trauma with ripe cashew fruit. Clinical examination revealed a well-circumscribed hematoma of 15 x 20 mm extending from 11-2 o'clock position. Cornea was hazy with total hyphema in the anterior chamber. Best corrected visual acuity was perception of light with accurate projection of rays. Ultrasonography of right eye showed superomedial dislocation of lens into subconjunctival space, choroidal detachment, and vitreous hemorrhage.

**Results:** Patient underwent wound exploration, lens extraction, and repair of scleral defect. Patient was left aphakic. Postoperative visual outcome was poor (hand movements) due to associated hyphema, choroidal detachment, and vitreous hemorrhage.

**Conclusions:** Phacocoele should be suspected in a case of occult scleral rupture with localized hematoma. Visual outcome depends on the timely intervention and associated ocular complications.

## Polyol Pathway Affecting Cataract Among Diabetics

*First Author: M Manjunath KAMATH*

**Purpose:** To determine the contribution of polyol pathway in causing cataracts in diabetics.

**Methods:** A total of 56 patients, among which 28 were diabetics and 28 non-diabetics who underwent cataract surgery, were included in the study. Blood samples were taken to evaluate aldose reductase activity by sandwich enzyme linked immune sorbent assay technology. Nucleus removed during surgery was evaluated for lens glutathione levels using quantichrome glutathione assay kit.

**Results:** Aldose reductase was elevated and positively co-related among diabetics. No statistically significant in lens glutathione level was found.

**Conclusions:** Elevated aldose reductase levels play a central role in diabetics including cataract formation.

### Prediction of Spherical Equivalent Power After Cataract Surgery Using Machine Learning

*First Author: Tomofusa YAMAUCHI*

*Co-Author(s): Hiroki MASUMOTO, Hitoshi TABUCHI, Kosuke TAKASE*

**Purpose:** To predict refractive power after cataract surgery using machine learning.

**Methods:** The subjects were 1358 eyes that underwent cataract surgery and implanted SN60WF (Alcon inc.) as an intraocular lens (IOLs). A total of 1358 eyes data were divided into 958 eyes for training and 400 eyes for testing. We calculated the mean absolute error of postoperative spherical equivalent power prediction, using conventional IOL power calculation formulas or machine learning based methods. As a conventional IOL power calculation formula, we evaluated SRK/T formula, Haigis formula and Barrett Universal 2 formula. As a machine learning based method, we evaluated Support Vector Machine (SVM), Random Forest Classifier (RFC), Gradient Boost Classifier (GBC), Neural Net Classifier (NNC), Random Forest Regressor (RFR), Gradient Boost Regressor (GBR) and Neural Net Regressor (NNR). Constants of each IOL power calculation formula and hyperparameters in machine learning were optimized using training data.

**Results:** Prediction errors of SRK/T formula, Haigis formula, Barrett Universal 2 formula, SVM, RFC, GBC, NNC, SVR, RFR, GBR and NNR were 0.3229, 0.3586, 0.3084, 0.3121, 0.3273, 0.3362, 0.3067, 0.3081, 0.3008, 0.3009, 0.3792, respectively.

**Conclusions:** Machine learning based IOL power calculation methods are not inferior to conventional formulas in terms of accuracy.

### Prevalence of Corneal Astigmatism in a Cataract Population in Bangladesh

*First Author: Mahziba CHOWDHURY*

*Co-Author(s): Rahima BHUIYA, Ahsanul HUQ, Ashrafur RIDOY*

**Purpose:** The purpose was to determine the prevalence

of corneal astigmatism in a cataract population and also to assess the pattern of astigmatism in those patients.

**Methods:** This observational study was done in a tertiary eye hospital in Bangladesh. Keratometric data was taken from cataract patients attending for routine phacoemulsification surgery with monofocal IOL from January 2017 to December 2017.

**Results:** There were 1023 consecutive eyes of 831 patients. The mean ( $\pm$  SD) corneal astigmatism was  $1.98 \pm 0.31$ . Corneal astigmatism was less than 1.00 diopters (D) in 574 eyes (56.1%), from 1.00 D to 1.50 D in 293 eyes (28.6%), from more than 1.50 D to 2.00 D in 82 eyes (8.1%), from more than 2.00 D to 3.00 D in 40 eyes (3.9%), more than 3.00 D in 7 eyes (0.7%), and no difference between K1 and K2 in 27 eyes (2.6%). The astigmatism was with-the-rule in 313 eyes (31.42%), against-the-rule in 403 eyes (40.47%), and oblique in 280 eyes (28.11%).

**Conclusions:** For routine cataract surgery correcting this astigmatism at the time of surgery will give the patient a better visual outcome.

### Residual Silicone Oil Behind Posterior Capsule Simulates a Truncated Convex Shape Lens Causing Refractive Surprise: A Case Report

*First Author: Chih-Yao CHANG*

*Co-Author(s): Jiunn-Liang CHEN*

**Purpose:** To present a case with residual silicone oil behind posterior capsule with high myopic refractive change.

**Methods:** A case report.

**Results:** A 57-year-old male patient had received vitrectomy combined with silicone oil tamponade and cataract surgery with +14.00 diopters (D) intraocular lens (IOL) insertion in bag due to recurrent macular hole for his left eye. After 1 year, removal of silicone oil was performed due to closed macular hole and patient's request. However, the result of manifest refraction testing changed from +sph3.00=-cyl0.25 Ax 3° to -sph19.25=-cyl6.25 Ax 138°. This spherical aberration change exceeded the normal myopic shift from silicone oil removal and was thought to result from a thin layer of residual silicone oil behind posterior capsule simulating a truncated convex shape lens found by slit lamp examination after removal of IOL. So, another surgery for removal of silicone oil was done, and then the result of manifest refraction testing was +sph6.25=-cyl0.25 Ax 40°. We implanted a +9.00 D IOL into sulcus, and final result of manifest refraction testing was +sph0.50=-cyl1.00 Ax 25° with best corrected vision measured as 0.5.

**Conclusions:** Residual silicone oil in vitreous cavity could be accidentally besieged behind posterior capsule by anterior vitreous. This condition resulted in high myopic refractive surprise and was corrected by

removal of the residual silicone oil.

## Role of Preoperative Nd:YAG Laser Anterior Capsulotomy in Mature Intumescent Cataracts

*First Author: Amit **PORWAL***

*Co-Author(s): Kavita **PORWAL**, Varsha **RATHORE***

**Purpose:** To study the role of Preoperative Nd:YAG Laser Anterior Capsulotomy in preventing intraoperative complications in mature intumescent cataracts.

**Methods:** A total of 52 eyes were selected in this prospective study. Mean age of  $57.6 \pm 5.2$  years. Preoperative anterior YAG Capsulotomy was performed in all eyes with 1 shot of 1.2 mJ and gush of fluid was noted. Anterior Chamber (AC) depth using AS-OCT and intraocular pressure (IOP) using iCare tonometer were measured pre- and post-laser. Intraoperative complications and surgeon's operative comfort were noted.

**Results:** There was a mean increase in AC depth by 0.24 mm and a mean decrease in IOP by 1.61 mm post-laser. On 2-tail t test, the change in AC depth and IOP change was significant ( $P < 0.05$ ). No intraop complications were noted except for capsulorhexis extension in 1 eye. High level of surgeon's operative comfort was there.

**Conclusions:** Preoperative Nd:YAG Laser Anterior Capsulotomy is a safe and effective technique in reducing intralenticular pressure and avoiding intraoperative complications in mature intumescent cataracts.

## Successful Management of Iridodialysis and Traumatic Cataract Through 1-Step Surgery: A Case Report

*First Author: Miratasya **KASIM***

*Co-Author(s): Tjahjono **GONDHOWIARDJO***

**Purpose:** To elaborate 1-step management of iridodialysis with traumatic cataract due to ocular contusion. The initial repair of the iris was mandatory to restore the shape of the iris so that the cataract extraction can be done.

**Methods:** A 40-year-old fisherman with chief complaint of blurry vision on the right eye for 1 year before admission. In 2016, he experienced eye trauma related to a compressor machine where the high air pressure directly hit his right eye, and within the next week his vision decreased significantly. He visited the hospital on March 2017, and at the initial visit the visual acuity (VA) of the right eye was 1/300 with intraocular pressure (IOP) at 17 mm Hg. He underwent 1-step surgery of iris reconstruction and cataract extraction, we used single armed-closed system-scleral approach technique to fix the iridodialysis, and then extracted the cataract using the phacoemulsification technique with the help of iris

retractor.

**Results:** After the surgery he had no complaints. The VA of his right eye was 6/7.5 and the IOP was within normal limits.

**Conclusions:** Iridodialysis and traumatic cataract is a common condition that occurred after eye trauma, the comprehensive management could significantly restore the anatomy of the iris and the physiological function of the effected organ, this surgical approach could improve the patient's vision hence his quality of life.

## The iTrace Wavefront Aberrometer Dysfunctional Lens Index as an Objective Measure of Cataract Severity

*First Author: Michael **MAHR***

*Co-Author(s): Jay **ERIE***

**Purpose:** To evaluate the functional clinical validity of the Dysfunctional Lens Index – a ray tracing wavefront-based objective measure of cataract severity.

**Methods:** Using the iTrace (Tracey Technologies – USA) ray-tracing aberrometer, 7291 measurements were recorded including the Dysfunctional Lens Index (DLI), a wavefront-based objective measure of cataract severity (inverse scale 1-10 with 1 being most severe). Each test was classified as performed under one of 3 possible conditions: no recorded cataract surgery, pre-cataract surgery, or post-cataract surgery.

**Results:** The Dysfunctional Lens Index for patients having received cataract surgery was significantly lower (mean 4.48, median 4.16, IQR 2.93-5.63) than patients not receiving cataract surgery (mean 6.69, median 6.64, IQR 4.34-10;  $P < 0.001$ ). Measurements made after cataract surgery show significant improvement in the DLI (mean 8.25, median 8.98, IQR 6.84-10;  $P < 0.001$ ).

**Conclusions:** The iTrace Dysfunctional Lens Index (DLI) shows potential clinical validity as an objective measure of functional cataract severity resulting in cataract surgery.

## Visual Improvement After Nd:YAG Laser Capsulotomy in Posterior Capsular Opacity After Cataract Surgery

*First Author: Heba **HOQUE***

**Purpose:** To evaluate the changes in visual acuity following Nd:YAG laser posterior capsulotomy.

**Methods:** A hospital-based observational study. Settings: Laser unit at Ophthalmology Dept., Chittagong Medical College & Hospital. Sample: A total of 100 pseudophakic eyes. Inclusion criteria: Patients attending at the laser unit with posterior capsule opacification during the period of January 2017 to December 2017, either sex, and aged between 40 and 85 years. Exclusion criteria: The study excluded patients with corneal opacity, glaucoma, complicated cataract,

posterior segment disease like vitreous opacity, macula disease, optic nerve disease, or any other retinopathy causing impairment of vision. Exposure of interest: Nd:YAG laser. Main outcome measures: Visual acuity for both distant and near vision.

**Results:** A total of 32 eyes (32%) had pre-capsulotomy visual acuity 6/36 to 6/60, 28 eyes (28%) had 6/18 to 6/24, 22 eyes (22%) had <6/60 and 18 eyes (18%) had 6/12. After 7 days of capsulotomy, 70 eyes (70%) gained 6/12 or better vision. Visual acuity improved to 6/12 in 84 patients (84%) after 30 days with refractive correction. On the other hand, 60 eyes (60%) had pre-capsulotomy near vision less than N10 and 12 eyes (12%) had N6. After Nd:YAG laser capsulotomy, near vision improved in 22 (22%), 18 (18%), 26 (26%), and 12 (12%) patients to N5, N6, N8, and N10 respectively. Failure of improvement following laser capsulotomy was found in 4 eyes (4%) that had pre-capsulotomy vision <N10.

**Conclusions:** Nd:YAG laser capsulotomy in posterior capsule opacification can substantially improve the visual outcome in both distant and near vision.

## Zepto-Assisted Cataract Surgery: The Indian Experience. A Report on the First 100 Cases

*First Author: Rishi SWARUP*

**Purpose:** To assess the efficacy and safety of ZACS.

**Methods:** First 100 consecutive eyes (of 82 patients) of ZACS were included. Follow-up duration ranged from 1 to 14 months. Patient records were reviewed to assess surgical complications, postoperative outcome, and complications. Based on postoperative assessed centration of Zepto capsulorhexis with respect to intraocular lens (IOL) Optic, cases were classified as Type 1 (well centered rhexis with nearly equal overlap of optic), Type 2 (slightly decentered rhexis with asymmetric overlap of optic), and Type 3 (largely decentered rhexis beyond optic edge).

**Results:** Three cases had malfunctioning Zepto handpieces. Four cases had incomplete capsulorhexis. A total of 23 eyes had Zepto with a multifocal IOL. Three were pediatric cataract. Only 32 eyes had well Type 1 Zepto capsulorhexis, whereas 53 had Type 2. One patient had recurrent postoperative uveitis and finally developed CME.

**Conclusions:** Precision Pulse technology ZEPTO assisted capsulorhexis is a safe and effective technology, but it has its own challenges with respect to centration, incomplete CCC, and malfunctioning handpieces.

## Cornea, External Eye Diseases & Eye Bank

### A Case of Granular Corneal Dystrophy Type 2 Accompanying Conjunctival Hyaline Deposition

*First Author: Minori KUMADA*

*Co-Author(s): Atsuki FUKUSHIMA, Iguchi MITSUKO, Tamaki SUMI, Naoyuki YAMADA*

**Purpose:** To report an unusual case of granular corneal dystrophy type 2 with hyaline deposition in conjunctiva.

**Methods:** A case report.

**Results:** A 43-year-old female patient presented with visual disturbance to our hospital. Slit lamp examination revealed bilateral granular deposition at corneal stroma. Based on the genetic testing with a heterozygous result for the R124H mutation of the human transforming growth factor beta-induced gene, we diagnosed her condition as granular corneal dystrophy type 2. She presented with ocular pain and hyperemia of conjunctiva in her left eye 1 month later. Slit lamp examination showed the swelling and congestion of conjunctiva and yellowish-white deposition beneath the bulbar conjunctiva in her left eye. Similar conjunctival lesions appeared in her right eye 2 weeks after. We performed biopsy of her left conjunctival lesions to investigate pathogenesis. Histopathological examination revealed that an amorphous eosinophilic deposit in lamina propria, which was stained positively with Masson's trichrome stain but not with Congo red stain. CD68 positive multinucleated giant cells were observed around hyaline deposits and lymphatic vessels were dilated. Treatment with betamethasone eye drops improved the redness and swelling of the conjunctiva and decreased the deposition.

**Conclusions:** We reported an unusual case of conjunctival deposition of hyaline with granular corneal dystrophy type 2. The hyaline deposition may occur not only in corneal stroma but also in conjunctiva in patients with granular corneal dystrophy.

### A New Observation Method Using Low-Vacuum Scanning Electron Microscopy in Corneal Wound Healing

*First Author: Takeshi ARIMA*

*Co-Author(s): H TAKAHASHI, Masaaki UCHIYAMA*

**Purpose:** To evaluate the efficiency of low-vacuum scanning electron microscopy (LV-SEM), a new observation method, in observation of the corneal wound healing process in the rat corneal alkali-burn.

**Methods:** LV-SEM for paraffin sections of alkali injured

cornea was compared with conventional transmission electron microscope (TEM). In LV-SEM, periodic acid-methenamine silver staining and platinum blue staining was used for observation of collagens and vascular endothelial cells, respectively. Immunohistochemical analysis was also done for observation of corneal wound healing.

**Results:** The images obtained by LV-SEM were better in the 3-dimensional view than the images by TEM. On the other hand, TEM was better in the ultra-high magnification than LV-SEM. Immunostaining in LV-SEM provided clear images of the formation process of neovascularization.

**Conclusions:** LV-SEM combined with immunostaining is an efficient method to observe the corneal wound healing process. The advantage of the method over conventional TEM is that the high magnification images of paraffin sections can be obtained.

### A Prospective Study, Risk Factors for Pterygium Recurrence in Training Program

*First Author:* Jirapol **BHUNTUVECH**

*Co-Author(s):* Orapin **ANUTARAPONGPAN**, Onsiri **THANATHANEE**

**Purpose:** To determine the risk factors related to recurrence of pterygium after surgical excision with conjunctival autograft for primary pterygium performed by ophthalmology trainees.

**Methods:** Fifty-eight eyes of 58 patients with primary pterygium were consecutively included in the prospective observational study. The pterygia were preoperatively graded based on corneal involvement and translucency. Recurrence rates and associated risk factors were evaluated at 1, 3, 6, 9, and 12 months postoperatively.

**Results:** Recurrences occurred in 8 out of 58 eyes (13.79%), mostly within 6 months after surgery. The mean recurrence onset was  $5 \pm 4.2$  weeks postoperatively. Operative time range from 30 to 120 minutes and the average was  $65.43 \pm 21.01$  minutes. Mean duration of postoperative topical corticosteroid was  $6.48 \pm 2.27$  weeks. The recurrence was not significantly associated with age ( $P = 0.669$ ), gender ( $P = 0.418$ ), occupation ( $P = 0.706$ ), address ( $P = 0.462$ ), pterygium translucency ( $P = 0.637$ ), corneal involvement ( $P = 0.334$ ), academic year of ophthalmology trainees ( $P = 1.000$ ), duration of postoperative topical corticosteroid ( $P = 0.535$ ), and operative time ( $P = 0.139$ ). However, prolonged operative time showed a relatively high risk ratio of 4.29, 95% Confidence Interval of 0.56-32.48.

**Conclusions:** Although there were no significant risk factors associated with the recurrence of pterygium in training program, prolonged operative time suggested a higher chance of recurrence.

### A Rare Presentation of Congenital Corneal Opacity in Waardenburg Syndrome

*First Author:* Krishnima **RAGHU**

*Co-Author(s):* Ansu **JOHN**, S Anandha **LAKSHMI**, Meera **MOHANAKUMAR**, Priyadharshini **PALANIYAPPAN**, Saranya **DEVI K**

**Purpose:** To report an atypical case of Waardenburg Syndrome with unilateral congenital corneal opacity and conductive hearing loss.

**Methods:** A 28-day-old baby boy presented with right eye corneal opacity since birth. Family history was negative, and the baby was born of non-consanguineous marriage. There was no history of maternal intrauterine infection. Systemic examination revealed white forelock hair, bilateral cleft lip and palate, broad nasal bridge, dystopia canthorum. Ocular examination showed right eye leucomatous corneal opacity. B scan right eye was within normal limits. BERA done for hearing assessment revealed bilateral mild conductive hearing loss. USG abdomen showed bilateral kidney size small for age with minimal splitting of the calyces of left kidney. There was no evidence of other anomalies such as heterochromia iridis, leukodermic patches, fused hands, or Hirschsprung's disease.

**Results:** A clinical diagnosis of Waardenburg syndrome was made as it fulfilled the 2 major criteria (white forelock and dystopia canthorum) and one minor criterion (broad nasal bridge). Patient also had atypical features like unilateral corneal opacity and bilateral conductive hearing loss, which have not been reported yet.

**Conclusions:** This case is being reported as congenital corneal opacity, is a rare presentation in Waardenburg syndrome, and also should be considered as a differential diagnosis in a child presenting with corneal opacity and hearing loss.

### Active Inflammatory Cytokines in Keratoconus

*First Author:* Judy **LOH**

*Co-Author(s):* Trevor **SHERWIN**

**Purpose:** Keratoconus is historically defined as a non-inflammatory corneal disease. However, recent reports found increased expression of proinflammatory cytokines in the tears of patients, and clinical and immunohistochemical observations of mature dendritic cells and leukocytes in keratoconic samples. In this study, we scanned a broad spectrum of 120 cytokines to identify those that are highly active in keratoconus, aiming to provide evidence for the often-overlooked inflammatory aspect of this dystrophy.

**Methods:** A total of 43 corneal buttons were collected for analysis, comprising 14 keratoconic and 29 non-keratoconic samples. Protein was extracted from each corneal tissue and incubated with cytokine antibody

arrays. The results from the 2 groups were analyzed using Mann Whitney *U* test, and a P value of <0.05 was considered significant.

**Results:** A total of 22 cytokines were identified as significantly different and elevated in the keratoconic group. Nine cytokines were elevated between 1.6 and 50-fold, while the remaining 13 were almost solely expressed in keratoconic corneas. Apart from master regulators, we also identified elevated cytokines that are involved in wound healing, neuroprotection, angiogenesis, and inflammation.

**Conclusions:** We reported 13 cytokines that were almost uniquely expressed in keratoconus and a further 9 that were severely elevated, including multiple inflammatory cytokines that cover a full range of immune responses. The interplay of these cytokines is intricate. This study provides evidence to substantiate an inflammatory mechanism in keratoconus and the potential redefinition of keratoconus as a chronic inflammatory corneal disease.

### An Unusual Ocular Presentation of Reactive Arthritis in a Child

First Author: Saadia **FAROOQUI**

Co-Author(s): Boon Long **QUAH**

**Purpose:** To present the case of a young boy with a rare ocular manifestation of reactive arthritis.

**Methods:** A 9-year-old boy who presented to the emergency room with fever, arthritis, and redness in both the eyes was diagnosed with reactive arthritis. The ophthalmologic examination revealed multiple epithelial defects with underlying anterior stromal infiltrates and edema in both the eyes. Systemic workup failed to reveal any underlying infectious cause. The result for HLA-B27 antigen was positive.

**Results:** Treatment with topical steroids and antibiotic drops led to the resolution of keratitis over a 1-month period. Nummular keratitis recurred in one eye after stopping steroids, which responded well to tapering dose of steroid eye drops. The ocular manifestation commonly associated with reactive arthritis is conjunctivitis and less frequently anterior uveitis. Keratitis is a very unusual presentation, especially in children.

**Conclusions:** Keratitis could be an ocular manifestation of reactive arthritis in young patients, with this case describing the youngest patient in the literature with bilateral characteristic keratitis.

### Challenges in Diagnosis and Clinical Management of a Infectious Keratitis Caused by *Stenotrophomonas maltophilia* Combined with Herpes Necrotizing Stromal Keratitis

First Author: Po-Yen **LEE**

Co-Author(s): Li-Yi **CHIU**, Shiuhliang **HSU**, Chang-Ping **LIN**

**Purpose:** *Stenotrophomonas maltophilia* (*S. maltophilia*), an uncommon cause of infectious keratitis, is difficult to treat because of its resistance to multiple antibiotics. We reported a case of corneal co-infection of *S. maltophilia* and herpes stromal keratitis.

**Methods:** Case report.

**Results:** This 70-year-old female was referred from the clinic due to the diagnosis of corneal ulcer. Before the episode, she had long-term use of topical steroids due to corneal herpetic infection. During admission, repeated corneal scrapping for smear and culture couldn't identify any organism. We tried topical Amikacin and Piperacillin as the first-line treatment, but the abscess progressed with stromal melting. Fortunately, *S. maltophilia* was cultured and susceptible to levofloxacin, minocycline, and trimethoprom/sulfamethoxazole (TMP/SMX). Healing was achieved after treatment with topical levofloxacin, oral TMP/SMX and minocycline. However, stromal suppuration with prominent infiltrates attacked again. Fluorescein staining showed classical geographic-like epithelial ulcer. Slit lamp examination revealed diffuse stromal vascularization, cells in the anterior chamber as well as keratic precipitates on the corneal endothelium. Although aqueous PCR analysis showed no virus detection, a diagnosis of recurrent herpes infection with stromal keratitis and endothelitis was made according to clinical picture. Consequently, the ulcer was treated successfully with oral acyclovir combined with topical corticosteroid, antibacterial, and antiviral therapy.

**Conclusions:** Infectious keratitis caused by *S. maltophilia* and herpes has common risk factors in a compromised cornea. The most common risk factors for *S. maltophilia* keratitis were preexisting corneal disease. Treatment is complicated because of its resistances to broad-spectrum antibiotics. Fluoroquinolones and TMP/SMX should be considered in these cases.

### Changes in Corneal Power and Astigmatism Measurements After Short-Term Dry Eye Treatment

First Author: Aubhugn **LABIANO**

Co-Author(s): Ivo **DUALAN**, Anthony **FELIPE**

**Purpose:** To evaluate the changes in central corneal power and astigmatism measurements of dry eye patients before and after short-term use of artificial tears.

**Methods:** This single-center prospective case series evaluated 18 eyes of 9 patients with dry eye disease (age range: 30-66 years; mean age: 53 years; M-F ratio 2:7). Before and after using sodium hyaluronate drops for 4 to 5 weeks, patients underwent dry eye assessment and corneal power and astigmatism measurements. Dry eye measures evaluated were the Ocular Surface Disease Index score, tear break-up time, Oxford grades of corneal and conjunctival staining, and basal tear secretion test value. Corneal power and astigmatism were assessed using an autorefractor keratometer (Zeiss IOLMaster 500) and a Placido-disk-based corneal topographer (Oculus Keratograph).

**Results:** Mean keratometric and topographic average corneal power increased by 0.075 diopters (D) and 0.044 D respectively, and these changes were not statistically significant ( $P = 0.77$ ,  $P = 0.9$ ). On average, the magnitudes of the keratometric cylinder and topographic cylinder decreased by 0.07 D and 0.05 D respectively, and these changes were not statistically significant ( $P = 0.87$ ,  $P = 0.5$ ). On vector analysis, keratometric astigmatism changed by  $0.13 \text{ D} \times 27^\circ$  and topographic astigmatism by  $0.16 \text{ D} \times 17^\circ$ . These changes were not statistically significant ( $P = 0.71$ ,  $P = 0.22$ ). Among eyes with at least 1 D magnitude of cylinder at baseline, the mean change in topographic astigmatism ( $0.28 \text{ D} \times 48^\circ$ ) was weakly statistically significant ( $P = 0.07$ ).

**Conclusions:** Small statistically insignificant changes in corneal power readings and astigmatism values were seen after short-term use of artificial tears for dry eye. Among astigmatic eyes, the mean change in the topographic cylinder measurement may not be clinically significant.

## Changes in the Tear Film Lipid Layer During the Initial Period After Posterior Segment Surgery

*First Author: Ryuichi SHIMADA*

**Purpose:** Changes in the tear film lipid layer (TFLL) after ocular surgeries such as cataract surgery and vitrectomy cause dry eye syndrome. In this study, we evaluated the changes in the TFLL on the ocular surface during the initial period after surgery for posterior segment diseases.

**Methods:** Vitrectomies for posterior segment diseases were performed on study participants. The surface of the eye was imaged using a DR1 $\alpha$  Dry-Eye Monitor (Kowa, Tokyo, Japan) before and 1 week after surgery in 18 eyes from 18 patients. The images of the TFLL were classified using two 5-level scales for spreading grade (SG) and interference grade (IG) to evaluate changes between the pre- and post-surgery.

**Results:** In all 18 eyes, the mean SG was  $1.55 \pm 0.70$  pre-surgery and  $2.27 \pm 1.17$  post-surgery ( $P = 0.012$ ), and the mean IG grade was  $1.85 \pm 0.65$  pre-surgery and  $2.57 \pm 1.07$  post-surgery ( $P = 0.012$ ); both grades

worsened after surgery. An analysis of the mean SG according to age groups showed that for patients under 65 years old the SG was  $1.40 \pm 0.69$  pre-surgery and  $2.10 \pm 0.99$  post-surgery ( $P = 0.035$ ); the SG worsened after surgery for patients under 65 years old. However, mean IGs between pre- and post-surgery had no significant differences for both patients above and under 65 years old.

**Conclusions:** We could successfully evaluate the changes in the TFLL before and after vitrectomy using a DR1 $\alpha$  Dry-Eye Monitor (Kowa). The TFLL changed during the early postoperative period and may be a factor in causing dry eye syndrome after surgery.

## Clinical Evaluation of Ocular Injury from Chestnut Burr

*First Author: Jong Hyuck LEE*

*Co-Author(s): Ji Eob KIM*

**Purpose:** Ocular injury from chestnut burr could be encountered in autumn. The purpose of this study was to find out the proper removal technique and further management in case of chestnut burr foreign body being in corneal and subconjunctiva.

**Methods:** A 2-year period of charts were analyzed, retrospectively. Medical records of a total of 2053 people treated with corneal injury in outpatient or emergency rooms were reviewed, 13 of whom had chestnut burr related injuries. We investigated their clinical symptoms, treatment methods, and progress.

**Results:** The average number of foreign bodies was 3.3 in 13 patients. A total of 12 patients received corneal and subconjunctival foreign body removal under slit lamp biomicroscopy, and 1 patient had surgical removal due to foreign body in the anterior chamber. In a case, a subconjunctival foreign body remained. After removing the foreign body, bandage contact lens was inserted along with antibiotic treatment. Among the 13 cases, 9 cases were observed in our hospital. All 9 patients developed partial corneal opacity without other specific complications. Among the patients under observation, 4 cases (44.4%) showed improvement of visual acuity, 4 cases (44.4%) showed no difference from the visual acuity in the initial visit, and visual acuity was decreased in 1 patient (11.1%) who underwent surgical treatment.

**Conclusions:** In the case of ocular injury from a chestnut burr, careful considerations should be taken to find and remove it. It is necessary to remove the foreign body with as minimal damage as possible. Additional assessment on remaining foreign body is required. Good visual prognosis could be gained with proper removal technique and antibiotic treatment.

## Comparative Outcomes of Femtosecond Low Energy Laser Enabled Keratoplasty vs Manual Keratoplasty in Cases of Corneal Scar

First Author: Bhupesh **SINGH**

Co-Author(s): Sudhank **BHARTI**, Neha **BHARTI**

**Purpose:** The aim of this study was to compare the outcomes of low energy femtosecond laser-enabled keratoplasty with those of conventional penetrating keratoplasty (PKP) in eyes with corneal scar.

**Methods:** This was a retrospective, interventional case study at tertiary eye care center. Patients were divided into 2 groups based on the technique used for keratoplasty. Data on preoperative and postoperative manifest refraction, uncorrected visual acuity, best-corrected visual acuity (BCVA), endothelial cell counts, and complications were noted.

**Results:** At 12 months of follow-up, the mean logMAR BCVA was  $0.33 \pm 0.65$  in the Manual group and  $0.35 \pm 0.23$  in the PKP group ( $P = 0.91$ ). The mean manifest cylinder was significantly lower in the femto group ( $-2.0 \pm 1.07$  diopters) than in the PKP group ( $-3.61 \pm 2.26$  diopters;  $P = 0.03$ ). There was a smaller mean endothelial cell loss in the femto group compared with the PKP group (25.5% vs 35.2%, respectively,  $P = 0.17$ ) 1 year postoperatively.

**Conclusions:** Low energy femto appears to be a safe and effective procedure that results in less astigmatism and a trend towards lower endothelial cell counts compared with conventional PKP, with similar postoperative BCVA.

## Corneal Perforations Secondary to Infective Etiology. What is the Outcome?

First Author: Radhika **NATARAJAN**

**Purpose:** To study the anatomical and functional outcomes of corneal perforation secondary to infective etiology.

**Methods:** A total of 62 eyes of 62 patients who were treated for corneal perforation of infective etiology were reviewed. Parameters analyzed included demographic data, etiology of perforation, vision at presentation, characteristics of the infection and the perforation, treatment modality, and visual and anatomical outcome at the last follow-up. Mean follow-up time was  $28.7 (\pm 1.8)$  months.

**Results:** Mean age was 45.42 ( $\pm 19.25$ ) years. Right eyes were more (61%). 14.5% of eyes had trauma. All were on anti-microbial treatment. Active corneal infiltrates seen in 80.6% of eyes. 62.3% of eyes had central corneal perforation. 73% had perforation size more than 3 mm. 2% of eyes had endophthalmitis. Management was medical (6%), glue and bandage contact lens (27%), corneal suturing (2%), patch graft (13%), penetrating keratoplasty with or without added procedures (39%), and evisceration (8%). Sixteen eyes

needed more than 1 procedure. Reinfection (5%) and re-perforation (2%) were post-treatment complications. Visual acuity at last follow-up was better than 6/60 in 27% of eyes. Tectonic restoration achieved in 78% of eyes.

**Conclusions:** Corneal perforations due to infective keratitis can be treated by surgical and non-surgical methods. Non-surgical treatment was instituted in a third of the patients. Final outcome depended on the predisposing condition, site and size of the perforation, and promptness of the treatment. Tectonic integrity could be restored.

## Descemet Stripping Automated Endothelial Keratoplasty with Intrasceral Haptic Fixated Intraocular Lens: Sequential vs Simultaneous Approach

First Author: Rajesh **SINHA**

Co-Author(s): Tushar **AGARWAL**, Prafulla **MAHARANA**, Sridevi **NAIR**, Hannah **RUBSINGH**

**Purpose:** To compare the outcomes of Descemet Stripping Automated Endothelial Keratoplasty (DSAEK) with intrasceral haptic fixed intraocular lens (IOL) in sequential and combined approach. The study was performed to evaluate whether the manipulation of explantation of IOL and scleral fixation along with DSAEK can jeopardize the outcome of the graft if done in a single sitting.

**Methods:** Thirty eyes with aphakia or pseudophakia with improperly placed anterior chamber (AC) IOL with endothelial decompensation were enrolled and randomized into 2 groups. In group-I, intrasceral haptic fixation of IOL in posterior chamber followed by DSAEK sequentially was performed. In group-II, both procedures were performed simultaneously and outcome was compared.

**Results:** Twelve eyes in group-I and 11 eyes in group-II were aphakic and 3 eyes in group-I and 4 eyes in group-II had unstable and tilted AC IOL. At 3 months, 1 eye in group-I and 3 eyes in group-II had failed graft. Rebubbling rate was higher in group II, and graft survival was significantly better in group I. Mean best corrected visual acuity and percent endothelial cell loss in clear grafts were significantly better in group-I at 3 months.

**Conclusions:** In complicated aphakia and pseudophakia with endothelial decompensation, sequential surgery should be preferred.

## Efficacy of Air Descemetopexy in the Management of Descent Membrane Detachment

First Author: Satya **SINGH**

Co-Author(s): Swarnima **AGRAHARI**, Basant **KUMAR SINGH**, Arun **SINGH**, Vinod **SINGH**

**Purpose:** To study the efficacy of air descemetopexy

in the management of various types of descemet membrane detachment based on anterior segment optical coherence tomography and to know the role of 14% C3F8, 20% SF6 in failed cases of air descemetopexy.

**Methods:** After ethical committee approval, clinical data of 40 patients during the period of December 2017 to December 2018 who developed DMD after cataract surgery were analyzed.

**Results:** Majority of patients (n = 32, 80%) had severe generalized corneal edema, n = 4 had moderated corneal edema, and n = 4 had localized mild corneal edema. Only air was sufficient to reattach DMD in majority of the patients (n = 36, 90% cases), and only 4 patients who had very large DMD failed to attach by air. In these patients, repeat descemetopexy by 14% C3F8 gas was done which led to attachment of descemet membrane with improvement of visual acuity in 3 cases. Complications due to increased intraocular pressure were noted with these gases.

**Conclusions:** Air descemetopexy is a safe and efficacious option for DMD repair in most of these cases and it is associated with less postop complications.

### Etiology and Treatment Outcome of Fungal Keratitis in Tertiary Eye Care in Northern Thailand

*First Author: Phit UPAPHONG*

*Co-Author(s): Napaporn TANANUVAT*

**Purpose:** To evaluate predisposing factors, causative organisms, and treatment outcomes of fungal keratitis.

**Methods:** Medical records of patients with culture-positive fungal keratitis over a 6-year period (2012-2017) were reviewed. Predisposing factors, causative organisms, and the response to treatment were analyzed. Treatment outcomes were categorized into 3 groups: success (no progression of stromal infiltration and fully healed epithelial defect within 2 weeks); slow response (infiltration size decreased by greater than or equal to 20% but the epithelial defect was still present at week 2); and medication failure (no clinical improvement or required surgical intervention).

**Results:** A total of 113 eyes of 113 patients were recruited. Ocular trauma (69.0%) was the most common predisposing factor, followed by undetermined (24.8%) and non-traumatic causes (7.1%). Foreign body accounted for 83.3% in the traumatic group, 80% were organic matter. The dominant fungal pathogen was filamentous fungi (93.9%), while yeast was found in 6.1%. The most common fungal species was *Fusarium* spp. (46.0%), followed by unidentified dematiaceous fungi (18.6%) and *Aspergillus* spp. (9.7%). Only 24.8% of eyes had successful medical treatment, while 29.2% had slow response and 42.5% had medication failure.

In the failure group, most cases (52.1%) underwent therapeutic penetrating keratoplasty and 27.1% eventually required enucleation or evisceration.

**Conclusions:** Ocular trauma, particularly from organic matter, was the major predisposing factor and *Fusarium* species was the most common pathogen of fungal keratitis. The majority of cases were refractory to primary treatment and required surgical intervention.

### Flanged Intraclear Lens Fixation with Ultrathin Descemet-Stripping Automated Endothelial Keratoplasty for Management of Bullous Keratopathy

*First Author: Aditya KELKAR*

*Co-Author(s): Jai KELKAR, Anchal AGARWAL, Yogesh Chougule CHOUGULE, Priyanka PATRA*

**Purpose:** To report results of Flanged Intraclear Intraocular Lens (FIIOL) Fixation with Ultrathin Descemet-stripping automated endothelial keratoplasty (UT-DSAEK) for management of bullous keratopathy.

**Methods:** A case series of 12 patients with post cataract surgery endothelial decompensation with aphakia or lens subluxation who underwent UT-DSAEK and FIIOL were evaluated for visual outcome and complications.

**Results:** There were no intraoperative complications. Uncorrected visual acuity improved from median of 1.48 logMAR units (IQR = 1.3-2.0 logMAR) at baseline to 0.3 logMAR (IQR = 0.2-0.4 logMAR) at 6 weeks (P < 0.001) which was maintained at 6 months. The average endothelial cell loss was 21%. Postoperatively, 1 patient had slightly decentered FIIOL but was managed by appropriate refractive correction and 1 patient had dislocated corneal lenticule for which air re-injection was done. None of the patients had raised IOP and posterior segment related complications.

**Conclusions:** FIIOL along with UT-DSAEK has lesser incidence of graft rejection which makes this technique unique and effective for management of bullous keratopathy.

### Good Visual Outcome Following Penetrating Keratoplasty for *Metarhizium anisopliae* Fungal Keratitis

*First Author: Jonathan LEE*

*Co-Author(s): Edward GREENROD, Chengde PHAM*

**Purpose:** To report a rare case of *Metarhizium anisopliae* keratitis with good visual outcome following keratoplasty, and to review the available literature on this disease.

**Methods:** A 24-year-old woman from rural Victoria with a history of extended-wear soft contact lenses and travel to Vietnam presented with 2 weeks of left

eye redness and irritation. Clinical examination findings and management at presentation and follow-up visits were reviewed.

**Results:** Initial examination revealed a best corrected visual acuity (BCVA) of 20/16 in the right eye and 20/80 in the left eye. *Metarhizium anisopliae* was isolated from a 2.4 x 3.7 mm corneal ulcer with associated anterior chamber inflammation. The patient was treated with topical natamycin as well as systemic, intraocular, and topical voriconazole, and eventually developed a 2.0 x 2.0 mm perforation requiring a therapeutic keratoplasty after 17 days of antifungal therapy. BCVA was 20/20 15 months post-keratoplasty. Aggressive targeted antifungal therapy based on isolate susceptibilities, peripheral infiltrate location, and surgical intervention before scleral involvement may account for the successful response in this patient. Visual prognosis is dependent on early recognition, and factors that may contribute to poorer outcomes include anterior chamber inflammation, large ulcer size, or scleral involvement.

**Conclusions:** *Metarhizium anisopliae* is a parasitic fungus found distributed in soil worldwide with very few reports of ocular infection in the literature. Prompt identification and early antifungal therapy is imperative for the treatment of *Metarhizium anisopliae* keratitis. Surgery may be indicated in cases of progressive keratitis refractory to medical management or if perforation is imminent.

### Herpes Simplex Keratitis: An Overlooked Menace?

*First Author: Anica SHAH*

**Purpose:** Herpes Simplex Keratitis (HSK) has varied presenting patterns and is one of the leading causes of corneal scarring and subsequent visual disability. This study was carried out to determine the incidence and patterns of HSK presenting at a tertiary eye center in Nepal, and also to assess associated visual impairment.

**Methods:** A descriptive, cross-sectional study at a tertiary eye care center which included 302 cases of clinically diagnosed HSK over a period of 1 year. Detailed ocular examination was done in all patients. Visual acuity at presentation and on subsequent visits in follow up cases was recorded. Findings were noted on a structured format and later assessed.

**Results:** Out of 302 cases of HSK, 53 cases presented with epithelial keratitis, 156 with stromal keratitis without ulceration, 22 cases with stromal keratitis with ulceration, 66 cases with endothelitis and 5 patients with neurotrophic ulcer. Presenting visual acuity in 108 patients (35.7%) was less than 3/60. Out of 175 patients who followed up, 36 patients continued to have vision less than 3/60.

**Conclusions:** This study shows that HSK has a varied presentation and can cause significant vision

impairment. Stromal Keratitis without ulceration is the most common presentation. In developing nations, due to a higher incidence of fungal and bacterial keratitis, HSK is not much emphasized on. Not much of epidemiological data is available on the subject and since the disease is notorious for recurrences, a need for long-term studies is paramount to estimate the burden of visual morbidity caused by the disease.

### Hypersensitivity Reaction to Mango Sap: A Case Report

*First Author: Mukti MITRA*

*Co-Author(s): Md.Alauddin AL AZAD, Al AMIN*

**Purpose:** To present a case report on hypersensitivity reaction following contact with mango sap and also to report subsequent development of necrotizing fascitis in the involved lids.

**Methods:** A 60-year-old male patient had been presented to the emergency eye department with the complaint of severe painful swelling involving the left side of forehead, left upper and lower eyelids including the ipsilateral face and neck. The patient also had difficulties in swallowing and slight breathlessness. His detailed visual assessment was not possible in his left eye which was normal in right eye. On examination, there were multiple blisters including the left side of the lips. He was a mango cultivator and had contact with mango sap on the day of developing the symptoms. This patient was consulted with department of otolaryngology (dysphagia and breathlessness) and dermatology (to exclude Herpes Zoster Ophthalmicus).

**Results:** After diagnosis, the patient was treated with intravenous corticosteroids along with antibiotics. On laboratory investigations his Neutrophil count rose, and serum creatinine was 3.58 mg/dL. His fluid intake and output and electrolyte level were closely monitored. On the 5th day of admission, all the blisters and swelling subsided with sloughing of upper and lower lid skin, which was managed by debridement and a skin graft after taking care of all the vital parameters.

**Conclusions:** Though acute contact dermatitis with mango sap is not very rare, a severe form of hypersensitivity reaction with the development of necrotizing fasciitis is not commonly seen. Early diagnosis and prompt treatment can save vision as well as life.

### In Vitro Topical Fluoroquinolone Susceptibility of Common Bacterial Keratitis Standard Isolates

*First Author: Arabella MENDOZA*

*Co-Author(s): Eleonore IGUBAN*

**Purpose:** This study aimed to compare the in vitro susceptibility of *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and *Streptococcus pneumoniae* to locally available topical fluoroquinolones:

Levofloxacin, Ofloxacin, Moxifloxacin, Besifloxacin, Ciprofloxacin, and Gatifloxacin as measured by their zones of inhibition. It also sought to compare the antimicrobial efficacy of the locally-manufactured topical fluoroquinolones with internationally-manufactured fluoroquinolone brands.

**Methods:** This was a single blind controlled experimental study which compared the in vitro susceptibility of *Staphylococcus aureus*, *Streptococcus pneumoniae* and *Pseudomonas aeruginosa* to locally available fluoroquinolones (generic and innovator) specifically: Levofloxacin, Ofloxacin, Moxifloxacin, Besifloxacin, Ciprofloxacin, and Gatifloxacin. Zones of inhibition in mm for each bacterial isolate were recorded and tabulated. One-way ANOVA and T-test were used to statistically analyze and interpret the data obtained.

**Results:** All the 3 isolates were sensitive to all the eleven topical fluoroquinolones used in this study. Ciprofloxacin obtained the largest zone of inhibition (mm) when exposed to *Pseudomonas aeruginosa* isolates. Moxifloxacin showed the greatest anti-microbial activity for *Staphylococcus aureus* and *Streptococcus pneumoniae* isolates. No statistically significant differences exist between generic topical fluoroquinolones with innovator fluoroquinolone brands, except for the 2 brands of Ciprofloxacin 0.3%.

**Conclusions:** The standard bacterial keratitis isolates used in the study were sensitive to all the fluoroquinolones tested. Ciprofloxacin demonstrated good in vitro activity for the gram-negative *Pseudomonas aeruginosa*. Moxifloxacin, on the other hand, had the highest microbial sensitivity for the gram-positive *Staphylococcus aureus* and *Streptococcus pneumoniae*. Topical fluoroquinolones that were considered as innovators had comparable in vitro anti-microbial efficacy with generic brands, except for Ciprofloxacin.

## Indication and Outcomes of Therapeutic Penetrating Keratoplasty in Northern Thailand

First Author: Pichaya **KULNIWATCHAROEN**  
Co-Author(s): Napaporn **TANANUVAT**

**Purpose:** To determine the indication and outcomes of therapeutic penetrating keratoplasty (TPK) at the tertiary eye care in Northern Thailand.

**Methods:** A total of 79 eyes of 79 patients underwent TPK between January 2007 and November 2016. Patients' demographic data, ocular co-morbidities, indication for surgery, surgical details, intra- and postoperative complications were reviewed. Graft survival rate was analyzed.

**Results:** There were 62 male (78.5%) and 17 female (21.5%) patients with mean age of 56.9 years. The most common indication for surgery was fungal keratitis

(63.3%), followed by unknown cause of infectious keratitis (22.8%), and bacterial keratitis (11.4%). Graft survival rate was 80% at 6 months, 58.6% at 1 year, 52.8% at 2 years, and 39.6% at 5 years, respectively. The median graft survival time was 28 (9.1-46.9) months post-surgery. Glaucoma (68.2%) was the most common postoperative complication, followed by allograft rejection (62.1%), ocular surface problems (54.5%), and suture-related complications (34.8%).

**Conclusions:** Fungal keratitis was the major indication for TPK in Northern Thailand. Glaucoma and allograft rejection were common complications after surgery.

## Intracorneal and Sclerocorneal Cysts: Rare Clinical Condition

First Author: Tanvi **MADIA**

**Purpose:** Two cases of corneal cysts were reported, one sclerocorneal and the other intracorneal. The presence of a corneal cyst is a rare clinical condition.

**Methods:** Examination of both the cases was done thoroughly to see if it had reached which layer of cornea or sclera entirely. Most of the corneal cysts have a scleral component from where they actually originate.

**Results:** First case (12 years) had a small scleral cyst at the superonasal quadrant beginning at 2 mm from the limbus and invading the cornea for a further 2 mm at the level of mid-stroma with overlying epithelium clear. The remaining cornea was normal, but faint scarring at the level of Bowman's membrane surrounded the corneal extension. Gonioscopy revealed a normal angle, and examination of the rest of the eye showed no abnormality. The anterior wall was removed surgically to the largest possible extent and the remaining portion was cauterized. The nasal part of the cornea was left, using the epithelial lining of the cyst as the covering layer. Second case (8 years) had a history of local injury. It involved purely the cornea in the center pre Descemet's level confirmed on OCT.

**Conclusions:** It's a rare condition and needs thorough evaluation to know the cause and to treat it with a favorable prognosis.

## Keratoconus Progression Rates in Children and Adolescents

First Author: Jay **MEYER**  
Co-Author(s): Akilesh **GOKUL**, Charles **McGHEE**, Hans **VELLARA**

**Purpose:** To evaluate the long-term rates of keratoconus progression in eyes of children and adolescents.

**Methods:** Retrospective study of individuals younger or equal to 18 years old at time of diagnosis with keratoconus, and at least 6 months of follow-up between 2000 and 2016. Corneal tomography was

performed using an Orbscan tomographer (Bausch & Lomb, Rochester, NY). Tomographic progression was defined as an increase in any of the investigated parameters (keratometry values, KMAX, maximum anterior and posterior elevation, central pachymetry, thinnest pachymetry) beyond the repeatability limits. For eyes unable to be imaged with tomography, non-tomographic progression was defined as need for corneal transplantation or development of corneal hydrops or central corneal scarring.

**Results:** 214 eyes of 144 patients with a mean age of  $15.2 \pm 2.5$  years were studied. The overall rate of non-tomographic and tomographic progression was 84.1% (180/214 eyes). Of these, progression was defined non-tomographically for eyes with advanced disease that received corneal transplantation ( $n = 23$ ) and eyes that developed corneal hydrops ( $n = 37$ ) or central scarring ( $n = 6$ ). For the remaining 148 eyes (106 patients), evaluation for progression was performed tomographically over a mean follow-up period of  $2.9 \pm 2.2$  years. Of these, 77.0% (114/148) progressed in at least 1 investigated tomographic parameter. Eyes that progressed had higher initial anterior curvature and posterior elevation and lower thinnest pachymetry measurements compared to the eyes that did not progress.

**Conclusions:** A high rate of progression was identified in keratoconic eyes of children and adolescents. More advanced disease at initial presentation may further increase the risk of keratoconus progression.

### Long-Term Phenotypic Change of Epithelial Cytokeratins After Cultured Oral Mucosal Epithelial Transplantation

*First Author: Gaku ISHIDA*

*Co-Author(s): Tsutomu INATOMI, Shigeru KINOSHITA, T NAKAMURA, Chie SOTOZONO*

**Purpose:** Cultivated oral mucosal epithelial transplantation (COMET) is effective for treating patients with severe ocular-surface disease and stem-cell deficiency, and we previously reported on its long-term clinical outcome. However, and to the best of our knowledge, there have been no reports on how the phenotype of transplanted epithelium changes over the long-term period post-COMET. In this study, we performed penetrating keratoplasty (PKP) post-COMET and investigated phenotype changes in the transplanted corneal epithelial graft over the long-term postoperative period.

**Methods:** Corneal epithelial grafts obtained by performing PKP at 7 years post-COMET for stem-cell deficiency caused by Stevens-Johnson syndrome were subjected to hematoxylin and eosin (HE) staining and immunostaining [cytokeratin (CK) 1, 3, 4, 12, 13, and 15, laminin 5, desmoplakin, and Ki-67].

**Results:** HE staining revealed layered epithelial cells. Immunohistochemistry showed positive for CK3, CK4,

and CK13, and the phenotype of CK of oral mucosal epithelium was consistent. CK15-positive cells were also found in the basal layer, and a scattering of Ki-67-positive cells were also observed.

**Conclusions:** Stratified epithelium remained over the long-term course after COMET and maintained the same phenotype as the oral mucosal epithelium, thus suggesting that stem / progenitor cells exist in the basal layer and are involved in maintaining cultured oral mucosal epithelium over the long-term postoperative period.

### Management of Corneal Perforation Using Fascia Lata Graft

*First Author: Mohamad HERDIWAN*

**Purpose:** To report the management of corneal perforation with fascia lata graft.

**Methods:** A case report of a 41-year-old woman who presented with corneal perforation with history of corneal ulcer on the right eye. Ophthalmology examination showed visual acuity 1/300, leukoma adherent, ulcers with a size of 4.5 x 5.5 mm, with iris prolapse on the cornea. This patient was diagnosed with corneal ulcer perforation with leukoma adherent with iris prolapse OD. The patient underwent fascia lata graft procedure of corneal perforation on the right eye. The fascia lata graft was taken from the lateral thigh of patient.

**Results:** Examination on 5 months postoperative showed visual acuity 1/60 with the graft intact.

**Conclusions:** Corneal perforations are ophthalmic emergencies that require immediate intervention. Corneal fascia lata graft can be considered as an option in the treatment of corneal perforation.

### Ocular Manifestations in Scleroderma

*First Author: Wassamon JIRATTIPHAN*

*Co-Author(s): Orapin ANUTARAPONGPAN, Chingching FOOCHAROEN, Wipada LAOVIROJJANAKUL, Yosanan YOSPAIBOON*

**Purpose:** To describe the ocular manifestations in scleroderma and determine the associations between signs and symptoms of dry eye and scleroderma severity.

**Methods:** In this cross-sectional study, 84 patients with systemic sclerosis were enrolled and underwent a complete ophthalmic evaluation. Demographic data and ocular findings were collected. Correlations between tear breakup time (TBUT), Schirmer I, Ocular staining score (OSS), and subtypes of scleroderma were assessed by using odd ratio (OR) and Spearman's rank correlation.

**Results:** Of 84 scleroderma patients, 25 (30%) had limited type while 59 (70%) had diffuse scleroderma. In

this group of patients, the evaporative tear loss (70.2%) is the most common ocular abnormality, followed by eyelid stiffness (29.8%) and aqueous tear deficiency (22.6%). An aqueous tear deficiency, measured by Schirmer I, was higher in the diffuse scleroderma group compared to limited scleroderma (OR = 2.73). However, we didn't find any statistical significance for this difference. The eyelid stiffness was the only factor that was found to be higher in the diffuse scleroderma group with a statistically significant difference ( $P = 0.01$ ). There was no correlation between OSS and skin score in our study.

**Conclusions:** Evaporative tear loss was the most common ocular abnormality in scleroderma patients. Eyelid tightness was the only finding that was significantly different between 2 subtypes. However, total skin score was not correlated with OSS from our data.

## Olmsted's Syndrome

*First Author: Anisha **AUGUSTIN***

*Co-Author(s): Rajini K. C, Sudha V*

**Purpose:** To report the ocular manifestations of Olmsted's syndrome. This is a very rare condition caused by a mutation of TRPV3 gene characterized by bilaterally symmetrical mutilating palmoplantar keratoderma with periorificial keratotic plaques. This was the 76th reported case in literature.

**Methods:** A 20-year-old male presented with a history of defective vision, redness, watering, and photophobia since 3 years of age. He had developmental delay and sensorineural hearing loss. Ocular examination – 1] Best corrected visual acuity of 6/60 [OD] and 6/36 [OS] 2] Bilateral extensive corneal vascularization with multiple erosions and opacities dermatological examination – 1] Palmoplantar and perianal verrucous keratotic plaques 2] Parrot beaking of nails and subungual hyperkeratosis 3] Alopecia differential diagnosis included – 1] Infections – leprosy, tuberculosis, mucocutaneous candidiasis, viral keratitis 2] Metabolic – oculocutaneous tyrosinemia, Acrodermatitis enteropathica [zinc deficiency] 3] Genetic – psoriasis - Clouston syndrome - onycho dermal dysplasia - Papillon- Lefevre syndrome - Vohwinkel keratoderma.

**Results:** Infectious etiology was ruled out. Skin biopsy showed hyperkeratosis, parakeratosis, and inflammatory infiltrate. Along with the clinical features described, a diagnosis of Olmsted's syndrome was made. Though the condition is resistant to treatment, the patient became symptomatically better with tear supplements and oral retinoids.

**Conclusions:** This report highlights the ocular manifestations of a rare ectodermal disorder and emphasizes the importance of systemic and dermatological examination in a case of bilateral keratopathy.

## Ophthalmic Manifestations of Paederus Dermatitis

*First Author: Pawan **PRASHER***

**Purpose:** To report the pattern of ophthalmic manifestations associated with Paederus dermatitis (PD).

**Methods:** Medical charts of patients presenting to eye clinic with clinical features consistent with diagnosis of PD from May 1, 2014 to April 30, 2016 were retrospectively reviewed. Relevant demographic and clinical data of periocular and ocular findings were collected and analyzed. The patients with a history of chronic skin disorders or allergies were excluded from the study.

**Results:** A total of 56 patients were included in the study. The age range was 4 to 65 years with a median of 27 years. On presentation, common subjective symptoms were burning sensation in 49 (87.5%), itching in 37 (66.1%), watering in 25 (44.6%), foreign body sensation in 17 (30.4%), blurring of vision in 16 (28.6%), and photophobia in 12 (26.8%) patients. Lid swelling, erythema, crusts, and vesicles were the common periocular findings; and conjunctival congestion, discharge, and corneal erosions were the common ocular findings.

**Conclusions:** The current study shows that PD can cause significant ocular morbidity. Physicians, especially those who work in endemic areas, should be aware of this entity both in terms of management as well as for educating patients about the preventive measures.

## Outcome of Pterygium Excision Using Amniotic Membrane Transplant Versus Conjunctival Membrane Autograft: Retrospective Study

*First Author: Thikumporn **CHANPOO***

*Co-Author(s): Nauljira **PRAKAI RUNGTHONG***

**Purpose:** To compare the outcome of pterygium excision between amniotic membrane transplant (AMT) and conjunctival autograft transplant (CAT).

**Methods:** A total of 367 patients underwent pterygium excision between October 2012 and September 2016 at Mettapracharak Hospital and were reviewed. Recurrent rates were assessed at 1, 3, and 6 months.

**Results:** 83.65% received AMT, 51.14% were performed by staff; average age was 55.58 years and 83.71% were female. Recurrences were 11.07%, 28.34%, and 41.04% at 1, 3, and 6 months respectively. CAT had significantly lower recurrence rates at 1, 3, and 6 months (1.67%,  $P = 0.023$ ; 8.33%,  $P = 0.001$ ; 15%,  $P < 0.001$ ). Resident surgeons had significantly higher recurrences than staffs (49.07% vs 27.18%,  $P < 0.001$ ).

**Conclusions:** CAT had significantly lower recurrent rates than AMT at 1, 3, and 6 months regardless of age and

gender. Outcome of surgery depended on surgeons' experience, and resident surgeons had significantly higher recurrences than staffs.

### Peripheral Ulcerative Keratitis in Kids and Young Adults with Rosacea: Corneal Involvement and Meibomian Gland Dysfunction

First Author: Jiunn-Liang **CHEN**

**Purpose:** To report 6 cases of rosacea associated peripheral ulcerative keratitis.

**Methods:** Clinical records of patients  $\leq 16$  years old with rosacea seen between 2012 and 2018 were reviewed. Best corrected visual acuity, slit lamp photography, conjunctival swab, anterior segment optical coherence tomography, and meibography were performed.

**Results:** The most common corneal manifestations were superficial punctate keratitis, corneal neovascularization (including peripheral and central) and leukoma (including 2 cases of leukoma adherence). In this cases series, patients with poor visual acuity showed dense central and peripheral opacities, superficial, and stromal neovascularization, stromal thinning, and even corneal perforation usually associated with a prolonged clinical course of the disease. Meibomian glands dysfunction affects most cases of rosacea associated peripheral ulcerative keratitis. These patients usually required a more aggressive therapeutic approach with long term topical soft steroids or cyclosporine-A, as well as oral minocycline for prolonged periods of time.

**Conclusions:** We reported 6 cases to share our experience of clinical presentation and treatment of rosacea associated peripheral ulcerative keratitis.

### Peroxisome Proliferator-Activated Receptor Alpha Agonist Suppresses Neovascularization by Reducing Both Vascular Endothelial Growth Factor and Angiopoietin-2

First Author: Yuji **NAKANO**

Co-Author(s): Takeshi **ARIMA**, H **TAKAHASHI**, Masaaki **UCHIYAMA**

**Purpose:** To investigate anti-neovascularization effects of the ophthalmic solution of peroxisome proliferator-activated receptor alpha (PPAR $\alpha$ ) in the rat alkali burn model.

**Methods:** After alkali injury, either an ophthalmic solution of 0.05% fenofibrate (the PPAR $\alpha$  group) or vehicle was topically instilled onto the rat's cornea. Histological and immunohistochemical observation, and real-time reverse transcription polymerase chain reaction was performed.

**Results:** By PPAR $\alpha$  agonist instillation, PPAR $\alpha$  was strongly expressed and activated in the nucleus in the vascular endothelial cells after alkali injury. PPAR $\alpha$

agonist reduced not only mRNA expression of vascular endothelial growth factor (VEGF) but also angiopoietin Ang-1 and Ang-2.

**Conclusions:** PPAR $\alpha$  agonist contributed to the downregulation of VEGF, Ang-1, and Ang-2 suggesting that PPAR $\alpha$  agonist ophthalmic solution can be a new strategy for preventing neovascularization.

### Podophyllin-Induced Corneal Injury: A Case Report

First Author: Jiunn-Liang **CHEN**

**Purpose:** To report one rare case of podophyllin induced corneal injury.

**Methods:** Case report and literature review.

**Results:** A 62-year-old obstetrician had viral warts at right lower lid and treated by himself with topical podophyllin. Several days later, right eye pain, redness, and blurred vision developed. Topical antibiotics and steroid were prescribed at first. The corneal epithelial defect improved but corneal stromal haze and central corneal thinning were noted by anterior segment OCT. Oral prednisolone was then prescribed and the corneal haze decreased gradually. Unfortunately, pseudodendrate lesion of cornea developed during recovery. Oral Valacyclovir was prescribed for a short period under the assumption of herpes zoster infection. His vision improved 1 month after treatment and obvious hyperopic shift was left.

**Conclusions:** Podophyllin is a common topical drug used for viral warts. Here, we reported a rare case of podophyllin induced corneal injury and its sequel.

### Prevalence of Dry Eye in Post-Menopausal Females Attending a Tertiary Care Ophthalmology Clinic

First Author: Ekta **GARG**

Co-Author(s): Piyush **BAJAJ**, Pushkar **DHIR**, Parikshit **DHIR**, Ruchika **GARG**, Tarun **GUPTA**

**Purpose:** Dry eye syndrome (DES) is one of the most frequently encountered ocular conditions. Although clinical observations have long suggested that DES is more common in post-menopausal women, there is little epidemiological data available to describe the magnitude of the problem of DES among post-menopausal women especially in India.

**Methods:** A total of 200 post-menopausal females attending the opd were included in the study. All patients were given OSDI (Ocular Surface Disease Index) questionnaire. Diagnosis of dry eye in our study was made when 2 of the 3 tests are positive viz. TBUT (Tearfilm Break-Up Time) ( $< 10$  sec), Ocular surface dye staining with Lissamine green dye (Van Bijsterveld's score  $\geq 4$ ), and Schirmer-I test ( $< 10$  mm).

**Results:** Prevalence of DES was high in this age

group ie, 44% (88/200 post-menopausal women). 49% (98 post-menopausal women) responded with symptoms of dry eye (OSDI score >12), thus OSDI is a reliable questionnaire to diagnose DES on the basis of symptoms ( $P < 0.00$ ). TBUT test sensitivity was 97.6% and specificity was 92.36%. Lissamine green dye staining was a less sensitive but more specific test to diagnose DES (sensitivity of 33.6% and specificity of 98.91%). Schirmer I test has high sensitivity (91.2%) and high specificity (96.36%). All 3 tests are reliable in diagnosing dry eye as each had a  $P$  value of  $<0.001$ . Meibomian gland dysfunction was present in 10% of dry eye positive females.

**Conclusions:** There is a high prevalence of dry eye in post-menopausal females responsible of significant morbidity.

### Probability of Meibomian Gland Dysfunction Based on Age, Sex, and Meibography

*First Author:* Kris Zanna **ACLUBA-ARAO**

*Co-Author(s):* Anthony **FELIPE**, Ruben Lim Bon **SIONG**

**Purpose:** To know the probability of having Meibomian Gland Dysfunction (MGD) based on age, sex, and meibography, as well as each factor's correlation with the disease.

**Methods:** A total of 295 eyes from 154 patients were included in the study and were divided into 6 age groups: 18 to 29, 30 to 39, 40 to 49, 50 to 59, 60 to 69, and 70 and above. At a single visit, the patients were examined and the following data were collected: age, sex, diagnosis for MGD based on signs seen at the slit lamp biomicroscope, and non-contact meibography pictures using the OCULUS Keratograph 5M of the upper and lower lids. The meibography pictures were scored and the Total Meiboscore per subject was noted.

**Results:** MGD was seen in 53.6% (158 eyes) of the study population. MGD was seen more commonly in females (56.3%) and among those 50 years and above (58.7%). A positive correlation was seen between MGD and female sex [odds ratio (OR) = 1.783, age (OR=1.053), and meiboscore (OR=1.125)].

**Conclusions:** Our MGD frequency was similar with other Asian studies and the probability of having the disease is positively correlated with female sex, older age group, and higher meiboscore.

### Profile of Tear Film Among Tax Office Employees

*First Author:* Henry **SUNGKONO**

*Co-Author(s):* Ariesanti **HANDAYANI**, Nindya **SURYANI PRASETYO**

**Purpose:** To determine the tear film status of tax office employees and to study the epidemiology of the tear film abnormality.

**Methods:** A cross-sectional study of 13 patients was conducted at the Denpasar tax office. The inclusion criteria were patients aged 30 years or older, working with a computer more than 4 hours with a resting period of no more than 15 minutes, no history of eye disease and contact lenses used, have never underwent any surgery, and no use of eye drops in the past month. Patients with systemic disease and those who consumed any medication such as anti-allergy, anti-glaucoma, anti-inflammatory drug, and anti-hypertension were excluded. Ocular Surface Disease Index (OSDI) questionnaire, Schirmer's test, and Tear Film Break-Up Time (TBUT) was done. An OSDI score of 22 or more with a TBUT of less than 10 seconds or a Schirmer's test reading of less than 10 mm was considered diagnostic of dry eye disease (DED).

**Results:** DED based on symptoms were found in 3 patients (20%). DED based on signs were found in 10 patients (66, 6%). DED based on symptoms and signs were found in 3 patients (20%).

**Conclusions:** Most of DED in computer users in this study were evaporative type DED, with less symptoms than the signs. The accurate diagnosis of DED, along with classification of severity and subtype, is essential for developing an effective treatment plan.

### Radial Keratoneuritis as a Presenting Sign in a Bilateral Acanthamoeba Keratitis and Treatment Strategy

*First Author:* Po-Yen **LEE**

*Co-Author(s):* Li-Yi **CHIU**, Shihliang **HSU**, Chang-Ping **LIN**

**Purpose:** We reported the treatment of a case with bilateral acanthamoeba keratitis presenting as radial keratoneuritis.

**Methods:** Case report.

**Results:** A 15-year-old woman, who had a 10-day history of pain, redness, and blurred vision in both eyes presented to the emergency clinic. She was an orthokeratology contact lens wearer who had rinsed her lens with tap water on a regular basis. Biomicroscopy revealed radial keratoneuritis in both eyes. Corneal scraping was performed, and samples underwent KOH staining showed multiple double-walled cyst structures consistent with acanthamoeba. The inpatient treatment included 0.02% polyhexamethylene biguanide, chlorhexidine, 1% Voriconazole, topical steroid (0.1% Flumethasone), and oral Itraconazole. The corneal infection was successfully controlled, and the best corrected visual acuity were recovered to 25/20 in both eyes. Infection did not recur during the 6-month follow-up period.

**Conclusions:** Bilateral acanthamoeba keratitis is an infectious complication of contact lens wearers. It should be considered in patients with radial keratoneuritis. With laboratory confirmation, vision

often can be restored with medical treatment. Therefore, early and appropriate workup, followed by efficient treatment, is critical to achieving good outcomes.

### Relationship Between Dry Eye Disease and Depression: Large-Scale Crowdsourced Research Using iPhone Application DryEyeRhythm

*First Author: Kunihiro* **HIROSAWA**

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**Purpose:** To investigate the relationship between dry eye disease (DED) and depression using the iPhone application DryEyeRhythm.

**Methods:** We conducted an observational study from November 2016 to April 2017, to identify the relationship between DED and depression using the iPhone application DryEyeRhythm. The study included iPhone users in Japan who downloaded DryEyeRhythm and electronically consented. DryEyeRhythm was used to assess the severity of DED as determined by the Ocular Surface Disease Index (OSDI) score (Normal: 0-12, Mild: 13-22, Moderate: 23-32, Severe: 33-100) and depressive symptoms as determined by The Center for Epidemiological Studies-Depression (CES-D). We defined a CES-D score greater than 31 as moderate depression. We calculated the odds ratio for depression associated with the severity of DED adjusted for age and sex using logistic regression analysis.

**Results:** We had 5797 participants (age:  $27.5 \pm 12.4$  years, women 66.4%), including 1544 normal people with no DED ( $28.9 \pm 13.2$  years, women 53.7%), 1488 people with mild DED ( $28.0 \pm 12.4$  years, women 64.0%), 1012 people with moderate DED ( $26.9 \pm 11.8$  years, women 71.3%), and 1753 people with severe DED ( $26.2 \pm 11.7$  years, women 76.9%). The rate of depression was 9.8%, 11.2%, 13.1%, and 18.5%, in normal, mild, moderate, and severe DED group, respectively. The severity of DED correlated with higher risk of depression (mild: 1.19 (0.94-1.50),  $P = 0.154$ , moderate: 1.44 (1.12-1.85),  $P = 0.004$ , severe: 2.17 (1.76-2.68),  $P < 0.001$ ).

**Conclusions:** Progression of DED is associated with depression according to our large-scale crowdsourced research using the iPhone application.

### Risk of Mitral Valve Prolapse in Patients with Keratoconus

*First Author: Yuh-Shin* **CHANG**

*Co-Author(s): Ren-Long* **JAN**

**Purpose:** To investigate the risk of mitral valve prolapse (MVP) in keratoconus (KCN) patients.

**Methods:** The retrospective, nationwide, matched

cohort study included 4488 KCN patients identified by the International Classification of Disease. Ninth Revision, Clinical Modification Code (ICD-9-CM), code 371.6 and recruited between 2002 and 2011 from the Taiwan National Health Insurance Research Database. The six-times number control group included age- and sex-matched 26,928 patients without KCN selected from the Taiwan Longitudinal Health Insurance Database 2000. Information for each patient was collected from the index date until December 2014. The incidence and risk of MVP were compared between the 2 groups. Cox proportional hazard regression analysis was used to obtain adjusted hazard ratio (HR) for MVP. Kaplan-Meier analysis was used to calculate the cumulative MVP incidence rate.

**Results:** The MVP incidence rate in KCN patients older than 40 years was 1.77 times (95% CI = 1.09-2.8) that in the control patients. The significant incidence rate ratios were also shown in female KCN patients (IRR = 1.49, 95% CI = 1.12-1.98;  $P = 0.0060$ ). After adjustment for potential confounders including hypertension, hyperlipidemia, and congestive heart failure, KCN patients older than 40 years were 1.77 times ( $\times$  95% CI = 1.09-2.88) and female KCN patients were 1.48 times (95% CI = 1.11-1.97) more likely to develop a MVP in cohort for the total sample.

**Conclusions:** We found that KCN patients older than 40 years or female KCN patients increased the risk of MVP. Therefore, ophthalmologists should educate KCN patients about MVP.

### Scleral and Rigid Gas Permeable Contact Lenses in the Management of Keratoconus: How do They Compare?

*First Author: Radhika* **NATARAJAN**

**Purpose:** The aim of the study was to evaluate the visual outcome, corneal surface changes, and fitting parameters in Rigid gas permeable contact lenses and scleral (PROSE) contact lenses in patients prescribed with contact lenses for the management of keratoconus.

**Methods:** Out of 150 patients included retrospectively, 110 patients were prescribed rigid gas permeable contact lenses (RGP) and 40 patients scleral Prosthetic Replacement of Ocular Surface Ecosystem (PROSE) lenses. Best corrected visual acuity (BCVA) was recorded with glasses and contact lenses. Complete Slit lamp biomicroscopy included detailed evaluation of the keratoconus. Corneal curvature (flat and steep K values) was measured by auto keratometer, corneal topography, and tomography. RGP lens parameters included were base curve, power, diameter, and fit classification. Scleral (PROSE) lens parameters were base curve, power, diameter, vault, and eccentricity.

**Results:** BCVA with RGP contact lens was  $0.04 \pm 0.21$  (mean  $\pm$  SD) and improvement in BCVA with PROSE lens was  $0.40 \pm 0.31$  (mean  $\pm$  SD). In eyes with apical

scarring, there was a significant ( $P < 0.05$ ) difference in improvement in BCVA with PROSE lenses compared to RGP lens wearers. Most common reason for change of RGP contact lens to PROSE lens was blurring of vision with RGP lens (41.94%), followed by the ill-fitting of RGP and customized RGP lenses (17.20%). There was a significant ( $P < 0.05$ ) difference in flat K and steep K in both the groups. PROSE lens wearers were wearing lenses for 6 hours/day or more.

**Conclusions:** In advanced keratoconus, Prosthetic Replacement of Ocular Surface Ecosystem (PROSE) is preferred due to ill-fitting and blurring of vision with RGP lens. Such patients preferred the change from RGP to PROSE.

### Survival Analysis of Corneal Densitometry After Collagen Crosslinking for Progressive Keratoconus

*First Author: Tommy CHAN*

*Co-Author(s): Jason Chung Kit CHAN, Christopher RAPUANO, Yumeng WANG*

**Purpose:** To evaluate the natural changing of densitometric data in keratoconus patients undergoing corneal crosslinking.

**Methods:** Twenty-two eyes of 22 keratoconus patients were included. Corneal tomography and densitometry measurements were performed before and after accelerated corneal crosslinking. Duration of corneal haze was defined as the time between crosslinking and densitometry measurements returning to the preoperative value. Survival analysis of corneal haze after crosslinking was performed. Preoperative and postoperative corneal densitometry, maximum keratometry (Kmax) and central corneal thickness (CCT) were compared.

**Results:** The duration of corneal haze was  $18.2 \pm 3.8$  months at the first zone of 0 to 2 mm and  $10.9 \pm 2.5$  months at the second zone of 2 to 6 mm. There was no change in Kmax between the preoperative period and the time at which corneal haze resolved ( $P = 0.394$  at first zone;  $P = 0.658$  at second zone). Compared with the measurement taken at resolution of corneal haze, the Kmax at one year after haze resolution was lower ( $62.0 \pm 9.9$  D to  $61.2 \pm 9.9$  D,  $P = 0.008$  at first zone;  $63.6 \pm 10.9$  D to  $62.5 \pm 10.1$  D,  $P = 0.016$  at second zone). There was thinning of CCT between the preoperative period and the time at which corneal haze resolved ( $470.8 \pm 34.1$   $\mu$ m to  $464.8 \pm 34.5$   $\mu$ m,  $P = 0.047$  at first zone;  $465.0 \pm 35.3$   $\mu$ m to  $454.7 \pm 37.2$   $\mu$ m,  $P = 0.001$  at second zone), but it remained unchanged after haze resolution ( $P = 0.146$  at first zone;  $P = 0.067$  at second zone).

**Conclusions:** Corneal crosslinking halted keratoconus progression when detectable haze was present. There was continuous corneal flattening measured at one year after haze resolution. Thinning of cornea was only seen when haze was detectable after crosslinking.

### The Effects of Season and Age on Warm Compress Efficacy in Dry Eye Patients

*First Author: Chiung-Yi CHIU*

*Co-Author(s): Shu-Wen CHANG, Wei-Ting HO, Tzu Yun TSAI*

**Purpose:** To evaluate the change in patients' symptoms and objective parameters after warm compress.

**Methods:** This retrospective study enrolled 266 eyes from 266 patients who visited our outpatient department due to dry eye symptoms. All patients performed warm compression 1 to 2 times a day with duration of more than 10-20 minutes. SPEED and OSDI questionnaires, lipid layer thickness (LLT), meibography, numbers of expressible Meibomian gland (MGE), and Schirmer test with anesthetics were recorded before and after warm compress. LLT and meibography were evaluated by LipiView II Interferometer. LLT change was defined as the difference in averaged LLT before and after warm compress. MGE was observed with Meibomian Gland Evaluator through slit lamp biomicroscopy. We subdivided these patients into 4 seasonal groups by the date of their first outpatient visit to evaluate the impact of season on the treatment effects of warm compress.

**Results:** Both SPEED and OSDI scores decreased significantly after warm compress ( $11.6 \pm 5.6$  vs  $9.1 \pm 5.5$ ,  $P < 0.001$  and  $38.2 \pm 22.3$  vs  $31.6 \pm 22.3$ ,  $P < 0.001$  for SPEED and OSDI respectively). Significant improvement was also found in LLT level ( $58.6 \pm 22.9$  nm vs  $55.7 \pm 22.2$  nm,  $P = 0.046$ ). Season and age were significantly associated with treatment effects of warm compress. The LLT change was significantly higher in summer than in winter ( $8.9 \pm 17.3$  nm and  $-2.2 \pm 20.2$ , respectively,  $P = 0.033$ ). The LLT change was negatively correlated with age ( $r = -0.2235$ ,  $P = 0.002$ ).

**Conclusions:** For patients with dry eye syndrome, warm compress was effective in reducing both subjective symptoms and objective LLT. Older age and winter were associated with worse treatment effects.

### The Relationship Between Corvis Scheimpflug Technology Tonometry and Ocular Response Analyzer Corneal Hysteresis Parameters

*First Author: Takashi FUJISHIRO*

*Co-Author(s): Makoto AIHARA, Ryo ASAOKA, Yoshiaki KIUCHI, Hiroshi MURATA, Shunsuke NAKAKURA*

**Purpose:** The purpose of the study was to investigate the association between Corneal Visualization Scheimpflug Technology instrument (CST) measurements and Reichert Ocular Response Analyzer (ORA) parameters.

**Methods:** Ninety-five patients with primary open-angle glaucoma were included in the study. Measurements of CST, ORA, axial length, average corneal curvature, central corneal thickness (CCT), and intraocular

pressure with Goldmann applanation tonometry (GAT) were carried out. The association between CST and ORA parameters was assessed using linear regression analysis, with model selection based on the second order bias corrected Akaike information criterion index.

**Results:** Measurements from ORA [corneal hysteresis (CH) and corneal response factor (CRF)] had high intraclass correlation coefficients (ICC) and low coefficients of variation, but some CST parameters showed much lower reproducibility, namely: A1 length, A2 length, highest concavity time, and peak distance. Of 12 CST parameters tested, 8 were significantly correlated with CH and 10 were significantly correlated with CRF; however, the magnitude of the correlation coefficients was weak to moderate at best. The optimal model to explain CH using CST measurements was given by:  $CH = -76.3 + 4.6 \times A1 \text{ time} + 1.9 \times A2 \text{ time} + 3.1 \times \text{highest concavity deformation amplitude} + 0.016 \times CCT$  ( $R^2 = 0.67$ ,  $P < 0.001$ ).

**Conclusions:** ORA parameters showed higher reproducibility than CST measurements. Although many CST parameters were significantly related to ORA parameters, the strengths of these relationships were weak to moderate.

## Vitamin B12 Deficiency as a Cause of Neurotrophic Keratopathy

*First Author:* Nader **NASSIRI**

*Co-Author(s):* Mansoor **SHAHRIARY**, Kourosh **SHEIBANI**

**Purpose:** To present a case of neurotrophic keratopathy caused by B12 deficiency.

**Methods:** Neurotrophic keratitis is a rare degenerative corneal disease caused by an impairment of trigeminal corneal innervation, leading to a decrease or absence of corneal sensation. Here, we present a case of neurotrophic keratopathy caused by B12 deficiency in a 34-year-old man who had a progressive decrease in visual acuity and corneal involvement for 3 months before being referred to our ophthalmology clinic.

**Results:** Based on our clinical findings and with the diagnosis of B12 deficiency we started B12 treatment for the patient. After 3 weeks the patient showed a dramatic response with corneal sensation reversal, an increase of visual acuity, improved neurotrophic keratopathy and significantly improved neurological findings.

**Conclusions:** To the best of our knowledge, there is no report regarding vitamin B12 deficiency induced keratopathy and this is the first report that describes this aspect of vitamin B12 deficiency.

## Glaucoma

### 12-Month Results of Filtration Surgery with Express for Neovascular Glaucoma Due to Proliferative Diabetic Retinopathy

*First Author:* Taku **IMAMURA**

**Purpose:** To report 12-month results of filtration surgery with Express for neovascular glaucoma in eyes with proliferative diabetic retinopathy.

**Methods:** A retrospective study. This study included 11 eyes of 10 cases, 8 men and 2 women, who were followed for 12 months or longer after filtering surgery with Express for neovascular glaucoma in eyes with proliferative diabetic retinopathy. Visual acuity, intraocular pressure (IOP), and complications were evaluated. Additional surgery, IOP of 20 mm Hg or higher, and loss of vision were defined as death in Kaplan-Meier survival analysis.

**Results:** Mean IOP declined from  $31.5 \pm 9.0$  mm Hg preoperatively to  $16.2 \pm 7.8$  mm Hg postoperatively ( $P < 0.01$ ). Preoperative and postoperative mean logMAR visual acuity was  $0.86 \pm 0.66$  and  $0.85 \pm 0.60$ . Survival rate in Kaplan-Meier survival analysis was 64% at 12 months after surgery because of death in 4 eyes; additional surgery in 1 eye and IOP higher than 21 mm Hg in 3 eyes. No postoperative complications, including fibrin separation and shallow anterior chamber, were found.

**Conclusions:** IOP control was well controlled for 12 months in 64% of cases after filtering surgery with Express for neovascular glaucoma in eyes with proliferative diabetic retinopathy.

### A Phase IV, Double Blind, Randomized Study to Evaluate the Additive Intraocular Pressure-Lowering Effect of Brinzolamide 1%/Brimonidine 0.2% Fixed-Dose Combination as an Adjunct to Travoprost 0.004%/Timolol 0.5% Fixed Combination Therapy in Open-Angle Glaucoma or Ocular Hypertension (Maximal Medical Therapy)

*First Author:* Da-Wen **LU**

*Co-Author(s):* Doug **HUBATSCH**, Antonia **RIDOLFI**

**Purpose:** To demonstrate the additive intraocular pressure (IOP)-lowering effect of twice-daily Brinzolamide 1%/Brimonidine 0.2% fixed-dose combination (BBFC) when added to once-daily Travoprost 0.004%/Timolol 0.5% fixed combination (TTFC) in patients with open-angle glaucoma or ocular hypertension who were currently on TTFC.

**Methods:** Patients on TTFC with a mean IOP greater or equal to 19–<28 mm Hg were randomized (1:1) to receive BBFC ( $n = 67$ ) or vehicle ( $n = 67$ ) for 6 weeks.

The primary endpoint was the mean change in diurnal IOP (averaged over 09:00 and 11:00) from baseline (BL) at Week (W) 6.

**Results:** This study was terminated prematurely due to recruitment challenges. Mean IOP at BL was 21.6 mm Hg and 21.8 mm Hg in the BBFC + TTFC and vehicle + TTFC groups, respectively. The estimated mean change in diurnal IOP from BL at W6 was statistically significant ( $P < 0.001$ ) and greater with BBFC + TTFC ( $-4.25$  mm Hg) than vehicle + TTFC ( $-2.11$  mm Hg), treatment difference (TD)  $-2.15$  mm Hg [95% CI ( $-2.8, -1.5$ )]. At W6, BBFC + TTFC showed a greater mean change and mean percentage change in IOP than vehicle + TTFC, at the peak (11:00:  $-5.38$  mm Hg vs  $-2.52$  mm Hg; TD  $-2.85$  mm Hg;  $-24.96\%$  vs  $-11.74\%$ , TD  $-13.21\%$ ; both  $P < 0.001$ ) and trough (09:00:  $-4.49$  mm Hg vs  $-3.15$  mm Hg; TD  $-1.33$  mm Hg;  $P = 0.022$ ;  $-20.23\%$  vs  $-14.08\%$ , TD  $-6.15\%$ ;  $P = 0.018$ ) points. Ocular adverse events (AEs) were reported in 11.9% (BBFC + TTFC) and 7.5% (vehicle + TTFC) of patients.

**Conclusions:** BBFC + TTFC as MMT demonstrated a greater and statistically significant reduction in mean diurnal IOP than TTFC alone. The AEs with BBFC + TTFC were consistent with the known safety profile of the individual medications.

## A Rare Case of Fibrin-Pupillary Block Glaucoma Successfully Treated with Nd:YAG Laser as the Primary Treatment

*First Author: Selina KHAN*

**Purpose:** We presented a case of fibrin-pupillary block glaucoma in a patient with mixed connective tissue disease that was successfully treated with Nd:YAG laser and a review of the current literature.

**Methods:** Retrospective case note review was completed with a systematic literature search.

**Results:** A 43-year-old woman presented with sudden loss of vision and severe pain in the right eye 2 weeks post uncomplicated cataract surgery in this eye. Visual acuity in the right eye was hand movements and  $-0.02$  logMAR in the left eye. The intraocular pressure was 45 mm Hg in the right eye with corneal oedema and shallowing of the anterior chamber centrally. Her ophthalmic history included bilateral diabetic retinopathy and a central retinal vein occlusion to the right eye in 2013. Slit lamp examination revealed a fine pupillary membrane causing outflow obstruction. 167 single-shots at 1.6-1.9 mW were delivered to remove the membrane and hourly post-procedural topical steroids were commenced with cycloplegia. At 1 week, the pressure remained 12 mm Hg and the membrane had not recurred.

**Conclusions:** The use of Nd:YAG laser as the primary treatment of fibrin pupillary block glaucoma was successful. This is likely due to the post-procedure management with high-frequency topical steroids

in combination with cycloplegia to reduce the inflammatory response following laser therapy, already heightened by an existing diagnosis of mixed connective tissue disease.

## A Study of the Circadian Intraocular Pressure Fluctuations in Primary Open Angle Glaucoma Treated with Several Antiglaucoma Medications

*First Author: Haruka IDA*

*Co-Author(s): Fumihito HIKAGE, Yosuke IDA, Yayoi MARUMO, Hiroshi OHGURO*

**Purpose:** The purpose of the present study was to evaluate effects of the circadian intraocular pressure (IOP) fluctuations among several anti-glaucoma medications in primary open angle glaucoma (POAG) patients.

**Methods:** POAG patients ( $n = 49$ , 97 eyes) treated with or without several anti-glaucoma medications were used IOP measurements at 14 time points over a period of 48 hours (every 3 hours from 12 o'clock on day 1, to 9 o'clock on day 2, except 3 o'clock at midnight). IOP changes occurring in the first 24 hours and later 24 hours were evaluated by several therapeutic factors.

**Results:** A nocturnal acrophase pattern was observed in all the eyes with POAG. The shape of the first 24-hour IOP curve was similar to that of the following 24-hour IOP curves. Circadian IOP fluctuation patterns in no medications exhibited a flat pattern, but a nocturnal acrophase pattern became evident in medication groups. Among several medications, PG alone and PG +  $\beta$ -blocker exhibited flat shapes and more than 3 medications showed evident nocturnal acrophase shapes.

**Conclusions:** The present study of IOP monitoring patients with POAG over a period of 48 hours indicated that their changes in circadian patterns of IOP were significantly affected by numbers and types of anti-glaucoma medications.

## Ability of RETeval-Determined Photopic Negative Response to Diagnose Glaucoma

*First Author: Yoshiyuki KITA*

*Co-Author(s): Akito HIRAKATA, Akiko MURAI, Tsunehiro SAITO*

**Purpose:** RETeval (LKS Technologies) is a handheld, portable skin electrodes full-field electroretinogram. To evaluate the usefulness of RETeval-Complete-determined photopic negative response amplitude in glaucoma diagnosis.

**Methods:** We assessed 40 eyes of 32 early to advanced primary open angle glaucoma patients (67.3 years, MD value;  $-9.14$  dB) and 12 eyes of 12 normal participants (33.5 years). Spectral domain optical coherence tomography (Cirrus HD OCT; Carl Zeiss) was used to

measure the circumpapillary retinal nerve fiber layer (cpRNFL) thickness and the macular ganglion cell inner plexiform layer (mGCIPL) thickness. PhNR amplitude was also measured. A PhNR 3.4 Hz cd protocol was used in dilated pupils, and the mean value was calculated from the 3 measurements. Dark adaptation was not one of the measurement conditions for PhNR. The structure-function relationship and the area under the receiver-operating characteristics curve (AUROC) were investigated.

**Results:** Significant differences ( $P < 0.05$ ) between glaucoma and normal eyes were found in cpRNFL thickness, mGCIPL thickness, and PhNR amplitude. The cpRNFL thickness and the mGCIPL thickness were significantly correlated with PhNR amplitude ( $r = -0.698$ ,  $P < 0.0001$  and  $r = -0.647$ ,  $P < 0.0001$ , respectively). AUROC values were 0.958, 0.963, and 0.941 for cpRNFL thickness, mGCIPL thickness, and PhNR amplitude, respectively. Diagnostic accuracy of these parameters did not differ significantly ( $P > 0.05$ ).

**Conclusions:** Use of the PhNR amplitude is recommended for the detection of glaucoma function loss. RETeval has a potential to become an effective objective function test device that can be operated bedside.

### Ahmed Glaucoma Valve Implantation for Neovascular Glaucoma Associated with Proliferative Diabetic Retinopathy

*First Author: Sano* **MASAHICO**

*Co-Author(s): Yoshiyuki* **KITA**

**Purpose:** To evaluate the efficacy and complications of Ahmed Glaucoma Valve implantation (AGVI) for the management of neovascular glaucoma (NVG) associated with proliferative diabetic retinopathy.

**Methods:** We retrospectively reviewed 15 eyes of 15 patients with NVG who underwent AGVI (FP7) between June 2017 and April 2018. The average age at operation was  $56.4 \pm 12.0$  years. There were 14 eyes with pseudophakia, 13 avitrous eyes, 14 eyes with panretinal photocoagulation, and 3 eyes which underwent other glaucoma surgery. Success was defined as an intraocular pressure (IOP) of  $\leq 21$  mm Hg and  $\geq 5$  mm Hg, without further glaucoma surgery or loss of light perception and devastating complications.

**Results:** The mean follow-up time was  $4.9 \pm 2.7$  months. The AGV tube was placed into the posterior chamber (PC group) or the pars-plane (PP group). There were 5 eyes of the PC group and 10 eyes of the PP group. One eye of the PC group underwent cryotherapy and 9 eyes of the PP group underwent endophotocoagulation. The mean preoperative IOP was  $39.2 \pm 10.6$  mm Hg and the average postoperative IOP at the last visit was  $15.7 \pm 4.7$  mm Hg. Success rate was 98% (14 eyes). One eye in the PP group underwent additional AGVI for an IOP elevation. Postoperative complications were malignant glaucoma, choroid

detachment, and minor hyphema in one eye from each of the PC groups.

**Conclusions:** AGVI is a safe and effective procedure that enables successful IOP control in the NVG patients.

### An Unusual Case of Glaucoma in a Patient on Oral Tamoxifen

*First Author: Ramya* **RAVINDRAN**

*Co-Author(s): Kumaravel* **PARASURAMAN**

**Purpose:** To report a rare complication from the use of oral tamoxifen, which is commonly used in patients with breast carcinoma post-surgery.

**Methods:** A 65-year-old female patient reported to the ophthalmology outpatient department of a multispecialty hospital with severe headaches and vomiting episodes of 6-month duration. She had a history of right-sided breast carcinoma, treated with a mastectomy and radiotherapy. She has been on oral tamoxifen 10 mg twice daily for 5 and a half years. Her visual acuity was recorded, and a complete ophthalmic examination was done.

**Results:** She had a best corrected visual acuity of 6/12 in the right eye and 6/60 in the left eye due to amblyopia from an uncorrected refractive error from childhood. Her AC was shallow (van hericks grade 1). Gonioscopy showed grade 1 by the Shaffer's grading. Intraocular pressure (IOP) was 40 mm mercury both eyes. Disc appeared healthy, however. A PI was done, and the patient was started on AGM. The IOP reduced to 22 the next day, and the patient was comfortable. She is now on topical AGM and on regular follow-up.

**Conclusions:** The importance of ophthalmic examination in patients with oral tamoxifen is highlighted. Oral tamoxifen is a commonly used drug in cases of hormone responsive breast carcinoma and it is important that these patients receive an annual eye check every year.

### Association Between Acquired Pits of the Optic Nerve and Rate of Local and Global Visual Field Decay in Primary Open-Angle Glaucoma Patients

*First Author: Suria* **SUDHAKARAN**

**Purpose:** To evaluate the association between acquired pits of the optic nerve (APON) and the rate of local and global visual field (VF) decay in primary open-angle glaucoma (POAG) patients.

**Methods:** POAG patients were screened for APON by assessment of optic disc stereoscopic photographs by 3 independent, masked glaucoma specialists. A control group of POAG eyes without APON were matched for age, gender, baseline intraocular pressure (IOP), baseline mean deviation (MD), and follow-up duration. Proportions of decaying, improving, or no change serial test locations and their pointwise rates of change (% of

perimetric range/year) were analyzed. Global indices of VF change including MD rate, visual field index (VFI) rate, and a new Glaucoma Rate Index (GRI) were calculated.

**Results:** A total of 26 eyes of 22 POAG patients with APON were identified. Number of decaying locations did not differ significantly between 2 groups ( $P = 0.10$ ); mean rate of change of all points and decaying points were test locations was significantly faster in APON group ( $-0.83 \pm 3.29\%/yr$  vs  $-0.40 \pm 2.40\%/yr$ ,  $P = 0.004$  and  $0.001$ , respectively;  $P = 0.004$ ). MD rate (mean  $\pm$  SD) was significantly faster in APON group ( $-0.23 \pm 0.26$  dB/yr versus  $-0.06 \pm 0.54$  dB/yr,  $P = 0.024$ ), VFI rate was not significantly different ( $P = 0.14$ ). As measured with GRI, eyes with APON progressed twice as fast globally and had twice the decay index as did the non-APON group ( $P = 0.043$ ).

**Conclusions:** Presence of APON in POAG patients was associated with more rapid rate of VF decay with local and global variety of rate measures.

### Association Between Polymorphisms in Interleukin-18 and Primary Open Angle Glaucoma

*First Author: Chun-Yuan WANG*

**Purpose:** Recent laboratory evidence indicates that the inflammatory cytokine, interleukin-18 (IL-18), have adverse effects on primary open angle glaucoma (POAG). Inheritance of the IL-18 (-607) polymorphism (the C allele), previously shown to increase IL-18 production, has been associated with an elevated risk of Alzheimer's disease. The neuronal injuries associated with Alzheimer's disease have a number of similarities with the optic nerve changes often seen with POAG. In this report we have explored the possible association between the IL-18 (-607) polymorphism and the development of POAG.

**Methods:** A total of 109 patients with POAG were recruited and compared with 109 healthy controls in Chinese population. Polymorphisms will be determined using sequence-specific primers (SSPs) and polymerase chain reaction (PCR). Patients and controls were genotyped for the C/A polymorphism at position -607 of the IL-18 gene promoter region.

**Results:** The frequency of the IL-18 (-607) C allele (59.6% vs 48.6%, respectively;  $P = 0.02$ ) and were greater in POAG patients compared with controls. There is a higher risk of POAG associated with homozygosity for the IL-18 (-607) C allele (CC genotype) compared with the control population (CC genotype; 31.2% vs 19.3%, respectively,  $P = 0.04$ ).

**Conclusions:** The IL-18 (-607) C allele polymorphism, previously shown to increase IL-18 gene expression, may be a risk factor in the development of POAG.

### Association of Cognitive Function Status and Glaucoma Tests Among Elderly Population in Hong Kong

*First Author: Bonnie Nga Kwan CHOY*

*Co-Author(s): Joseph KWAN, Jimmy LAI, Jason PANG, Mingming ZHU*

**Purpose:** To evaluate whether cognitive function affects results of intraocular pressure (IOP) measurement, optical coherence tomography (OCT), and visual field testing (VF) among Chinese elderly population in Hong Kong.

**Methods:** A cross-sectional study was performed in subjects aged greater or equal to 60 years, recruited from the Ophthalmology clinic of Hong Kong West Cluster. Questionnaires to assess the cognitive and executive function, including Chinese version of Montreal Cognitive Assessment (MoCA), and patient demographics were used to correlate with the difference between non-contact tonometry (NCT) and Goldmann applanation tonometry (GAT), Humphrey VF reliability, and OCT retinal nerve fiber layer (RNFL) measurement.

**Results:** Fifty-six eyes in 28 subjects were recruited, with a mean age of 71.54 years. IOP measured by GAT was higher than that by NCT. IOP variation was negatively correlated with Lawton's activities of daily living (ADL) score, indicating a worse ADL score is associated with a larger variation in IOP measurement. Pattern standard deviation (PSD) is the most commonly affected VF index, which is associated with age, education level, and MoCA score. Linear regression analysis showed that, after adjusting for demographic parameters and visual acuity, MoCA score was significantly associated with median deviation (MD), PSD, and false positivity. Age was found to be moderately correlated with PSD and false negativity. Furthermore, education level is inversely correlated with PSD. No association was found between RNFL thickness and either demographic parameters or functional status.

**Conclusions:** MoCA score, an indicator of the functional status, can potentially serve as an independent parameter in predicting unreliable VF in elderly population.

### Calibration of Various Tonometers: Schiotz, Goldmann, Perkins, Noncontact Tonometer, iCare, and Tonopen

*First Author: Rashmita RAVISANKAR*

*Co-Author(s): Davis AKKARA, John AKKARA, Ethamma DAVIS, Anju KURIAKOSE*

**Purpose:** To teach the calibration process of various tonometers used for measuring intraocular pressure – Schiotz, Goldmann, Perkins, Noncontact Tonometer, iCare, and Tonopen.

**Methods:** The calibration methods of all of these tonometers were found and demonstrated. Schiøtz tonometer, Goldmann Applanation Tonometer, Perkins Tonometer, Noncontact Tonometer, iCare Rebound Tonometer, and Tonopen. ePoster was prepared with the methodology for each calibration.

**Results:** The ePoster demonstrated the calibration techniques of all these listed tonometers. Some of the devices were not calibrated for a long time and were found to have calibration error which was later corrected. Proper correction of calibration error required biomedical engineers to open up and adjust the calibration.

**Conclusions:** Simple calibration techniques have to be followed to check the calibration of the various IOP measuring devices. These make the difference between a diagnosis of glaucoma and a false positive or negative. Regular calibration testing should be made a protocol to be followed.

### Challenging Management of Advanced Juvenile Open Angle Glaucoma: A Case Report

*First Author:* Yeni **RAHMAN**

*Co-Author(s):* Aulia **ABDULLAH**

**Purpose:** To report a rare case of juvenile open angle glaucoma and its challenging management.

**Methods:** Diagnosis was made based on history-taking, slit lamp biomicroscopy, applanation tonometry, gonioscopy, funduscopy, perimetry, and optic disk and retinal nerve fiber layer optical coherence tomography.

**Results:** A 27-year-old man complained of blurred vision in his right and left eye since 8 months ago. The best corrected visual acuity of the right eye was 5/7.5 and left eye was 2/60 from temporal side. Intraocular pressure (IOP) of the right and left eye were 62 mm Hg and 55 mm Hg. The anterior chamber angle was open with glaucomatous optic nerve cupping. Automated perimetry of the right eye revealed advanced visual field defect while the left eye was unable to be examined. Optical coherence tomography showed thinning of the nerve fiber layer. Patient was diagnosed as having right and left eye advanced juvenile open angle glaucoma. Trabeculectomy was urgently planned and performed on both eyes. Subconjunctival 5-FU injection was performed on both eyes to prevent tissue scarring. After surgery, the IOPs were decreased to 8 mm Hg for the right eye and 10 mm Hg for the left eye.

**Conclusions:** This case showed a significant IOP reduction with trabeculectomy on Juvenile Open Angle Glaucoma. A long-term follow-up is needed to ensure effective IOP control.

### Change in Central Corneal Thickness After Trabeculectomy

*First Author:* Pir Salim **MAHAR**

**Purpose:** To determine the change in central corneal thickness (CCT) after trabeculectomy.

**Methods:** A total of 130 eyes of 113 glaucoma patients who underwent trabeculectomy were assessed for the change in central corneal thickness from January 2014 to June 2016. The study approval was granted by the institutional ethical review committee. Patients' characteristics, including demographics, clinical details, and management were recorded in a detailed Proforma.

**Results:** The mean age of our patients was  $53.3 \pm 12.3$  years (range 13 to 84 years). The mean CCT before trabeculectomy was  $524.25 \pm 38.53 \mu\text{m}$ . After 12 months follow-up, the mean CCT was  $521.95 \pm 38.25 \mu\text{m}$  with correlation of 0.855 which was not statistically significant.

**Conclusions:** In our study there was no statistically significant change in central corneal thickness after trabeculectomy at the mean follow-up of 12 months.

### Comparative Study Between Trabeculectomy and Trabeculectomy with Collagen Implantation at a Tertiary Ophthalmic Center

*First Author:* Shams **NOMAN**

**Purpose:** To present the result of our study that compared the outcomes of trabeculectomy with collagen implant versus conventional trabeculectomy for uncontrolled intraocular pressure (IOP).

**Methods:** A total of 60 eyes of 60 patients were randomly selected for trabeculectomy either with OloGen implant (study group) or without implant (control group). Preoperative history taking and examinations were done. Data collected included age, gender, glaucoma type, IOP, and number of postoperative glaucoma medications. Postoperative IOP, number of postoperative glaucoma medications, and postoperative complications were recorded. Each patient was followed up on for at least 6 months.

**Results:** No significant differences were observed between the groups like preoperative IOP and number of preoperative anti-glaucoma medications. Postoperative IOP in both groups were significantly lower than preoperative level for all follow ups. The number of glaucoma medications were reduced from a preoperative mean of  $3.5 \pm 0.5$  to a 6-month postoperative mean of  $0.2 \pm 0.5$  ( $P < 0.001$ ) in the study group and from  $3.5 \pm 0.7$  to  $0.4 \pm 0.1$  ( $P < 0.001$ ) in the control group. Collagen group had statistically significant less complications were observed in this study.

**Conclusions:** Trabeculectomy with collagen does

not show any significant advantages over the trabeculectomy alone in terms of IOP, but immediate postoperative complications are less with collagen implantation, that indicates collagen's safety profile. A large sample size and a prolonged follow-up are needed to confirm the safety and long-term outcome of trabeculectomy with collagen implantation.

### Difference of Ocular Biometric Parameters Between Acute Primary Angle Closure Eyes and Fellow Eyes

*First Author: Yangfan YANG*

*Co-Author(s): Yanyan WU, Minbin YU*

**Purpose:** To evaluate the effects of different ocular biometric parameters between the acute primary angle closure eyes and the fellow eyes, and identify the risk factors for acute primary angle closure.

**Methods:** A retrospective study was performed to compare the differences in axial length, Lawrence coefficient, lens thickness, and anterior chamber depth between the acute primary angle closure eyes and the fellow eyes of 97 patients by using the Paired-Samples *t* Test. Ocular biometric parameters, including axial length and lens thickness, were measured using A-scan ultrasound, while the UBM is used to measure the anterior chamber depth as well as calculate the Lawrence coefficient.

**Results:** In this study, only anterior chamber depth ( $P = 0.00$ ) was a higher risk factor of acute primary angle closure. No interaction effects were detected in axial length ( $P = 0.256$ ), lens thickness ( $P = 0.809$ ), and Lawrence coefficient ( $P = 0.283$ ) on acute primary angle closure.

**Conclusions:** There was weak evidence showing that the disparity existed in anterior chamber depth between the acute primary angle closure eyes and the fellow eyes. Shallower anterior chamber depth implied a higher risk for primary angle closure. In the group of axial length we noticed some differences, but they did not achieve statistical significance as well as lens thickness and Lawrence coefficient.

### Diurnal Variation of Intraocular Pressure in Healthy Children Using Rebound Tonometry

*First Author: Ya-Chuan HSIAO*

*Co-Author(s): Tsai I-LUN, Ching-Yao TSAI, Lin-Chung WOUNG*

**Purpose:** The clinical assessment of intraocular pressure (IOP) often relies on one measurement obtained at an office during daytime, but diurnal variation of IOP is known in glaucoma and non-glaucoma eyes in adults. Little has been reported on diurnal IOP patterns in healthy children. The purpose of this study was to investigate diurnal IOP in normal eyes of healthy children using rebound tonometry.

**Methods:** Healthy children between 6 and 15 years old and cooperative for Goldmann applanation tonometry were recruited from a pediatric eye clinic. A parent was instructed on the use of rebound tonometer by study physician. Home measurements of IOP were recorded 6 times daily at 2 to 3-hour intervals during 2 consecutive days by a parent. Exclusion criteria included high refractive error greater than 6 diopters, corrected Snellen vision less than 20/25, family history of glaucoma, or medication use.

**Results:** A total of 22 normal pediatric eyes were included. We found that children without glaucoma showed mean diurnal IOP fluctuation of 4 to 6 mm Hg, with similar IOP between 2 eyes, fair repeatability between consecutive days, and a tendency for higher early morning and lower evening IOP.

**Conclusions:** Higher morning and lower evening IOPs reported in the study parallel published studies in adults with glaucoma and correspond well to that in pediatric glaucoma eyes. The rebound tonometer was well tolerated in school-aged children. This normative data from home assessment may be useful as comparative for children with known or suspected glaucoma.

### Effects of Black Currant Anthocyanins on Hemodynamics of Aqueous Humor and Peripheral Blood Circulation

*First Author: Yayoi MARUMO*

*Co-Author(s): Fumihito HIKAGE, Haruka IDA, Yosuke IDA, Hiroshi OHGURO*

**Purpose:** In our previous studies, we demonstrated the beneficial effects that black currant anthocyanins (BCACs) have on glaucomatous optic neuropathy (GON) through their possible mechanisms toward reactivity to endothelin-1 (ET-1). The purpose of the current study was to examine the influence of BCACs on peripheral blood circulation as well as aqueous humor (AH) circulation.

**Methods:** In our examination of peripheral blood circulation, responses toward finger cooling stimulation were monitored by a thermography in 8 healthy subjects receiving one-time administration of BCACs (130 mg) and 5 separate subjects receiving BCACs daily (50 mg/day) for 1 week. To examine aqueous humor (AH) circulation, AH outflow resistance or AH production was evaluated by means of a Weight on-off test at baseline and again at week 1, 2, or 3 of BCACs administration.

**Results:** Compared to pre-administration, recovery of the surface temperature of the middle finger was achieved more rapidly after both the one-time BCAC intake and when they were administered over 7 days. Upon administration of BCACs for 3 weeks, the IOP drop rate and IOP recovery time increased and shortened, respectively.

**Conclusions:** Our present results indicate that BCACs intake effectively suppresses cold-induced vasospasms and modulates AH circulation by a possible ET-1 mediated mechanism.

## Efficacy and Safety of Low-Cost Nonvalved Drainage Device to Control Refractory Glaucoma

First Author: Erin **ARSIANTI**

**Purpose:** The purpose of the study is to report efficacy and safety low-cost of nonvalved drainage device in the management of refractory glaucoma at “Dr Yap” Eye Hospital, Yogyakarta, Indonesia.

**Methods:** Retrospective review of consecutive patients older than 18 years with uncontrolled intraocular pressure (IOP) refractory to medical treatment and considered at high risk failure following trabeculectomy. The patient using low-cost non-valved drainage device, between January and June 2018, who had at least 3 months follow-up. Primary outcome evaluated was IOP. Secondary outcomes were visual acuity (VA) and complications. Complete success was defined as IOP greater or equal to 5 mm Hg and less than or equal to 21 mm Hg, or reduction of IOP by greater or equal to 20% from baseline without glaucoma medication. Failure was defined as inability to control IOP criteria, loss of perception of light, explantation, or any additional glaucoma surgery.

**Results:** Total of 10 eyes were included. Mean follow-up was  $12.1 \pm 6.3$  months. The IOP and visual acuity was evaluated at every visit. Mean IOP preop  $47 \pm SD 9.253$ , mean IOP post op  $16 \pm SD 2.699$ , mean VA preop  $\pm 2/60$ , and mean VA post op  $\pm 6/60$ . IOP was significantly lower at every visit postoperatively ( $P < 0.001$ ). Complications occurred in 2 patients (20%).

**Conclusions:** Low cost nonvalved implant surgery is effective in reducing IOP and controlling visual acuity. It thus has the ability to breach the cost barrier in low-to-middle income countries. Further follow-up is required to determine sustainability over time.

## Excitatory-Inhibitory Balance in the Visual Cortex of Glaucoma Patients

First Author: Ji Won **BANG**

Co-Author(s): Kevin **CHAN**

**Purpose:** We aimed to investigate how the neurochemical profiles in the visual cortex are affected by glaucoma. Specifically, we focused on gamma-aminobutyric acid (GABA), a chief inhibitory neurotransmitter, and glutamate, a chief excitatory neurotransmitter in the early visual cortex.

**Methods:** We recruited 25 adults with normal vision (age,  $21.71 \pm 0.52$  years) and 5 adults with glaucoma (age,  $61.4 \pm 2.75$  years). We measured the levels of GABA and glutamate in the early visual cortex using

magnetic resonance spectroscopy at 3 Tesla. The GABA level was assessed using a MEGA-PRESS sequence, and glutamate level was assessed using a PRESS sequence. LC-Model software was used in data analysis.

**Results:** Compared to healthy subjects, glaucoma patients showed significantly lower levels of GABA [ $t(27) = -2.672$ ,  $P = 0.013$ , independent-samples  $t$ -test] but higher levels of glutamate [ $t(27) = 2.457$ ,  $P = 0.021$ , independent-samples  $t$ -test] in the early visual cortex. This resulted in a significantly greater excitation-inhibition ratio of the levels of glutamate to GABA for glaucoma patients compared to healthy subjects [ $t(27) = 4.164$ ,  $P < 0.001$ ]. No apparent association was found between age and GABA or glutamate level in either glaucoma or healthy group ( $P > 0.05$ ).

**Conclusions:** Our preliminary results suggest that older adults with glaucoma may involve changes in neurochemical profiles in the early visual cortex toward a more excitatory-dominant environment. Future studies will identify the relative contributions of glaucoma and normal aging to such excitatory-inhibitory imbalance in the early visual cortex.

## Glaucoma Screening in Family Members of Glaucoma Patients in Eastern Nepal

First Author: Ravi **BHANDARI**

**Purpose:** To determine the prevalence of glaucoma in first degree relatives of primary open angle glaucoma (POAG) and primary angle closure glaucoma (PACG) patients during routine eye examination in the hospital.

**Methods:** In this prospective observational hospital-based study, we determined the prevalence of glaucoma in first degree relatives of the patient diagnosed as glaucoma, attending the outpatient department at Ramlal Golchha Eye Hospital from June 2016 to May 2017.

**Results:** We invited 227 individuals, first-degree relatives of 72 persons diagnosed as POAG/PACG, out of which 143 attended our hospital screening for glaucoma. 61% of the attendees were males and 39% were females. A total of 23 persons were identified as having glaucoma, of which 9 persons were aged more than 60 years, 7 persons were aged 40-60 years, 4 of them were aged 20-40 years, and 3 were aged 10-21 years.

**Conclusions:** Prevalence of glaucoma in first degree relatives is higher than the rest of the general population. Screening of glaucoma in first degree helps in earlier detection and treatment of glaucoma. Awareness of screening in first degree relatives may also play a major role in early detection of glaucoma. It also reduces needless blindness due to glaucoma.

## Glaucoma and Frequent Flying

First Author: Keith **ONG**

Co-Author(s): Lillian **ARMELLIN**, Leonard **ONG**

**Purpose:** A 58-year-old male with advanced normal tension had progression of visual field loss despite good intraocular pressure (IOP) control. His work involves weekly travel on a domestic flight and monthly travel on an international flight.

**Methods:** To investigate whether oxygen saturation (SpO<sub>2</sub>) could be a factor in his glaucoma progression. A Fingertip Pulse Oximeter was used to measure his oxygen saturation.

**Results:** It was found that on ground level, SpO<sub>2</sub> was 96 to 99%, and during cruising altitude was 93 to 95%, and fell below 93% when he was dozing. The author also evaluated himself on an international flight. It was found that SpO<sub>2</sub> was 96 to 99% on ground level and was 89 to 95% during flight. Several other volunteers reported similar findings. The author also measured IOP during flight with the iCare PRO tonometer. It was found that IOP was about 12 mm Hg at ground level and was about 14-15 mm Hg during cruising altitude.

**Conclusions:** This observation found that oxygen saturation drops below 95% and can decrease by up to 7% from baseline during cruising altitude, and that IOP may rise 2-3 mm Hg at cruising altitude. This would not be significant on short flights for a healthy patient. However, in a patient with advanced glaucoma travelling on long haul flights, prolonged suboptimal oxygen saturation can contribute to optic nerve ischemia and glaucoma progression. Hypoxia may be exacerbated if the subject has sleep apnea and falls asleep during an overnight flight.

## Glaucomatocyclitic Crisis: An Elusive Disease. Our Experience in Management and Outcomes

First Author: Shams **NOMAN**

**Purpose:** The purpose of the current study is to describe clinical manifestations, management, and its outcome of patients who were diagnosed as glaucomatocyclitic crisis.

**Methods:** A hospital-based observational case series study. Study period was from July 1, 2012 to June 30, 2015. Unilateral ocular hypertension cases of unexplained origin were included in this study. Detailed history-taking and ocular examinations were done. GCC was diagnosed according to mentioned criteria. Management detail was recorded. Patients were followed up after 1 week, 1 month, and 3 months of initial visit.

**Results:** 45 patients with GCC were included. Patients were categorized into 2 age groups: 20-49 and 50+. For the 45 patients, 37 were male and 8 were female. 53.3% of patients (n = 24) presented with decreased

vision, 15.6% of patients with both pain and occasional redness, 13.3% of patients with mild discomfort, 11.1% of patients with recurrent redness, 8.9% of patients with occasional halos, 4.4% of patients with occasional eye ache, and 2.2% of patients with loss of vision. Mean IOP of affected eyes was 30 mm hg before treatment and 15 mm hg after treatment. Angles were open in all cases. At presentation, 81.2% of patients presented with glaucomatous optic disc C:D ratio (0.8-1): 1. 91% of patients needed anti-glaucoma medications, and 9% needed filtration surgery with Ologen implantation to control IOP.

**Conclusions:** Early diagnosis with meticulous examinations and investigations are needed to manage a GCC case. As it is an elusive disease, proper explanation of the disorder to the patient to get good compliance from them is necessary to achieve a good medical treatment outcome.

## Intraocular Pressure Control in Patients with Secondary Glaucoma Due to Iridocorneal Endothelial Syndrome

First Author: Srishti **RAJ**

Co-Author(s): Surinder **PANDAV**, Faisal **TT**

**Purpose:** Intraocular pressure (IOP) control in patients of Iridocorneal Endothelial (ICE) Syndrome with glaucoma.

**Methods:** Glaucoma is a frequent association with ICE syndrome. Managing glaucoma in these patients is a challenge. Medical records of 22 eyes of 22 patients with ICE syndrome presenting to Glaucoma Clinic of a tertiary eye center between 2003 and 2013 were retrieved. Demographic data included visual acuity (VA), IOP, clinical findings, treatment, and outcome at last follow-up (FU). Main outcome measures were IOP control, VA, and medication required.

**Results:** A total of 22 patients (10 males and 12 females), mean age was  $44.55 \pm 11.77$  years. Ten patients had Essential Iris Atrophy, 9 patients had Chandler Syndrome, while 3 patients had Cogan-Reese Syndrome. 8/10 patients who underwent Corneal Confocal Microscopy had ICE cells. Eight patients (36.37%) with pre-treatment IOP of  $16.71 \pm 8.75$  mm Hg on  $1.00 \pm 1.00$  drug after mean FU of  $41.57 \pm 31.91$  months maintained IOP of  $16.57 \pm 3.6$  mm Hg on  $1.29 \pm 1.11$  drugs. In patients requiring surgery, 8 had trabeculectomy, 6 underwent glaucoma drainage device (GDD), of these 3 after failed trabeculectomy. In trabeculectomy group, IOP reduced from  $22.43 \pm 7.44$  mm Hg on  $3.29 \pm 0.94$  anti-glaucoma medications to  $13.29 \pm 4.71$  mm Hg on  $0.43 \pm 0.79$  medications at last FU. Two eyes required bleb revision. In GDD group, IOP reduced from  $32.33 \pm 13.59$  mm Hg on  $3.17 \pm 0.75$  anti-glaucoma medications to  $15.67 \pm 6.25$  mm Hg on  $0.83 \pm 0.75$  medications at last FU. Two eyes underwent cyclophotocoagulation for refractory glaucoma. Mean number of surgeries required was 1.5.

**Conclusions:** Glaucoma associated with ICE syndrome requires predominantly surgical management and although successful, multiple procedures are often required.

### Intraocular Pressure Fluctuation During Femtosecond Laser-Assisted Cataract Surgery Using a Fluid-Filled Interface

*First Author:* Chien-Liang **WU**

*Co-Author(s):* Ju Chuan **CHENG**, Ya-Hui **WANG**

**Purpose:** To evaluate intraocular pressure (IOP) during femtosecond laser-assisted cataract surgery using a fluid-filled interface.

**Methods:** The absolute IOP was measured with a Medtronic Tono-pen XL before and after laser-assisted cataract surgery with and without a fluid-filled interface (LENSAR Cataract Laser with Augmented Reality system).

**Results:** The study evaluated 92 eyes. Tonometry and laser cataract surgery were completed successfully in all eyes. The mean preoperative IOP was 20.16 mm Hg  $\pm$  4.8 (SD). Upon application of the suction ring and vacuum, the mean IOP rose to 54.2  $\pm$  11.0 mm Hg. After removal of the suction ring, the mean IOP was 23.88  $\pm$  6.5 mm Hg. There was no linear correlation between the IOP upon application of the suction ring with vacuum and post-dilated pupil size, anterior chamber depth, central corneal thickness, or axial length. There was no correlation between suction time and post-suction IOP. Patient with glaucoma history tends to have larger fluctuation in IOP during the suction time.

**Conclusions:** The results indicate a minor increase in IOP using the fluid-filled interface. This is in strong contrast to substantially higher values reported in the literature with flat and curved applanating contact interfaces. Our method to estimate IOP by Tonopen XL corneal precise compared with the previous study.

### Management of Lens-Induced Secondary Angle Closure Glaucoma After Trauma

*First Author:* Dechrist **WIBOWO**

*Co-Author(s):* Aulia **ABDUL HAMID**

**Purpose:** To report result of management lens-induced secondary angle closure glaucoma after trauma with traumatic cataract and subluxation.

**Methods:** Diagnosis is established based on history taking, slit lamp ophthalmology examinations, contact tonometry, gonioscopy, perimetry, and funduscopy examinations.

**Results:** A 57-year-old man complained about pain in his left eye lasting 2 weeks, and gradually blurred vision since 1 year ago. Patient had blunt trauma in left eye 2 years ago. He was diagnosed with secondary angle closure glaucoma due to lens subluxation in more

than 2 quadrants in left eye. Intracapsular cataract extraction (ICCE) surgery was preferred instead of phacoemulsification and Capsular Tension Ring (CTR) because of the extent of lens subluxation in more than 2 quadrants. After surgery, the visual acuity became 0.8 with addition spheric +11.00 D from hand movement. The intraocular pressure (IOP) decreased from 44 mm Hg to 10 mm Hg. The funduscopy examination showed glaucomatous optic nerve cupping. Patient had a second surgery for secondary intraocular lens (IOL) implant with scleral fixation of posterior chamber IOL technique after 2 months. First operation with ICCE was done to remove the dense cataract and subluxated lens to control the IOP. It succeeded in controlling IOP for about 10-12 mm Hg. The second surgery with scleral fixation was done to improve visual acuity.

**Conclusions:** This case showed significant IOP reduction on patient with traumatic cataract and subluxated lens by ICCE and improvement of visual acuity after the secondary implant surgery. A long-term follow-up is needed to ensure the effectiveness of IOP controlling, monitoring complications, and glaucoma progression.

### Outcome of Trabeculectomy and Factors Associated with Surgical Success in A Tertiary Referral Hospital: A 10-Year Retrospective Study

*First Author:* Huan-I **SU**

*Co-Author(s):* De-Kuang **HWANG**, Yu-Chieh **KO**, Catherine **LIU**

**Purpose:** To report the effects and complications of trabeculectomy supplemented with mitomycin C (trab-M) and factors associated with surgical success.

**Methods:** We enrolled patients who had undergone primary trabeculectomy between December 2006 and December 2017 with at least 1-year follow-up. Complete success was defined as postoperative intraocular pressure (IOP) less than 21 mm Hg or IOP reduction greater or equal to 20% without the need of glaucoma medication, and "qualified success" was defined if medication was needed to fulfill the same criteria. Patients who lost vision due to uncontrolled IOP or hypotony maculopathy, received further glaucoma surgery, or cyclophotocoagulation were defined as "surgical failure".

**Results:** There were 232 eyes (191 patients) enrolled in final analyses, including 119 (62.3%) men and 72 (37.7%) women with a mean age of 53.16  $\pm$  17.08 years. One year after surgery, the mean IOP reduced from 23.49  $\pm$  12.24 mm Hg to 14.37  $\pm$  5.12 mm Hg, while number of glaucoma medication decreased from 3.16  $\pm$  0.65 to 2.07  $\pm$  0.31. Complete success was achieved in 32.4% of eyes, and qualified success achieved in 60.8% at 1 year, while 6.8% of eyes received further intervention. Complications included 4 eyes with bleb leakage and 1 eye with blebitis, which recovered after antibiotics treatment. The Cox

regression analysis showed that preoperative factors associated with surgical failure were higher IOP [hazard ratio 1.06 (95% CI: 1.03-1.09) ( $P < 0.001$ )] and greater numbers of glaucoma medication [hazard ratio 2.11 (95% CI: 1.10-4.07) ( $P = 0.025$ )].

**Conclusions:** One year after trab-M, 93.2% of patients had IOP well-controlled. Preoperative IOP and numbers of glaucoma medication independently influenced the surgical outcome.

## Outcomes of Second Ahmed Glaucoma Valve Implantation in Refractory Neovascular Glaucoma

First Author: Charudutt **KALAMKAR**

Co-Author(s): Amrita **MUKHERJEE**

**Purpose:** To evaluate results of second Ahmed Glaucoma Valve (AGV) implantation in eye with refractory Neovascular Glaucoma (NVG) with failed primary AGV

**Methods:** A total of 17 adult eyes with NVG underwent second AGV implantation when intraocular pressures (IOP) were not controlled after first AGV implantation. This was a retrospective case series. Minimum follow-up of 1 year was considered. Success was defined as IOP  $>5$  mm Hg and  $\leq 21$  mm Hg. Pre- and post-surgery IOP measurements, number of antiglaucoma medications, and complications were assessed.

**Results:** Mean IOP reduced from  $36.94 \pm 4.9$  mm Hg to  $16.6 \pm 2.3$  mm postoperatively ( $P < 0.001$ ). Percentage mean reduction in IOP from baseline was  $(57.54 \pm 9.98\%)$ . Hyphema was the most common postoperative complication (35.3%) followed by shallow AC and corneal edema (23.5% each). Number of antiglaucoma medications (AGM) required postoperatively was  $(1.40 \pm 1.17)$ . A total of 2 eyes (11.8%) had failure at 1-year follow-up.

**Conclusions:** Options for treatment of refractory NVG with failed AGV are limited. Implantation of second AGV was done to control IOP and maintain stable visual function in such cases. In refractory NVG patients with failed AGV, implantation of second AGV results in good IOP control and reduced need for AGM.

## Pediatric Intraocular Pressure and Risk Factor Analysis in Taiwan

First Author: Hsin-Chih **LIN**

Co-Author(s): Ying Yu **LIN**, Li-Ju **LAI**

**Purpose:** This observational study was a cross-sectional population-based study to evaluate the pediatric intraocular pressure (IOP) and the risk factors analysis in Taiwan.

**Methods:** The IOP of 4168 children with ages ranging from 7 to 16 years were measured by contact tonometer (ICare). The refraction condition was measured by autorefractor. The medication history

was recorded by self-report and tested by pupil size measurement and light reflex reaction. P value less than 0.05 was defined as significant.

**Results:** The mean IOP was  $16.24 \pm 4.06$  mm Hg among these eyes. The mean IOP was  $15.86 \pm 4.32$  mm Hg among children with hyperopia,  $16.22 \pm 4.06$  mm Hg among children with emmetropia, and  $16.34 \pm 4.11$  mm Hg among children with myopia ( $P < 0.05$ ). The prevalence of medical treatment for myopia in rural areas of Taiwan was limited: 36.29% in low myopia group, 54.64% in moderate myopia group, and 68.84% in high myopia group. In the children with myopia, the IOP were  $16.52 \pm 4.34$  mm Hg in the group without treatment and  $16.17 \pm 3.92$  mm Hg in the group with medical treatment ( $P < 0.05$ ).

**Conclusions:** Mydriatics seemed to be safe for myopic control of children considering about IOP. Regular IOP examination is necessary for children received mydriatics for myopia control. Clinicians and health providers should treat myopic patients more aggressively for preventing further complications.

## Potential Cost Reduction Based on Longitudinal Variability of Glaucoma Risk Calculation in Ocular Hypertensive Patients and Its Reliability as a Guide for Treatment Decision

First Author: Poemen **CHAN**

Co-Author(s): Sheung Man Vivian **CHIU**, Wing Ki Gilda **LAI**, Chun Sum **PANG**

**Purpose:** To investigate the variability of glaucoma conversion risk calculation longitudinally in Chinese patients with OHT and its reliability as a guide for treatment decisions providing the threshold of initiating treatment is a 5-year estimated risk of greater than 15%.

**Methods:** Untreated Chinese OHT patients were followed up for 3 years. Clinical variables including intraocular pressure, central corneal thickness, vertical cup-disc ratio, pattern standard deviation and age were collected at baseline and on each follow-up. The 5-year risks of glaucoma conversion were calculated using the prediction model suggested by Ocular Hypertension Treatment Study and European Glaucoma Prevention Study. The estimated risk is assessed every 6 months.

**Results:** A total of 79 untreated subjects (eyes) were included. 11 subjects (13.9%) had greater than a 15% conversion risk at baseline and in the following 3 years persistently. 10 subjects (12.7%) had less than a 15% risk at baseline but needed treatment within the next 3 years. Meanwhile, 12 subjects (15.2%) had greater than a 15% risk temporarily due to fluctuation, but these patients might not actually require treatment if the risk profile is reassessed in the subsequent follow-up. From baseline to 3 years, the mean of fluctuation is  $10.3\% \pm 22.8\%$ , with a range of 57.8%. Out of the 79 untreated

subjects, 1 subject (1.3%) progressed to glaucoma.

**Conclusions:** Longitudinal risk profile fluctuations are common amongst OHT patients. Careful utilization of the risk calculator as a guide for initiating treatment for OHT patients could lead to substantial savings.

### Predictors of Glaucoma-Related Blindness at a Tertiary Care Center of North India

*First Author: Srishti RAJ*

*Co-Author(s): Surinder PANDAV, Faisal TT*

**Purpose:** To find predictors of glaucoma-related blindness in primary and secondary glaucoma in a tertiary institute.

**Methods:** Records retrieved, assessed, and followed for 1 year. Detailed evaluation of age, gender, family history, delayed diagnosis, literacy, urban/rural area, socio-economic status, trauma, surgeries, steroid use, best corrected visual acuity, intraocular pressure, visual field (VF), interventions, compliance, failed therapy, problems encountered during treatment, and FU up was done.

**Results:** Male preponderance, mean age of 62.67 / 54.65 years in primary / secondary glaucoma. Bilaterality in primary and unilaterality in secondary glaucoma was noticed. Trauma in secondary, family history and delayed diagnosis in primary glaucoma were significant. The patients: divided into advanced and end stage glaucoma (vision of PL/no PL or VF with MD >12.00 dB in worse eye) groups for comparison. In univariate analysis, literacy, income status, locality, delayed diagnosis, missed diagnosis in visual acuity output and cardiac disease, and glaucoma filtration surgery in visual fields output were significant. With multivariate analysis, literacy and delayed diagnosis were predictors of blindness in legally blind patients. Of the 52/121 (42.9%) literate and 33/48 (68.8%) illiterate patients reached the end stage glaucoma. 47/80 (58.8%) patients with delayed diagnosis, and 33/89 (42.7%) patients with no history of delayed diagnosis of glaucoma, reached end stage of glaucoma.

**Conclusions:** Main predictors of legal blindness were delayed diagnosis, trauma, cataract surgery, silicone oil tamponade, neovascular glaucoma. Illiteracy and delayed diagnosis were the predicting factors of complete blindness in a cohort of legally blind patients.

### Profile of Glaucoma in a Teaching Hospital in Southern India

*First Author: Juhy CHERIAN*

*Co-Author(s): Hannah PRASANTH, Elfride SANJANA*

**Purpose:** Retrospective analysis of glaucoma charts between 2016 and 2018 to determine the pattern of glaucoma.

**Methods:** Charts of patients with a diagnosis of glaucoma, glaucoma suspects, and ocular hypertension

were analyzed adhering to international guidelines for the definition of various glaucomas. Data collected included age, sex, laterality, vision, intraocular pressure, cup disc ratio, and relevant systemic comorbidities (hypertension and diabetes mellitus). Prevalence of different types of glaucomas was determined and ANOVA test was used to compare the severity of disc damage and mean intraocular pressure in various types of glaucomas. Visual acuity on presentation was compared using the Chi square test.

**Results:** Data of 600 eyes of 300 patients were retrieved. Patients with a diagnosis of ocular hypertension and glaucoma suspects were excluded from the study. POAG was diagnosed in 36.7%, 12.7% had PACG, 15.2% had secondary glaucoma, and 9.2% had normal tension glaucoma. Secondary glaucoma had a higher mean intraocular pressure (26.8 mm Hg), followed by PACG (21.66 mm Hg) and POAG (21.17 mm Hg), and this difference was statistically significant ( $P = 0.00$ ). Visual acuity on presentation was worse in secondary glaucoma, with 35.2% of patients presenting with best corrected visual acuity of worse than 6/60. Disc damage on presentation was more severe in POAG, with a mean cup disc ratio of 0.7.

**Conclusions:** POAG was the most prevalent glaucoma, in contrast to literature where PACG is commonly diagnosed in Asian countries. Secondary glaucoma had a higher IOP and worse visual acuity on presentation.

### Randomized Clinical Trial for Postoperative Complications After Ex-PRESS Implantation vs Trabeculectomy with 2-Year Follow-Up

*First Author: Masaru INATANI*

*Co-Author(s): Shogo ARIMURA, Kentaro IWASAKI*

**Purpose:** We compared complications between Ex-PRESS implantation and trabeculectomy for 2 years after surgery.

**Methods:** A total of 64 open-angle glaucoma eyes were randomly assigned to treatment with trabeculectomy ( $n = 32$ ) or Ex-PRESS implantation ( $n = 32$ ). The primary outcomes were postoperative complications, including reduction of the endothelial cell density (ECD) of the cornea, cataract progression, and the frequency of other late postoperative complications.

**Results:** The Ex-PRESS group had significantly greater reduction of postoperative corneal ECD than the trabeculectomy group did at 2 years after surgery ( $P = 0.026$ ). Among the corneal areas measured using specular microscopy, the superior area, where the Ex-PRESS tube was inserted, had significantly more severe corneal ECD reduction than the inferior area after 2 years ( $-17.6\%$  in superior area and  $-11.7\%$  in inferior area,  $P = 0.04$ ). More cataract progression occurred in the trabeculectomy group than in the Ex-PRESS group ( $P = 0.04$ ). Twelve eyes (37.5%) in the trabeculectomy group and 4 eyes (12.5%) in the Ex-PRESS group underwent cataract surgery ( $P = 0.019$ ). The total

number of other postoperative complications between 3 months and 2 years was significantly higher in the trabeculectomy group than in the Ex-PRESS group ( $P = 0.02$ ).

**Conclusions:** Ex-PRESS implantation is beneficial for preventing cataract progression after filtering surgery, though the procedure might be associated with an increased rate of corneal endothelial cell loss compared to trabeculectomy.

## Role of Visual Field Reliability Indices in Detecting Glaucoma Progression

*First Author: Puspha RAMAN*

**Purpose:** To evaluate the impact of false-positive errors (FP), false-negative errors (FN) and fixation loss (FL) of visual field (VF) reliability indices in detecting glaucoma progression.

**Methods:** A retrospective study on 415 VFs taken from 88 eyes of 45 patients which showed structural glaucoma progression over 5 years. Study participants underwent annual optic disc stereophotographs, visual field testing with standard automated perimetry (SAP), and spectral-domain optical coherence tomography (SD-OCT). Structural progression is defined as an increase in cup-disc ratio and objective thinning of retinal nerve fibre layer thickness in SD-OCT. Visual field progression was defined by an annual decrease in mean deviation (MD) slope by a minimum of 1 dB per year. Multivariable regression models were used to evaluate the associations between reliability indices and false negative detection of glaucoma progression on VF.

**Results:** Median FL, FP, and FN response rates were 18.6%, 1.3%, and 9.6% respectively. VF progression seen in 57 eyes (78%). The linear regression model (adjusted for age), predicts that with every 10% increase in FP, MD increases by 1 dB ( $P = 0.018$ ), while every 10% increase in FN decreases MD by 1.72 dB ( $P = 0.000$ ). The FL had no associations with the MD. The logistic regression model showed that every 10% increase in FP and FN increases the chance of false-negative detection of glaucoma progression by 1.35 times and 1.55 times respectively.

**Conclusions:** FL does not have a significant impact on VF reliability in established glaucoma. However, any level of FP or FN decreases VF reliability and affects the diagnosis of glaucoma progression significantly.

## Short-Term Outcomes in Asian Eyes of 2 Second Generation Trabecular Bypass Microstent Insertions in Subjects with Open Angle Glaucoma

*First Author: Fiona Pin Miao LIM*

*Co-Author(s): Rahat HUSAIN, Shamira PERERA, Desmond QUEK, Yar Li TAN, Tina WONG*

**Purpose:** The purpose of this study was to evaluate the

safety and intraocular pressure (IOP) lowering ability of 2 second-generation trabecular micro-bypass stents (iStent inject, Glaukos Corporation, Laguna Hills, CA) implanted in patients with OAG who were undergoing phacoemulsification and intraocular lens (IOL) implant.

**Methods:** A prospective, uncontrolled, nonrandomized, interventional case series study enrolled 40 subjects with both mild or moderate OAG who were undergoing cataract surgery. Outcome measures were IOP, ocular hypotensive usage, and adverse events. All subjects underwent uncomplicated implantation of 2 iStent inject trabecular stents after phacoemulsification and IOL implant. Postoperatively, ocular hypotensive medications were added in a cumulative manner if the IOP was uncontrolled.

**Results:** All 40 subjects completed 6 months of follow-up. Preoperative medicated mean IOP was 17.0 mm Hg. Postoperatively, mean IOP was 13.2 mm Hg. However, 41.7% had to be restarted on ocular hypotensives and the overall mean number of ocular hypotensives used was 0.71. There were no documented intraocular complications. However, postoperatively, 1 patient developed a steroid response and another had IOP spike due to blockage of stent by blood.

**Conclusions:** Outcomes from this study demonstrate safe and sustained reduction of IOP in eyes with OAG following implantation of 2 iStent inject stents.

## Spectrum of Secondary Glaucoma in an Eastern Region of Nepal

*First Author: Jamuna GURUNG*

*Co-Author(s): Rakshya PANTA, Anjanai SINGH, Sanjay SINGH*

**Purpose:** To determine the scenario of secondary glaucoma and their associated risk factors.

**Methods:** A cross-sectional study was conducted from June 1 to November 30, 2017. Patients' detailed history, their demographic parameters including the etiology of secondary glaucoma, visual acuity, slit lamp examination, gonioscopy, and intraocular pressure (IOP) were recorded.

**Results:** Secondary glaucoma was found in 528 cases. The common causes included lens induced (32.8%), neovascular (20.3%), steroid induced (16.3%), traumatic (14.4%), post-vitrectomy (3.2), and uveitic (2.1%). The most commonly affected age group was between 41 and 60 years (43.4%). 75.1% of eyes had vision of less than 6/60, a baseline IOP of greater than 30 mm Hg was present in 79.5%, and glaucomatous optic neuropathy was present in 8% of cases.

**Conclusions:** Secondary glaucoma is associated with various risk factors. Most patients have poor vision with high IOP and glaucomatous optic neuropathy. So, early detection and treatment of its causes can prevent the global blindness due to secondary glaucoma.

## Successful Management of Neovascular Glaucoma Patients with a New Polymethyl Methacrylate Glaucoma Drainage Device

First Author: Astrid **DEWI**

Co-Author(s): Aulia **ABDUL HAMID**

**Purpose:** To report the result of a new polymethyl methacrylate (PMMA) glaucoma drainage device developed in Indonesia for neovascular glaucoma patient. The device has a more simple design, is easier to implant, and is smaller than previous devices.

**Methods:** Diagnosis was based on history-taking, slit lamp examination, contact tonometry, gonioscopy, and funduscopy examination.

**Results:** A case report of a 61-year-old man with blind and painful right eye (RE) and uncontrolled intraocular pressure (IOP). Visual acuity was light perception (-) on RE and 2/60 on the left eye (LE). Slit lamp examination of RE presented deep and hyphema. RE IOP was 60 mm Hg. Gonioscopy showed open angle in all quadrants and angle neovascularization. Funduscopy examination presented glaucomatous optic nerve cupping and traction, exudates, and hemorrhage on the retina. Patient was diagnosed with RE absolute glaucoma with pain due to neovascular glaucoma and advanced proliferative diabetic retinopathy (PDR). Patient was treated with a new PMMA glaucoma drainage device. We applied a modified technique for this non-valve glaucoma device to prevent high IOP by semitotal ligation technique. One day after surgery, the IOP was 8 mm Hg and had been successfully maintained for 6 weeks. The device was fully functional 7 weeks after surgery. Five months after surgery, the average IOP was 9.8 mm Hg.

**Conclusions:** A new PMMA glaucoma drainage device successfully controlled IOP and reduced pain with no complications in a patient with neovascular glaucoma.

## Successful Management of Secondary Angle Closure Glaucoma Due to Uveitis with Secluded Pupil and Complicated Cataract

First Author: Seravina **IZZATI**

Co-Author(s): Aulia **ABDUL HAMID**

**Purpose:** To report successful management of secondary angle closure glaucoma due to uveitis with secluded pupil and complicated cataract.

**Methods:** A case report of patient diagnosed with secondary angle closure glaucoma due to uveitis with secluded pupil and complicated cataract treated by phacoemulsification.

**Results:** A 72-year-old man had complained of blurred vision in the right eye (RE) since a month before admission, with a history of pain and recurrent red eye for 7 months without therapy. His left eye (LE) wasn't able to see anything for 1 year. Visual acuity was 1/300 in RE and light perception with bad projection in LE. Slit

lamp biomicroscopy of RE showed iris bombè, secluded pupil, and complicated cataract while phthisis bulbi of the LE. The intraocular pressure (IOP) of RE was 30 mm Hg without medication. Gonioscopy revealed closed angle in all quadrants. Patient was diagnosed as RE secondary angle closure glaucoma due to uveitis with secluded pupil and complicated cataract, treated by phacoemulsification with synechiolysis 2 weeks after admission. Two weeks after surgery, his visual acuity was 20/150, perimetry showed arcuate visual field defect, optical coherence tomography revealed nerve fiber layer thinning, and IOP was stable at level of 10 mm Hg without medication.

**Conclusions:** Secondary angle closure glaucoma due to uveitis with secluded pupil and complicated cataract is a potentially fatal disease that is difficult to manage. In this case, successful phacoemulsification and synechiolysis improved visual acuity, and a stable IOP at a level of 10 mm Hg was achieved.

## The Effect of Laser Position Following Laser Peripheral Iridotomy in Taiwanese Angle Closure Patients

First Author: Han-Yi **TSENG**

Co-Author(s): Min-Yu **HUANG**, Kwou-Yeung **WU**

**Purpose:** To evaluate effects and complications following laser peripheral iridotomy (LPI), especially visual disturbances related to lid position in Taiwanese angle closure patients.

**Methods:** Data were collected by consecutive chart review. Patients receiving LPI were diagnosed as acute angle closure (AAC), primary angle closure (PAC), and chronic angle closure glaucoma (CACG). Chart records before LPI, 1 day, 1 week, and 4 weeks after LPI were evaluated.

**Results:** A total of 196 eyes, diagnosed as AAC (47 eyes, 24.0%), PAC (74 eyes, 37.8%), and CACG (75 eyes, 38.3%) were enrolled. Intraocular pressure (IOP) significantly decreased 4 weeks after LPI in AAC and CACG eyes (22.7 vs 17.7 mm Hg,  $P = 0.034$ ; 20.9 vs 17.5 mm Hg,  $P = 0.005$ , respectively). The number of IOP-lowering medications was also significantly decreased in AAC eyes following LPI ( $n = 2.49$  vs  $n = 1.35$ ,  $P < 0.001$ ). Most frequent complications were transient anterior uveitis (97.6%) and mild ciliary injection (85.3%). Visual disturbances were few and most were glare (14 eyes, 7.1%), which was significantly related to lid position (LPI partially covered by the lid 19.5% vs uncovered 3.6%,  $P = 0.0006$ ) and when performed at upper half of the iris (upper 13.5% vs lower 3.3%,  $P = 0.007$ ).

**Conclusions:** LPI is a safe and effective treatment for Taiwanese angle closure patients. Visual disturbance following LPI may be avoided by carefully choosing LPI position. Our study showed LPI performing at lower half of the iris and not partially covered by the lid might be the better option.

## The Risk of Open-Angle Glaucoma Among an Obese Population: A 13-Year Taiwanese Population-Based Matched Cohort Study

First Author: Weidar **CHEN**

Co-Author(s): Chien-Hsiung **LAI**, Li-Ju **LAI**

**Purpose:** Obesity contributes to multiple systemic disorders, but the association between obesity and open-angle glaucoma (OAG) remains rather divergent among previous studies. Hence, this study aimed to analyze the incidence and risk of OAG among obese population in Taiwan.

**Methods:** This retrospective, matched-cohort study used dual Longitudinal Health Insurance Database 2000 (LHID2000) and LHID2005 in Taiwan. A total of 11,461 individuals in LHID2000 and 11,608 individuals in LHID2005, age greater or equal to 18 years, encoded with obesity or morbid obesity were included from January 1, 2001 to December 31, 2010, and matched with non-obese individuals by gender, age, urbanization, and income at a ratio of 1:4. All individuals were traced from the index date to the diagnosis of OAG, the occurrence of death, or December 31, 2013. The outcome was defined as coding of OAG greater or equal to 2 times adjudicated by an ophthalmologist with the anti-glaucoma treatment.

**Results:** The incidence rate of OAG was 1.1/0.6 in LHID2000 and 1.3/0.7 in LHID2005 per 1000 person-years among the obese and non-obese group. The risk of developing OAG was significantly higher in the obese group than that in the non-obese group after adjustment [adjusted HR (95% CI): 1.40 (1.08-1.81) in LHID2000; 1.66 (1.32-2.10) in LHID2005]. Both LHID2000 and LHID2005 demonstrated male and aged less than or equal to 40 years obese group had a remarkably significant risk of developing OAG compared with the non-obese group.

**Conclusions:** This dual-database cohort study suggested that obese population had an increased risk of developing OAG. In a male and young population, obesity is a more significant risk factor for OAG.

## The Use of Ab-Interno Canaloplasty to Lower Intraocular Pressure and Reduce Topical Medication Related Symptomatic Ocular Surface Disease in Patients Who Underwent Microtrabecular Bypass Surgery

First Author: David **LUBECK**

**Purpose:** Case study to assess the effectiveness of performing ab-interno canaloplasty or ABiC (performed with the iTrack surgical system) to lower intraocular pressure (IOP), reduce topical medications, and reduce symptomatic ocular surface disease in patients who had previously undergone microtrabecular bypass surgery (iStent).

**Methods:** Four eyes in 2 patients with POAG had previously undergone microtrabecular bypass surgery (iStent) with a single stent combined with cataract surgery. 16 to 30 months postoperatively, the 4 eyes required 2 to 3 topical glaucoma medications to maintain control of IOP. All had symptomatic ocular surface disease that did not respond to preservative-free glaucoma medications, lid hygiene, topical lubricants, steroid, NSAID, or doxycycline. ABiC was performed to lower IOP, reduce the need for topical medications, and reduce symptomatic ocular surface disease. Visual acuity, slit lamp findings, IOP, and gonioscopic findings were noted preoperatively, and postoperatively to 1 year.

**Results:** Preoperative mean IOP was 17.5 mm Hg on 2 to 3 topical medications. Patients complained of decreased vision and irritation and were found to have  $\geq 2+$  conjunctival injection, and  $\geq 2+$  corneal epitheliopathy. Postoperative mean unmedicated IOP was 16.8 mm Hg. One eye required 1 topical glaucoma medication. Both patients reported improved vision and elimination of symptoms. Slit lamp findings showed  $\leq 1+$  injection and epitheliopathy.

**Conclusions:** ABiC can be used effectively to reduce IOP, as well as the need for topical medications in ocular surface disease in patients who have previously undergone microtrabecular bypass surgery.

## Trabecular Bypass Device Implantation and Goniotomy with Kahook Dual Blade: Short-Term Results

First Author: Koji **KOMATSU**

Co-Author(s): Hisato **GUNJI**, Tetsutaro **OKI**, Nobutaka **SHIOTANI**

**Purpose:** To evaluate the short-term efficacy of combined phacoemulsification and trabecular micro-bypass stent implantation (phaco-iStent) and goniotomy with Kahook dual blade (KDB) in patients with glaucoma.

**Methods:** We reported the change in mean IOP and average number of IOP lowering medications during 6 months of 6 eyes from 6 patients with primary open angle glaucoma or pseudoexfoliative glaucoma who experienced phaco-iStent. Also reported the same items for 2 months of 5 eyes from 5 patients who had a secondary glaucoma that experienced KDB.

**Results:** We reported the change in mean IOP and average number of IOP lowering medications during 6 months of 6 eyes from 6 patients with primary open angle glaucoma or pseudoexfoliative glaucoma who experienced phaco-iStent. Also reported the same items for 2 months of 5 eyes from 5 patients who had a secondary glaucoma that experienced KDB.

**Conclusions:** We confirmed a reliable intraocular pressure (IOP) decrease before and after surgery with iStent group and KDB group.

## Unusual Presentation of Neovascular Glaucoma Secondary to Central Retinal Vein Occlusion in a Seronegative HLA B-27 Positive Patient

First Author: Chintan **DESAI**

Co-Author(s): Fazil **KHURRUM**, Diva **MISRA**, Awaneesh **UPADHYAY**

**Purpose:** To report a case of neovascular glaucoma secondary to central retinal vein occlusion (CRVO) in a seronegative HLA B-27 positive young female.

**Methods:** Case report.

**Results:** A 27-year-old female, known case of anti-nuclear antibody negative, HLA B 27 positive ankylosing spondyloarthritis, presented with sudden onset diminished vision in right eye for 15 days associated with headache and vomiting. Best corrected visual acuity (BCVA) was HM+, <N36 in right eye (OD) and 6/36, N12 in the left eye (OS). RAPD was seen in the right eye. Intraocular pressure (IOP) was 47 and 17 mm of Hg respectively with angle closure and iris neovascularization in OD and open angles in OS. Fundus examination revealed a 0.9 vertical cup disc ratio in both eyes (OU) with features suggestive of ischemic CRVO in OD. No macular edema noticed on OCT. FFA showed delayed A-V transit time, areas of blocked fluorescence and extensive areas of capillary non-perfusion. Other serological investigations for systemic and autoimmune etiologies were negative. MRI and MRA brain as well as carotid doppler were within normal limits. She underwent panretinal photocoagulation in OD and was treated with topical antiglaucoma (AGM) drugs in OU. Resolving CRVO was seen at last visit, with no light perception in OD and fluctuating IOP due to poor patient compliance to topical AGM.

**Conclusions:** We reported a patient with seronegative rheumatoid arthritis (HLA B27 positive spondyloarthritis) with vasculitic CRVO leading to secondary neovascular glaucoma.

## Intraocular Inflammation, Uveitis & Scleritis

### A Case of Branch Retinal Artery Occlusion Associated with Cat-Scratch Disease

First Author: Ken **FUKUDA**

Co-Author(s): Atsuki **FUKUSHIMA**, Masao **TAKAHASHI**, Kazuyuki **YOSHIDA**

**Purpose:** To report an unusual case of a branch retinal arterial occlusion in a young male associated with cat scratch disease.

**Methods:** A case report.

**Results:** A 22-year-old male presented with sudden painless visual field defect in his right eye. Fundoscopy revealed occlusion of an inferior temporal branch of the retinal artery in his right eye and bilateral multifocal retinitis. Inflammatory cells in anterior chamber, macular edema, and swelling of optic disc were not observed. Visual field test revealed a defect in the upper nasal part of the visual field of his right eye. He had a history of swelling and pain of left preauricular lymph node and fever 2 weeks before, and oral levofloxacin was prescribed by physician to his unknown fever. He also had a history of exposure to a pet cat and a pet dog. Laboratory analysis showed increase of C-reactive protein and white blood cells, as well as both IgG titers and IgM titers for Bartonella henselae. Based on the serological results, we diagnosed his condition as cat-scratch disease.

**Conclusions:** Cat-scratch disease should be suspected in the differential diagnosis in young patients with retinal artery occlusion accompanying retinitis and systemic symptoms including fever or lymphadenopathy.

### A Case of Ocular Syphilis in a 59-Year-Old Ankylosing Spondylitis female

First Author: Chan-Wei **NIEN**

Co-Author(s): Yen-Po **YAO**

**Purpose:** To report a case of ocular syphilis in a 59-year-old ankylosing spondylitis female.

**Methods:** Case report.

**Results:** A 59-year-old woman developed a progressive blurred vision of right eye with photophobia but no other associated symptoms. She had a past history of ankylosing spondylitis without regular rheumatologist follow-up. Systemic steroid with steroid eyedrop were prescribed. Her symptoms temporarily improved with the drops, but approximately 1 month later her symptoms recurred. This time her ophthalmologist diagnosed panuveitis. Autoimmune analysis revealed positive rheumatoid factor but negative antinuclear antibodies, and a positive TPPA with an RPR titer of 1:512. She was treated at her local health department with 3 doses of weekly IM penicillin with resolution of her ocular symptoms.

**Conclusions:** Uveitis is the most common extra-articular manifestation in patients with ankylosing spondylitis (AS). The prevalence and characteristics of uveitis in AS have been studied in previous literatures, whereas its associated risk factors have not been clarified. Therefore, this study analyzed the risk factors of uveitis in patients with AS. Syphilis is known as the "great imitator" for its ability to infect any organ and cause diverse symptoms. Currently there is a re-emergence of syphilis for which the case count and rate is the highest recorded since 1995 in the United States. Without treatment, ocular syphilis can have serious consequences potentially leading to blindness.

## Acute Postoperative Endophthalmitis Caused by Multidrug-Resistant *Pseudomonas aeruginosa*

First Author: Aryati **SUSILO**

**Purpose:** To report a rare case and management of endophthalmitis caused by Multidrug-Resistant *Pseudomonas aeruginosa* following cataract surgery.

**Methods:** Diagnosis was based on history-taking, complete ophthalmology examination, ocular B-scan, and microbiology testing.

**Results:** A 75-year-old man came with the chief complaint of blurred vision in his right eye 2 days after cataract surgery, which developed into a severe acute postoperative endophthalmitis. Visual acuity was light perception, with clinical presentation eyelid edema, gross corneal edema, and severe anterior chamber reaction. Ocular B-scan demonstrated diffuse vitreous opacities, choroidal thickening, and tent-like discontinuity of sclera. From vitreous culture microbial profile, we found Multidrug-Resistant *Pseudomonas aeruginosa* which was resistant to ceftazidime and intermediately sensitive to amikacin. The endophthalmitis was progressing to panophthalmitis. Patient was treated with intravitreal vancomycin 1 mg/0.1 mL and amikacin 0.4 mg/mL, intravenous amikacin 500 mg daily, intravenous cefepime 1000 mg daily, intravenous dexamethasone 40 mg daily, moxifloxacin hydrochloride 0.5% 1 drop q4hr, dibekacin fortified 1.4% 1 drop hourly, and betamethasone 0.1% 1 drop hourly. The treatment successfully controlled the inflammation. However, the patient ended up with no light perception, visual acuity, and phthisis bulbi.

**Conclusions:** Acute postoperative endophthalmitis caused by Multidrug-Resistant *Pseudomonas aeruginosa* was rare yet difficult to manage. The infection resolved within 8 weeks of follow-up with steroid and combined antibiotics. Due to its resistance to various antibiotics, patient has poor visual outcome despite appropriate antibiotics therapy, which usually leads to phthisis and blindness.

## Anterior Chamber Migration and Hypotony After Dexamethasone Implantation: A Case Report

First Author: Chun Hsien **LIN**

Co-Author(s): De-Kuang **HWANG**

**Purpose:** To report a case that experienced complications after intravitreal dexamethasone implantation.

**Methods:** Case report.

**Results:** A 42-year-old female with persistent panuveitis was treated by intravitreal injection of dexamethasone implant. Unfortunately, hypotony and anterior chamber migration of the implant were noted on the first day postoperatively. Emergent surgery

was performed. After a few weeks of close follow-up, a stable condition was achieved without permanent intraocular damage.

**Conclusions:** Intravitreal injection of dexamethasone implant is usually safe and effective. However, surgically related complications may occur in patients with some complicated ocular conditions. Clinical ophthalmologists should be especially mindful of the possibility of complications following intravitreal injection of dexamethasone implant for the treatment of persistent panuveitis in such patients.

## Bilateral Endogenous Endophthalmitis in Disseminated Histoplasmosis Secondary to Immunosuppression: A Rare Case Report

First Author: Surpriya **HAWAIBAM**

Co-Author(s): Dipankar **DAS**, Saurabh **DESHMUKH**, Pushkar **DHIR**, Diva **MISRA**, Ronel **SOIBAM**

**Purpose:** To report the case of a bilateral endogenous endophthalmitis in disseminated histoplasmosis secondary to immunosuppression.

**Methods:** Case report.

**Results:** We reported the clinical course of a 47-year-old diabetic and hypertensive male who presented to us with diminution of vision in both eyes (OU) for 4 months. He was diagnosed with granulomatosis with polyangiitis and was treated with cyclophosphamide and steroids elsewhere. Before this, he was on steroids and methotrexate for probable sarcoidosis based on cavitary lesions in the lungs. During tapering of the steroids and so in relatively immunosuppressed status, he developed fever and maculopapular-nodular skin lesions. Skin lesion biopsy confirmed *Histoplasma capsulatum* and he was started on systemic antifungals. Later, he developed bilateral endogenous endophthalmitis and was managed with intravitreal medications followed by vitrectomy with lensectomy OU. The patient regained vision and is maintaining the same until 1 year of follow-up.

**Conclusions:** Thus, in spite of its rare occurrence, *H. capsulatum* should be considered as a cause of endogenous endophthalmitis in an immunosuppressed host with systemic histoplasmosis.

## Bilateral Exudative Detachments in Presumed TB Panuveitis

First Author: Ellen **YU-KEH**

Co-Author(s): Don Vincent **SALUD**

**Purpose:** To describe the ophthalmic findings in a case of presumed TB panuveitis associated with bilateral exudative retinal detachments.

**Methods:** The patient was a 35-year-old female seen in March 2018 with a 6-month history of bilateral blurring of vision associated with flashes. Vision was poor light perception in the right eye, and good light perception

in the left eye. Examination revealed 1+ cells in the anterior chambers, multiple subretinal yellowish infiltrates, and inferior exudative detachments.

**Results:** Workup revealed a highly reactive purified protein derivative skin test of 50 x 42 mm without associated systemic disease. Patient was started on quadruple anti-tuberculosis drugs, which resulted in resolution of the detachments with note of peripheral chorioretinal scars. Vision improved to hand movement associated with significant improvement in quality of life of the patient.

**Conclusions:** Although not frequently reported, TB panuveitis can present with bilateral exudative detachments which may completely resolve with systemic anti-tuberculous treatment, without the use of systemic corticosteroids.

### Case Series: Choroidal Tuberculoma

*First Author: NorAin RAWI*

**Purpose:** To report 3 cases of choroidal tuberculomas with different outcomes.

**Methods:** Retrospective case series.

**Results:** Three patients (2 male and 1 female), ages of 52, 50, and 25 years old and are immunocompetent. All 3 presented with unilateral blurring of vision of a week to 2 months duration. Vision at presentation was 6/12, 6/60, and 6/24 respectively. First 2 patients had unilateral solitary yellowish subretinal mass at midperipheries (one associated with exudative retinal detachment and vitritis) while the latter involved posterior pole. Second patient had positive PCR TB test (vitreal) and positive mantoux with concurrent disseminated tuberculosis (TB meningitis). Others were negative of systemic tuberculosis, while ocular investigations for TB were not done. All patients showed positive response to anti-tuberculous therapy (ATT) over a period of 2-6 weeks. First 2 cases improved to 6/9 and 6/6 vision. Unfortunately, the latter remained at CF 3ft from late treatment, complicated with retinal angiomatous proliferation (RAP). Retrospective analysis noted him to have 'contact' sign (attachment between the retinal pigment epithelial-choriocapillaris layer and the neurosensory retina over the granuloma) on optical coherence tomography (OCT) scan, however was treated as central serous chorioretinopathy initially.

**Conclusions:** ATT is cost-effective and well-tolerated. The key to saving the affected eye is to make a prompt diagnosis and early treatment. Distinctive feature of 'contact' sign on OCT and presence of RAP, which frequently developed in active tubercular granulomas, may provide clue to the diagnosis.

### Cytomegalovirus Necrotizing Retinitis in a Patient with Systemic Lupus Erythematosus

*First Author: Wei-Yu LAI*

*Co-Author(s): Chui-Lien TSEN, Tsung-Tien WU*

**Purpose:** To report an unusual case of cytomegalovirus (CMV) related necrotizing retinitis following CMV retinitis in an immunocompromised patient.

**Methods:** Case report and literature review.

**Results:** A 42-year-old woman with systemic lupus erythematosus, complicated with lupus nephritis, taking steroid and Azathioprine for 20 years developed cytomegalovirus retinitis OS. She received intravenous Ganciclovir for 2 weeks, followed by oral Valganciclovir for 2 months. The retinitis resolved significantly. However, after discontinuing antiviral treatment for 1 month, blurred vision OS was noted again. There was an anterior chamber reaction, new retinal hemorrhages, necrotic patches, and significant vitritis OS. The PCR in both aqueous humor and vitreal fluid revealed positive cytomegalovirus but negative for herpes. Retinal necrosis secondary to Cytomegalovirus was impressed, and she was admitted for systemic antiviral treatment. However, retinal detachment OS occurred during the hospitalization. She subsequently underwent combination of pars plana vitrectomy and scleral buckling plus silicone oil tamponade.

**Conclusions:** A unique CMV-related necrotizing retinitis is seen in partially immunocompromised patients with a phenotype intermediate between HSV-/VZV-related ARN and classic CMV retinitis. PCR analysis of the vitreal to confirm CMV DNA makes the diagnosis easier and more accurate to manage. Prolonged antiviral treatment should be considered in patients undertaking long-term systemic immunosuppressant.

### Diagnostic Approach and Successful Treatment of Vogt-Koyanagi-Harada Syndrome in Acute Uveitic Stage

*First Author: Dimas WIGID*

**Purpose:** To report a diagnostic approach and the successful management of Vogt-Koyanagi-Harada Syndrome in acute uveitic stage.

**Methods:** Diagnosis was made based on detailed history-taking, complete ophthalmology examination, uveitic work up, and ancillary test.

**Results:** A 51-year-old female presented to outpatient clinic complaining of sudden blurred vision for a week. There had been frequent ringing ears in the previous 2 weeks. There was also headache, nausea, and fever. Ophthalmological examination revealed visual acuity 1/60 in both eyes, old and white polymorphous keratic precipitate, 3+ flare and 3+ cells, 1+ vitreal cells in both eyes, bilateral exudative retinal detachment, and choroidal thickening. Laboratory examinations revealed no abnormality. Patient was diagnosed with

Vogt-Koyanagi Harada syndrome in acute uveitic stage. The patient was treated with intravenous methylprednisolone 1 gram daily given for 3 consecutive days continued with a high dose of oral prednisone and azathioprine. On 3 weeks follow-up, visual acuity became 5/5 in both eyes and exudative retinal detachment subsided. There was no recurrency noted until 3 months follow-up.

**Conclusions:** Vogt-Koyanagi-Harada syndrome in acute uveitic stage is a sight-threatening condition that needs immediate and aggressive steroid therapy. This case showed significant clinical improvement of VKH syndrome patient in acute uveitic stage after administered IV methylprednisolone.

### Diagnostic Dilemma Between Tubercular and Sarcoid Uveitis

*First Author: Zahedur RAHMAN*

*Co-Author(s): Nayeemul HUQ, Rajibul ISLAM, Bulbul ISLAM, Kamrul SOHEL*

**Purpose:** To share the diagnostic dilemmas between tuberculosis and sarcoidosis as the cause of posterior uveitis

**Methods:** Case report.

**Results:** A 30-year-old gentleman presented with granulomatous intermediate uveitis in his left eye. Tuberculin test was negative, bilateral hilar lymphadenopathy seen in high resolution computed tomography, normal serum angiotensin converting enzyme (ACE) with normal SGPT level. Though the disease initially responded to oral prednisolone, topical steroid, and eventually Mycophenolate mofetil, it recurred with bilateral choroiditis. Then Quantiferon TB Gold test (Positive) and T spot TB Test (Positive) were done. ATT was added. The inflammation has subsequently subsided. In a second case, a 33-year-old gentleman with granulomatous panuveitis, negative tuberculin test, HRCT suggestive of miliary tuberculosis, and normal serum angiotensin converting enzyme was treated with oral steroid and ATT. In spite of his ongoing treatment, he developed active choroiditis. For which the bronchoscopy done was normal, bronchial lavage negative for acid fast bacilli with no specific microscopic findings, elevated serum ACE found. Immunomodulators were added and disease responded well to it.

**Conclusions:** Diagnosis of granulomatous uveitis is confusing and misleading even with investigations, especially in cases of sarcoid and tubercular uveitis. In such a situation, investigations may need to be repeated which may be annoying to the patients.

### Effect of Uveitis on the Development of Keratopathy: A Population-Based Cohort Study

*First Author: Chan-Wei NIEN*

*Co-Author(s): Chia-Yi LEE*

**Purpose:** To evaluate the effect of uveitis on the development of various keratopathies via the use of national health insurance research database (NHIRD) in Taiwan.

**Methods:** About 1 million patients were randomly sampled from the registry of the NHIRD. Patients diagnosed with uveitis by ophthalmologist were enrolled into the study group after exclusion. Each individual in the study group was age- and sex-matched to 4 non-uveitis individuals which served as the control group. In addition to the keratopathy, other possible risk factors and medications were included in the multivariate model and effects of different subtypes of uveitis for developing keratopathies were also analyzed.

**Results:** A total number of 4773 uveitis patients (2662 male and 2111 female) and 19,092 non-uveitis patients (10,648 male and 8444 female) were enrolled. There were 406 events of keratopathy in the study group while another 764 events occurred in the control group, and a higher incidence rate ratio was found in the study group after adjustment (aHR: 1.772) with a greater cumulative probability ( $P < 0.0001$ ). For the subgroup analysis, anterior uveitis (aHR = 1.765) and panuveitis (aHR = 3.386) increased the risk of developing keratopathies. Moreover, male gender revealed a higher aHR than female gender for developing keratopathies in the study group.

**Conclusions:** The presence of uveitis will significantly elevate the risk for developing keratopathy, in which the risk is correlated to the disease period.

### Endogenous Endophthalmitis: A 16-Year Review of 78 Consecutive Patients in a Tertiary Care Hospital in Thailand

*First Author: Thitiporn THONGBORISUTH*

*Co-Author(s): Nattawat ASAWAWORARIT, Wichai PRASARTRITHA, Duangnate ROJANAPORN, Tharikarn SUJIRAKUL, Somsiri SUKAVATCHARIN*

**Purpose:** To study baseline clinical characteristics, causes, risk factors, and visual outcomes in endogenous endophthalmitis patients.

**Methods:** A retrospective descriptive medical record review of 95 eyes of 78 consecutive patients diagnosed with endogenous endophthalmitis from 2000 to 2016 at a tertiary care hospital in Thailand.

**Results:** Ninety-five eyes of 78 patients were diagnosed with endogenous endophthalmitis. Fifty-eight (74.4%) of them have underlying disease, with diabetic mellitus found to be the most common risk. Causative

organisms were identified in 67.9% of cases which were bacterial (47.4%), fungus (14.1%), and mixed organisms of bacterial and fungus (6.4%). *Streptococcus* spp. was the leading organism among bacterial endophthalmitis patients, following with *Klebsiella* spp., whereas *Aspergillus* spp. was the most common cause of fungal endophthalmitis. Source of infections were identified in 45 (57.7%) patients, with endocarditis being the most frequent source of infection followed by urinary tract infection and liver abscess. Visual outcome was generally poor with 27 (28.4%) eyes that had final vision between 20/400 and light perception, 17 (17.9%) eyes that resulted in no light perception, and 26 (27.4%) eyes that required evisceration or enucleation.

**Conclusions:** Endogenous endophthalmitis is a devastating condition associated with systemic infection. A majority of the patients have underlying risk factors predisposing to severe infection. Early recognition and proper investigations are crucial in suspicious cases, and prompt and early treatment both systemically and locally with antibiotic or antifungal agents are required.

### Glyceraldehyde-Derived Advanced Glycation End Products in Vitreous Fluid of Uveitis Patients

*First Author: Takako ITO*

*Co-Author(s): Susumu ISHIDA, Nobuyoshi KITAICHI, Kazuomi MIZUUCHI, Kenichi NAMBA*

**Purpose:** Advanced glycation end-products (AGEs) are permanently modified macromolecule derivatives produced by Maillard reaction. Among them, glyceraldehyde-derived AGEs (glycer-AGEs) are highly toxic and play an important role in the pathogenesis of chronic inflammatory diseases. However, its contribution to the pathogenesis of uveitis remains unclear. The aim of this study was to examine the association of glycer-AGEs in patients and endogenous uveitis.

**Methods:** Vitreous and serum levels of glycer-AGEs were quantified in 21 patients with uveitis (13 cases of sarcoidosis, 1 case of Vogt-Koyanagi-Harada disease, and 7 cases of unknown etiologies). Men and women were 2 and 19 patients, respectively (average 66.6 years old). Control samples were collected from 20 subjects (14 epiretinal membrane and 6 macular hole patients, 6 men and 14 women, average 71.2 years old). All samples were collected in receiving vitreous surgery from 2013 to 2017.

**Results:** Active inflammation was observed in 66.7% of uveitis patients. Average level of vitreous glycer-AGEs was 0.405 U/mL in uveitis patients. It was significantly higher than controls (0.209 U/mL,  $P < 0.01$ ). Mean level of serum glycer-AGEs was 11.4 U/mL in uveitis, and it was also significantly higher than that of controls (9.66 U/mL,  $P < 0.05$ ). It showed a positive correlation between vitreous and serum glycer-AGEs, especially in

patients with active sarcoidosis.

**Conclusions:** Glycer-AGEs levels of uveitis were significantly elevated in both vitreous and serum. It suggests that glycer-AGEs contribute to the pathogenesis and the progression of endogenous uveitis.

### Immunohistochemistry Interpretations of Enucleated Uveitic Eyes: An Interesting Case Series

*First Author: Diva MISRA*

*Co-Author(s): Harsha BHATTACHARJEE, Dipankar DAS, Pushkar DHIR, Awaneesh UPADHYAY*

**Purpose:** To show immunohistochemistry interpretations of enucleated uveitic eyes.

**Methods:** Histopathological study and IHCs of the enucleated eyeballs with uveitic conditions were studied from 2010 to 2016. Selections of pathological cases were made on the result of histological diagnosis. All the specimens in the cohort were subjected for IHC using kit method for different antibodies as per indications.

**Results:** Three cases of sympathetic ophthalmia (SO), 2 cases of BDUMP, and 1 case of ciliary body medulloepithelioma mimicking as intraocular inflammation were studied in the cohort. IHCs were done with various markers to confirm the histopathological findings. Appropriate controls were taken for retinal and uveal areas for the lesions. Foreign body documentation in uveal tissue in one of the SO cases, sparing of choriocapillaris in all of SO cases. Angio-centric involvement in BDUMP was a unique finding that was documented and supported by IHCs.

**Conclusions:** These will be shown as case-based presentations.

### Multiple Infectious Retinochoroiditis in an Immunocompromised Filipino Male: A Case Report

*First Author: Jessica DAZA*

**Purpose:** To describe the course of multiple opportunistic ocular infections in an immunocompromised young male.

**Methods:** This was a descriptive case report based on clinical records and diagnostic examinations.

**Results:** The patient is a 30-year-old immunocompromised male who initially presented with severe headache with diplopia on left gaze. Visual acuity of both eyes was 20/20 via pocket snellen. There was limitation of eye movement on the temporal gazes. On fundus examination, both eyes had optic disc edema and hyperemia with multiple subretinal yellowish lesions on all quadrants and scattered intraretinal hemorrhages. Fluorescein angiography

revealed bilateral multiple hypofluorescences and blocked hyperfluorescences. Lumbar puncture and CSF tested positive for CALAS and positive *Cryptococcus neoformans* on India ink. He was managed as a case of cryptococcal meningitis and cryptococcal choroiditis and given Amphotericin B and fluconazole. There was resolution of diplopia after 1 month of treatment, but he reported shadows on his left eye. Examination showed decreased peripheral chorioretinal lesions. However, he developed flame-shaped hemorrhages on the vascular arcades with suspicious necrosis. CMV retinitis was considered and he was started on oral valgancyclovir and was given 5 doses of intravitreal injections of ganciclovir. At 9 months, visual acuity was 20/20 on the right eye and 20/70 on left. Pocket snellen and fundus examination showed marked resolution of hemorrhages.

**Conclusions:** Combined opportunistic ocular infections in persons living with HIV is a rare but possible occurrence. Early eye screening and continuous follow-up must be added to the routine examinations in HIV patients to avoid potential blindness.

### Ocular Angiostrongyliasis in Thailand: A Retrospective Analysis Over 2 Decades

*First Author:* Suthasinee **SINAWAT**

*Co-Author(s):* Stephanie **CHOI**, Michael **MORLEY**, Tanapat **RATANAPAKORN**, Supat **SINAWAT**, Thawinee **TRISAKUL**

**Purpose:** To elucidate the clinical features, management, and visual outcomes of patients with ocular angiostrongyliasis.

**Methods:** This was a single-center retrospective study of patients with ocular angiostrongyliasis presenting between 1995 and 2017 at Srinagarind Hospital, Khon Kaen, Thailand. A total of 17 patients were diagnosed through clinical identification of the intraocular parasite. Medical records and fundus photography were reviewed.

**Results:** There were 17 cases (9 males, 8 females) with mean age of  $40.4 \pm 14.6$  years, all with history of raw food ingestion such as snails, fish, and shrimp. The majority of cases presented with blurred vision and best corrected visual acuity (BCVA) of 1/60 or worse, resulting from optic neuropathy or macular damage. Three patients had history of meningitis preceding visual impairment. *Angiostrongylus cantonensis* parasites were identified in the subtenon, intracameral, intravitreal, and subretinal space. Multiple types of treatment modalities were used including focal laser, surgical removal, and medical management. Primary laser ablation was typically applied to the pigmented gut followed by parasitic removal. Surgical removal was performed in 9 out of 17 cases. Various routes of corticosteroids were administered depending on site and severity of intraocular inflammation. Over half of patients were prescribed anti-helminthic drugs.

**Conclusions:** Surgical removal is recommended to eliminate intracameral and intravitreal angiostrongyliasis; however, focal laser to the living parasite should be done prior to surgery to immobilize the worm. Pulse methylprednisolone therapy may be beneficial in cases of acute optic neuritis. Anti-helminthic drugs should be considered for all patients given history of raw food intake.

### Ocular Toxocariasis in a 21-Year-Old Female

*First Author:* Cristina **GARCIA**

*Co-Author(s):* Egidio **FORTUNA**

**Purpose:** To present a rare case of ocular toxocariasis in an adult.

**Methods:** Case report.

**Results:** This was a case of a 21-year-old female with a 1-month history of blurring of vision of the right eye. On consult, a peripheral granuloma of the right eye was noted with stalk attached to the peripheral retina causing distortion of peripheral vision. No other symptoms were noted. Testing for *Toxocara* titers yielded positive results. Fluorescein angiography revealed patchy choroidal hyperfluorescence with enhancing peripheral granuloma and angiographic evidence of macular edema. Patient was initially managed with IV pulse dose methylprednisolone and then maintained on oral methotrexate.

**Conclusions:** Ocular toxocariasis is a rare infectious cause of uveitis usually seen in children. We present an adult female with a peripheral granuloma with positive *Toxocara* antibody titers managed medically with immunosuppressive therapy and currently doing well.

### Role of Corneal Patch Grafting in the Management of Postoperative Endophthalmitis with Tunnel Infection

*First Author:* Tanvi **MADIA**

**Purpose:** To demonstrate the role of tunnel deroofting with patch graft (eccentric PK) in the management of postoperative endophthalmitis with tunnel involvement.

**Methods:** A 50-year-old male patient presented with chief complaints of diminution of vision, watering, and floaters in the left eye for 7 days. History of cataract surgery (Phacoemulsification & IOL implantation) done 3 weeks back. Visual acuity of left eye was HMCF. Slit lamp biomicroscopic examination of the left eye revealed AC cells and flare, hypopyon, tunnel abscess, and corneal oedema. A diagnosis of postoperative endophthalmitis with tunnel infection was made. Without any delay, tunnel scrapping and intravitreal (IV) antibiotics (vancomycin + ceftazidime) was given and AC tap was done.

**Results:** Culture of aspirate was positive for few gram positive and gram negative bacilli. Intrigel moderate

reflective echoes noted on B-scan. Following this, intravitreal and intrastromal injection of voriconazole (50 mg/0.1 mL) was given and vitreous aspirate was taken which was positive for gram positive and gram negative bacilli. Following injections, posterior lens capsule had lots of exudate with focus of infection localized in the tunnel area. So, ultimately tunnel deroofing with subsequent patch graft was done and IV injection of antibiotics was repeated. Cornea became clear and he gained BCVA up to 6/12.

**Conclusions:** Postoperative endophthalmitis can present within a few days to weeks (early endophthalmitis) or after several months to years (delayed endophthalmitis). IV antibiotics and antifungals are the best treatment option for postoperative (postsurgical) bacterial and fungal endophthalmitis. Pars plana vitrectomy may be needed. In addition to intravitreal antibiotics and antifungals, corneal patch grafting in a postoperative endophthalmitis with tunnel involvement aids in better control of the infection and restoring good vision.

## Spectrum of Oculo-Orbital Parasitic Disorders in the SAARC Region

*First Author: Virendra P SINGH*

*Co-Author(s): Golam HAIDER, Sameera IRFAN, Syeed KADIR, Ben LIMBU, Rajendra MAURYA*

**Purpose:** SAARC countries are an endemic region for several parasitic infections. Our aim was to review the clinical profiles, treatment modalities, and outcomes of patients with various ocular parasitic manifestations in this region.

**Methods:** A retrospective analysis of 180 cases of various ocular parasitic infestations over a period of 2 years. Data were collected from reputed ophthalmologists of SAARC countries regarding demographics, clinical features like the location of the parasite/cyst, radiographic presentation, treatment modalities, and outcomes.

**Results:** Out of 180 cases, 54.4% were reported from India and Bangladesh. The male : female ratio was 1.1:2, with an age range from 8 to 55 years. The most common parasitosis was ocular cysticercosis (61.1%), followed by ophthalmomyiasis (25.0%), hydatid cyst (8.3%), and Dirofilaria (5.6%). The most common ophthalmic site for cysticercosis was the anterior segment, including the extraocular muscles (36.4%) and subconjunctival space (23.6%), followed by orbit (18.2%), vitreous cavity (9.1%), subretinal space (7.3%), and eyelid (5.5%). Only 28.2% of ocular cysticercosis cases were associated with neurocysticercosis. In the majority of cases, ophthalmomyiasis developed in patients of ocular malignancy. 80.6% of cases were managed by medical treatment (oral Albendazole and Prednisolone) and the rest by surgical excision. 80.6% had a complete cure while recurrence was noticed in 11.1% of cases. However, in 8.3% of cases

the eye became phthisical due to a severe reaction/ endophthalmitis.

**Conclusions:** Ocular parasitosis is quite rare. Radioimaging helped in arriving at the diagnosis. Management of ocular parasitosis is quite difficult and challenging. Prompt treatment can lead to complete recovery.

## Topiramate-Induced Anterior Uveitis: Clinical Presentations and Management

*First Author: Komal AGARWAL*

*Co-Author(s): Rajeev REDDY, Mudit TYAGI*

**Purpose:** To describe the clinical presentations and management of topiramate induced anterior uveitis.

**Methods:** A retrospective case review of 2 patients with intense anterior chamber inflammation and choroidal detachments after initiation of Topiramate therapy. The first case was of a 60-year-old female who had been started on Topiramate 15 days earlier for her bipolar disorder by her neurophysician, and the second case was of a 32-year-old female who was started on Topiramate for a migraine 1 week back. Both the cases had intense AC inflammation, bilateral angle closure and a choroidal detachment in both eyes. All systemic investigations were done to rule out other uveitis etiologies, and then a diagnosis of Topiramate-induced Inflammation was made and the drug was discontinued.

**Results:** Tablet Topiramate was discontinued in both patients and they were treated with hourly topical steroids and cycloplegics along with systemic steroids. Acetazolamide was stopped and prostaglandin analogues were started for control of intraocular pressure. Anterior chamber inflammation reduced significantly, and choroidal detachment resolved one week after discontinuation of Topiramate.

**Conclusions:** Multiple ocular side effects have been reported after the oral use of Topiramate. Cilio-choroidal effusion and acute angle closure is the most common. Anterior inflammation is a less commonly reported complication of the drug. These cases highlight the importance of accurate drug history in acute cases of anterior uveitis with ciliochoroidal effusion. Also, it's important for the physicians and neurologists to be aware of this possible toxicity.

## Neuro-Ophthalmology

### A Case Report: Pediatric Idiopathic Intracranial Hypertension

*First Author: Kornkanok SAKSRITAWEE*

**Purpose:** To report an uncommon case. Idiopathic intracranial hypertension (IIH) is an uncommon

neurologic condition in children. In pediatric IIH, there is no gender predilection and no excessive weight gain. IIH is characterized by elevated intracranial pressure (ICP) with normal CSF analysis. Neurological examination often reveals no neurological deficit except sixth nerve palsy from elevated ICP.

**Methods:** We presented a 6-year-old non-obese girl who complained of acute binocular horizontal diplopia with a history of headache for about 1 month. The patient did not report blurred vision or transient visual obscuration. Eye examinations revealed bilateral swollen optic discs, esotropia, and abduction deficit in both eyes. Ocular findings may be related to papilledema and sixth nerve paresis from increased ICP. Contrast-enhanced MRI brain demonstrated normal ventricles without a space occupying lesion or leptomeningeal enhancement. Lumbar puncture was performed and the cerebrospinal fluid (CSF) opening pressure was elevated; the CSF composition was normal. Contrast-enhanced MRV brain demonstrated no thrombosis or stenosis of cerebral venous sinuses. The patient received a carbonic anhydrase inhibitor therapy. Her symptoms resolved, and papilledema improved.

**Results:** The patient received a carbonic anhydrase inhibitor therapy. Her symptoms resolved, and papilledema improved.

**Conclusions:** We reported a non-obese girl who developed papilledema from IIH. IIH is a diagnosis of exclusion. Therefore, other structural causes of increased ICP must be excluded before IIH can be diagnosed.

## A Fatal Case of Cavernous Sinus Thrombosis

*First Author: Arwinderjit WALIA*

*Co-Author(s): A.r ROSNIZA, Dhashani SIVARATNAM*

**Purpose:** We reported a rare case of mortality associated with cavernous sinus thrombosis (CST) and septicemia secondary to hospital acquired bronchopneumonia.

**Methods:** A 70-year-old lady with underlying diabetes, hypertension, and renal failure presented to the emergency department with a 3-day history of fever and breathlessness associated with left eye proptosis and blurred vision. She was recently treated for bronchopneumonia a week prior. Ophthalmic examination revealed a vision of 6/60 in the affected eye with a frozen orbit and moderate proptosis and chemosis. Right eye examination was normal. Systemic examination revealed bibasal crepitations, so the provisional diagnosis of left eye orbital cellulitis secondary to septicemia due to hospital-acquired bronchopneumonia was made. Her total white cell count was  $21.7 \times 10^9/L$ , and a contrast CT scan of the brain and orbit revealed a dilated left superior ophthalmic vein and cavernous sinus thrombosis. The patient was started on intravenous Piperacillin/

Tazobactam and subcutaneous Clexane and Warfarin. The blood culture and sensitivity were no growth at day 5.

**Results:** The CST resolved on day 16, with vision 6/18. However, the patient remained septic and succumbed 1 week later from a left temporal brain abscess due to enterococcus faecalis bacteremia.

**Conclusions:** CST can be effectively treated in patients with ongoing septicemia, but the final outcome depends on other underlying comorbidities. Hospital-acquired infections are notoriously difficult to treat with high morbidity and mortality rates. As seen in our patient, even with aggressive antibiotic treatment, her infection progressed which led to her eventual demise.

## A Rare Case of Suspicious Sarcoidosis-Related Optic Neuritis in a Pediatric Patient

*First Author: Salmarezka DEWIPUTRI*

*Co-Author(s): Syntia NUSANTI, Mohamad SIDIK*

**Purpose:** To demonstrate a rare case of sarcoidosis related optic neuritis in a pediatric patient.

**Methods:** A 9-year-old boy complained of blurred vision of left eye. The mother noticed that her son sometimes hit objects on his left side. There was headache in the last 2 years. There was no history of trauma. There was similar family history (auntie). Visual acuity of right eye (RE) was 1.0 and left eye (LE) was light perception. Fundus of RE was good and LE was atrophy optic. Patient was diagnosed with atrophy optic of LE suspicious optic neuritis. Perimetry of RE was generalized depression. Brain and orbital MRI were normal. Anti-dsDNA, Toxoplasma antibody, and Cytomegalovirus antibody were negative. Antinuclear Antibody (ANA) was positive. Visual electrophysiology (VEP) revealed normal photoreceptor and macular function in both eyes. Pattern-VEP showed combination increased latency on the RE with absent VEP on LE, which may indicate either bilateral optic nerve lesion or chiasma lesion. Repeated laboratory result was negative ANA, negative oligo clonal bands, negative anti-Myelin Oligodendrocyte Glycoprotein (MOG), raised angiotensin converting-enzyme (ACE) serum, and also negative aquaporin-4 antibody. Mutation mtDNA analysis was negative. Patient experienced blurred vision of RE 2 years after and recurrent after 4 years. Patient was given high dose intravenous methylprednisolone and oral methotrexate.

**Results:** After treatment, visual acuity of RE was 0.5 and LE was light perception.

**Conclusions:** Choice of prophylactic therapy for optic neuritis is dictated by the underlying diagnosis. Repeated recurrence was treated successfully with addition of immunosuppression.

## A Rare Case of Tubercular Granuloma Presenting with Diplopia

First Author: Srii **ISVARYA**

Co-Author(s): Prithvi **CHANDRAKANTH**

**Purpose:** To illustrate tuberculosis as a cause of isolated fourth nerve palsy.

**Methods:** A 20-year-old male presented to our hospital with complaints of diplopia on downward gaze with visual acuity of 6/6. Right superior oblique restriction noted rest. Anterior segment and fundus examination was normal. Lab investigations were suggestive of tuberculosis, and radiological investigations showed granuloma in aqueduct of Sylvius.

**Results:** MRI imaging showed well-defined cystic lesion seen in the lower midbrain on the left side posterolateral to the aqueduct of Sylvius.

**Conclusions:** Tuberculosis should be considered as a cause for isolated fourth nerve palsy and MRI imaging should be done to rule out any lesion at the nuclear level.

## Acute Bilateral Vision Loss in Young Children Related to Post Tetanus-Diphtheria Vaccination Optic Neuritis: A Case Series

First Author: Atina **LESTARI**

Co-Author(s): Dwita **PERMATASARI**, Gatot **SUHARTONO**, Lukisiari **AGUSTINI**

**Purpose:** To describe a case series of bilateral acute vision loss due to optic neuritis in young children which occurred several days after Tetanus Diphtheria (TD) vaccination, and their responses to high-dose steroid therapy.

**Methods:** Three young girls complained of sudden blurred vision 3-7 days after TD booster vaccination. Two patients came to our outpatient clinic within a week after vaccination. They showed bilateral vision loss and optic nerve head oedema because of optic neuritis. The third patient came after a month vaccination. She also showed bilateral vision loss, but optic nerve head appeared pale. All patients were evaluated for best corrected visual acuity (BCVA), Ishihara color vision test, optical coherence tomography (OCT), visual field examination, head magnetic resonance imaging (MRI), and also visual evoked potential. All patients were given high dose intravenous methylprednisolone.

**Results:** Two patients showed improvement in BCVA, Ishihara color vision test, and also visual field. But their VEP examinations in 1-month follow-up showed prolonged latency due to bilateral demyelinating visual pathway. The third patient did not show any improvement. One of these MRI showed susceptibility to multiple sclerosis (MS).

**Conclusions:** Acute vision loss in young children

could be related to post vaccination optic neuritis. Early treatment with high dose steroid could restore visual function. There is still a dispute whether optic neuritis in children is a causative factor to develop MS. But patients who develop post-vaccination optic neuritis should be followed up as they may develop demyelinating syndromes years later.

## Acute Monocular Visual Loss Secondary to Undiagnosed Metastatic Breast Carcinoma Mimicking Retrobulbar Optic Neuritis

First Author: Hazel **LIN**

Co-Author(s): Graham **HOLDER**, Clement **TAN**

**Purpose:** To discuss the clinical, imaging, and electrophysiological features of a patient initially thought to be suffering from demyelinating retrobulbar optic neuritis (RON), but subsequent investigation revealed carcinomatous meningitis with optic nerve sheath infiltration.

**Methods:** A 36-year-old Chinese female presented with acute, unilateral, painful loss of vision, headaches and nausea, assumed to reflect RON. She underwent magnetic resonance imaging (MRI) of the brain, lumbar puncture (LP), and electrodiagnostic testing (EDT).

**Results:** MRI showed diffuse leptomeningeal involvement affecting the cerebellum and multiple cranial nerves. There was an elevated opening pressure of greater than 45 cm on LP, with raised proteins and cell count. EDT revealed an undetectable pattern of visual evoked potential (VEP) from the left eye, normal on the right. Flash VEP was delayed and reduced from the left eye, normal on the right. Pattern electroretinography (PERG) was bilaterally normal with no interocular asymmetry. The findings overall were not consistent with the initial diagnosis of RON, and malignancy was suspected. Further investigations included mammography, which showed multiple breast cysts, confirmed to be breast carcinoma on supraclavicular lymph node biopsy.

**Conclusions:** Carcinomatous meningitis is an uncommon presentation of metastatic disease. Visual loss as the first presentation of CM in previously undiagnosed cancer has not been previously reported and should be considered in atypical situations.

## Aquaporin-4 Antibody Seropositive Paraneoplastic Optic Neuropathy: Analysis of 1 Patient

First Author: Huanfen **ZHOU**

Co-Author(s): Shihui **WEI**, Honglu **SONG**

**Purpose:** A paraneoplastic optic neuropathy is a syndrome (a set of signs and symptoms) that is the consequence of cancer in the body which is mediated by humoral factors excreted by tumor cells or by an immune response against the tumor.

**Methods:** Case report.

**Results:** A 50-year-old female was admitted in the hospital because of decreased visual activity in both eyes. She had double vision and ptosis in right eye 3 years ago. She was diagnosed as myasthenia gravis and underwent surgery to remove thymoma. Biopsy indicates B3 type thymoma. Orbital MRI indicates T2 signal and enhancement in left optic nerve. Laboratory work indicates CV2 antibody positive, AQP4 antibody positive in serum and cerebrospinal fluid. After being diagnosed as paraneoplastic optic neuropathy, she was treated with high dose steroid and mycophenolate mofetil. She had a good recovery in her left eye.

**Conclusions:** AQP4 antibody may associate with paraneoplastic optic neuropathy and be a biomarker for early diagnosis.

### Baseline Retinal Nerve Fiber Layer Thickness and Macular Ganglion Cell Analysis and Visual Outcomes in Eyes with Ethambutol Toxic Optic Neuropathy: A Prospective Study

*First Author: Bryan Vincent* **MESINA**

*Co-Author(s): Franz-Marie* **CRUZ**, *Richard* **KHO**, *Justin Alan* **YAO**

**Purpose:** This study was conducted to determine whether baseline retinal nerve fiber layer (RNFL) and macular ganglion cell complex (MGC) thicknesses were correlated with visual outcomes in eyes of patients with ethambutol toxic optic neuropathy (ETON).

**Methods:** This was a single-center, prospective, observational, non-interventional study conducted at the Department of Ophthalmology and Visual Sciences of the University of the Philippines, Philippine General Hospital. Eight Filipino, adult, male patients diagnosed with ETON underwent baseline neuro-ophthalmologic evaluation including visual acuity (VA) measurement, color vision test, and automated perimetry. RNFL and MGC measurements were acquired using a Cirrus optical coherence tomography (OCT) machine at initial visit. Parameters of visual function including VA, color vision, and perimetric mean deviation (MD) were re-measured at 1, 2, and 4 months thereafter.

**Results:** Majority of eyes with ETON had thin MGC measurements at baseline (73%), while only 20% of eyes had thin baseline RNFL measurements. In some eyes, MGC thinning was observed despite normal baseline RNFL measurements. VA and color vision were not statistically different between the eyes with normal and thin RNFL measurements at all study visits. Meanwhile, only the means of color vision scores at month 4 were found to be statistically different between eyes with normal and thin baseline MGC measurements (14.5 vs 2.6,  $P = 0.00$ ).

**Conclusions:** There was significant improvement of dyschromatopsia in eyes with normal baseline MGC thickness. Baseline MGC thickness may have more

prognostic value for visual improvement in eyes with ETON over RNFL measurements. Longer follow-up period and a larger sample size are recommended.

### Bilateral Retrobulbar Optic Neuritis in a Patient with Active Hepatitis B Infection

*First Author: Jan Patrick* **CHU**

*Co-Author(s): Lee Allen* **CLOMA**

**Purpose:** To present an atypical case of optic neuritis associated with active type B hepatitis.

**Methods:** This is a case of a 28-year-old male with no known co-morbidity, who experienced sudden onset blurring of vision of both eyes associated with eye redness and eye pain. Subsequent loss of vision on both eyes after a week prompted consult. His visual acuity on both eyes were no light perception. Pupils were mid-dilated with sluggish constriction to light. Fundus exam showed slightly pale optic nerves with distinct borders.

**Results:** Fluorescein angiogram showed late leakage of both optic nerves. Cranial and orbital CT scans were normal. Sputum-negative pulmonary tuberculosis was confirmed, but anti-tuberculosis medications were not immediately started due to elevated liver enzymes. HIV screening test was negative. Hepatitis profile patterned an active hepatitis B infection based on reactive HBsAg and HBeAg and non-reactive anti-HBc IgM, anti-HBs, anti-HBe, anti-HAV IgM, and anti-HCV. Intravenous methylprednisolone 1 gram/day for 3 days followed by oral prednisone 1 mg/kg/day for 11 days with gradual taper was started on the 12th day of ocular symptomatology. Vision improved to hand movement after completion of IV methylprednisolone and improved further to 10/400 on both eyes 24 days after initiation of treatment.

**Conclusions:** Optic neuritis is an optic nerve demyelinating disorder. Atypical optic neuritis usually requires further investigation of possible etiologies other than multiple sclerosis. The pathophysiology of optic neuritis in hepatitis B infection is still unclear, but an immune-mediated process is postulated. Reports about the visual prognosis of atypical optic neuritis varies.

### Comparison of Inner Retinal Thickness Change According to the Severity of Optic Disc Edema in Optic Neuritis

*First Author: Dea Sung* **KIM**

*Co-Author(s): Hee Yoon* **CHO**, *Eun Hee* **HONG**, *Yong Un* **SHIN**

**Purpose:** To compare the changes of macular retinal nerve fiber layer (RNFL) and ganglion cell-inner plexiform layer (GCIPL) thickness according to the severity of initial optic disc edema in optic neuritis using swept-source optical coherence tomography (SS-OCT).

**Methods:** We retrospectively reviewed 18 eyes diagnosed as naïve optic neuritis with optic disc edema who underwent SS-OCT. The central thickness of optic disc and peripapillary retinal thickness were measured at initial visit. To quantify the degree of initial optic disc edema, we calculated the difference of each measurement between affected eye and the normal fellow eye. The macular RNFL and GCIPL thickness were measured at initial visit and at 1 month. The association of macular RNFL and GCIPL thickness change at 1 month and the severity of initial optic disc edema were evaluated.

**Results:** In affected eye, the macular RNFL and GCIPL thickness were decreased at 1 month. The central thickness of optic disc at initial visit showed no correlation with the inner retinal thickness change at 1 month, but the temporal peripapillary retinal thickness at initial visit showed significant correlation with the decrease in nasal macular GCIPL thickness at 1 month ( $R = 0.618$ ,  $P = 0.04$ ).

**Conclusions:** In optic neuritis with optic disc edema, thick temporal peripapillary retinal thickness at initial visit was associated with the decrease in nasal macular GCIPL thickness at 1 month. When evaluating the severity of optic disc edema in optic neuritis, the temporal peripapillary retinal thickness would be one of the visual prognostic factors.

### Effectiveness of Peli Prisms in a Patient with Homonymous Hemianopia

*First Author: Madhuwanthi DISSANAYAKE*

*Co-Author(s): Kumari FONSEKA, Chanura MAHINDAPALA*

**Purpose:** Homonymous hemianopia is a loss of vision in either the right or left sides of both visual fields. It is a complication of strokes, brain injuries, and tumors. This causes serious problems with mobility and reading. Various methods are utilized to overcome the disability. One such method recently introduced was the Peli prism, a concept developed by Dr. Eli Peli. In our study, we evaluated the effectiveness of Peli prisms in a patient with homonymous hemianopia in our setting.

**Methods:** A 57-year-old male with homonymous hemianopia was recruited for the study. He had a left homonymous hemianopia secondary to a brain tumor for 18 years. After explaining the procedure and obtaining the consent, the patient was assessed in the clinic. Peli lenses were placed on the distance glasses of the patient. Evaluations were performed at 1 week, 2 weeks, and 1 month intervals.

**Results:** Feedback obtained regarding patient experience on mobility, and visual function was satisfactory. He demonstrated increased awareness of his left side. Assessment of visual fields also showed marginal improvement.

**Conclusions:** This preliminary study showed that use of Peli prisms for this patient with homonymous hemianopia was successful in our setting. Further studies involving more patients are needed for further improvements and evaluation of this method.

### Hypercoagulable State Management in Nonarteritic Ischemic Optic Neuropathy Patients: A Case Series

*First Author: Syntia NUSANTI*

*Co-Author(s): Mohamad SIDIK*

**Purpose:** To evaluate the results of treating hypercoagulable state in patients with nonarteritic ischemic optic neuropathy.

**Methods:** This was a retrospective study of 5 cases. Three cases were middle-aged females and 2 cases were males with worsened visual acuity and visual fields. The onset was within days to a week. Further investigations revealed abnormality in optic nerve head (ONH) anatomy, the so-called “disk-at-risk” in fellow eye, perimetry, and laboratory results. We found that these 5 cases had hypercoagulable as the risk factor. We treated these cases by combining hypercoagulable management and systemic steroid therapy.

**Results:** All cases came with significant visual field defects in line with the ONH abnormalities. After 3 months and 6 months of follow-up, this combined treatment was able to improve the visual field significantly.

**Conclusions:** Pathogenesis and treatment of NAION remains controversial. Regardless, our study found that treating the hypercoagulable state and steroid therapy may benefit NAION patients.

### Miller Fisher Syndrome in a Patient with Atypical Optic Neuritis

*First Author: Honglu SONG*

*Co-Author(s): Shihui WEI*

**Purpose:** Miller Fisher syndrome is an autoimmune neuropathy characterized by the clinical triad of ataxia, areflexia, and external ophthalmoplegia. Ophthalmologic involvement in this syndrome is most often represented by motility disorders.

**Methods:** Case report.

**Results:** A 37-year-old woman presented with atypical optic neuritis for 9 months. She walked unsteady for 9 days. A neurological examination showed hyporeflexia in the right leg. Her serum anti-GM1 antibody test was positive. Lumbar puncture showed albuminocytologic disassociation, with a high protein and a normal cellular composition in the CSF. She was finally diagnosed with Miller Fisher syndrome. Intravenous high-dose steroid therapy and IVIG improved the patient’s ataxia.

**Conclusions:** Optic neuritis may be a part of the clinical

features of Miller Fisher syndrome, which is very rare in clinic.

### Nonarteritic Anterior Ischemic Optic Neuropathy Associated with Antiphospholipid Syndrome

*First Author: Yu-Hung LAI*

**Purpose:** Antiphospholipid syndrome could produce devastating complications. We would like to describe a rare case of non-arteritic anterior ischemic optic neuropathy (NAION) associated with antiphospholipid syndrome.

**Methods:** Case report.

**Results:** Case description. A 70-year-old male was referred for optic neuritis. He experienced right visual loss for 2 weeks. He denied systemic disorders and smoking. There was headache or pain on ocular motility. His vision was fingers counting at 25 cm OD and 6/6 OS. Slit lamp examination and intraocular pressure was normal. Fundus examination showed right optic disc edema and hemorrhage. Laboratory testing revealed elevated antiphospholipid antibodies and a false positive syphilis test. Rivaroxaban, azathioprine, and hydroxychloroquine were prescribed by the rheumatologist. Follow-up laboratory tests confirmed the diagnosis of antiphospholipid syndrome. Five months after the treatment, his vision improved to 6/60 OD and he remained free of systemic complications.

**Conclusions:** Antiphospholipid syndrome could be associated with NAION, and it should be considered in the differential diagnosis of NAION. Treatment for antiphospholipid syndrome should be initiated once the disease is suspected or established to avoid devastating systemic complications.

### Ocular Dysmetria as a Sequelae of Mumps in a 9-Year-Old Child: A Case Report

*First Author: Geraldine Clare Marie NEGRE*

*Co-Author(s): Leonides Karlo Iii MELENDRES*

**Purpose:** This paper aims to present a case of ocular dysmetria in a child who had a recent episode of Mumps infection.

**Methods:** A 9-year-old boy presented with dizziness and jerky eye movements. This was preceded, 2 weeks prior to referral, by swelling of both parotid glands, fever, and malaise. He was admitted at another institution, treated for dehydration, and discharged after 2 days. Upon discharge, his mother noted jerky eye movements. This symptom persisted, prompting them to consult an Ophthalmologist who referred them to East Avenue Medical Center.

**Results:** Upon examination, visual acuity was 20/80 improving to 20/25 on pinhole on the right and 20/63 improving to 20/25 on the left. Abnormal eye

movements were noted, consisting of overshooting when asked to fixate on a target with oscillations which decreased as fixation was achieved. Slit lamp, funduscopy, and neurologic examinations, including cerebellar function tests, were unremarkable. He was advised observation. Two weeks later, visual acuity was 20/40 improving to 20/25 (PH) on the right and 20/32 improving to 20/25 on the left. No ocular oscillations were observed.

**Conclusions:** Ocular dysmetria caused by viral infections is often self-limiting and warrants no treatment. In cases, however, which present with papilledema, further work-up and treatment are necessary to address increased intracranial pressure.

### Outcome of Low Dose Botulinum Toxin Injection in Benign Essential Blepharospasm

*First Author: Golam HAIDER*

*Co-Author(s): Sharmin AHMED, Hasan JAWAD, Syeed KADIR, Mukti MITRA*

**Purpose:** To observe the clinical outcome of low dose injection Botulinum Toxin in Benign Essential Blepharospasm at a tertiary eye care center, Bangladesh.

**Methods:** It was a retrospective observational study of benign essential blepharospasm at a tertiary care center in Bangladesh from 2008 to 2017. Proper history-taking and clinical examinations were done for evaluation. In preoperative assessment and evaluation, we considered Jancovic Rating scale, 3 (moderate very noticeable spasm, mildly incapacitating), and 4 (severely incapacitating). To make 25 IU injection in 1 mL we diluted 100 IU Botulinum toxin diluted with 4 mL of preserved normal saline.

**Results:** A total 828 cases were evaluated. Male (44%) and female (56%), mean age of 52 (range of 17-80). All patients were treated with injection of Botulinum toxin 25 IU. Among them, 682 were spasm free for 2 to 3 months (82.61%, rating scale score 0 to 1), 47 for 3 to 6 months (5.68%, rating scale score 1), 27 for 6 months to 1 year (3.26%, rating scale score 1), 40 for more than 1 year (4.83% rating scale score 0 to 1), 27 were completely spasm free (3.26% rating scale score 0), and 3 people claimed no improvement (0.36% rating scale score 4).

**Conclusions:** Injection botulinum toxin is the mainstay of treatment in Benign Essential Blepharospasm. Most of the cases were symptom free for at least 3 months of 25 IU injection Botulinum toxin. So, 25 IU is enough to control Blepharospasm as a primary treatment.

## Predictive Factors of Final Visual Acuity of Acute Retrobulbar Neuritis Patients Receiving Optic Neuritis Treatment Trial Regimen

First Author: Melvina **SANDRA**

Co-Author(s): Hartono **HARTONO**, Indra **MAHAYANA**, Tatang **TALKA GANI**

**Purpose:** To investigate the predictor factors of final visual acuity following ONTT in patients with acute retrobulbar neuritis.

**Methods:** This was a descriptive analytical study looking at medical records of patients diagnosed with unilateral or bilateral retrobulbar neuritis by normal funduscopy findings and typical optic neuritis perimetry results within 14 days of onset. The data were taken from a tertiary hospital with follow-up period from 1 to 6 months. We reviewed medical records of patients who received 1000 mg methylprednisolone IV per day for 3 days followed by 11 days 1 mg/kg body weight oral prednisolone. Visual acuity (VA) at onset, final visual acuity at time of follow-up, delta VA improvement, and time of follow-up were included in the analyses.

**Results:** There were 20 patients with mean age:  $33.95 \pm 8.07$  and VA at onset was  $1.96 \pm 0.81$  (~1 m CF). There was statistically significant improved ( $P = 0.001$ ) final VA post-therapy into  $1.39 \pm 1.12$  (~5 m CF). VA at onset was a predictor factor for final VA ( $P < 0.001$ ), every 1.17 increase of final VA for every 1-point decrease of VA at onset. Time of follow-up were shown trend ( $P = 0.059$ ). However, age and sex were not a predictor factor of final VA ( $P = 0.974$  and  $P = 0.549$ , respectively).

**Conclusions:** There was visual acuity improvement after receiving ONTT regimen. VA at onset was a predictor factor of final VA in patients with acute retrobulbar neuritis.

## Primary Diffuse Large B Cell Lymphoma of the Ethmoid Sinus Presenting as Acute Ocular Hypertension and Orbital Apex Syndrome: A Case Report

First Author: Szu-Yuan **LIN**

Co-Author(s): Hao-Jung **LI**, Hsin-Ching **SHEN**, I-Hua **WANG**

**Purpose:** Primary sinonasal lymphoma is a rare malignancy usually with non-specific symptoms and is diagnosed at an advanced stage. We reported a case of primary diffuse large B cell lymphoma (DLBCL) of the ethmoid sinus presenting initially as acute ocular hypertension combined with simultaneous orbital apex syndrome.

**Methods:** A case report.

**Results:** A 78-year-old male patient complained of acute pain in the left eye (OS) for several days. On ocular examination, his right eye (OD) was quiet and his conjunctiva was injected (OS). He was pseudophakia

with deep anterior chamber (OU). The intraocular pressure (IOP) was 21 mm Hg (OD) and 41 mm Hg (OS). Mild ptosis and eye movement limitation (OS) was noted in the next day. Emergent imaging study revealed a space-taking lesion at left nasal cavity and ethmoid sinus with compression over left medial rectus muscle and optic nerve. Functional endoscopic sinus surgery and tumor excision was performed, and pathology confirmed DLBCL. His vision improved from 0.02 to 0.2 (OS) with complete resolution of eye movement limitation but compromised optic nerve function.

**Conclusions:** Ethmoidal tumors may present as orbital apex syndrome by the trait of optic nerve dysfunction and oculomotility impairment when they invaded the orbit deeply from the nasal side. Besides, they may also interfere the episcleral venous return early and contribute to acute ocular hypertension. Such an uncommon scenario makes further differential diagnosis of the underlying etiology necessary. Image studies and surgical tissue proof will help us to diagnose and treat this rare malignancy and salvage the visual function.

## Profile of Nonarteritic Anterior Ischemic Optic Neuropathy Patients at a Tertiary Eye Care Institute

First Author: Krati **GUPTA**

Co-Author(s): Dipankar **DAS**, Saurabh **DESHMUKH**, Henal **JAVERI**, Diva **MISRA**

**Purpose:** Nonarteritic anterior ischemic optic neuropathy (NAION) is the most common cause of sudden optic nerve-related vision loss in patients over the age of 50. This study was done to form a profile of patients of NAION and assess its risk factors.

**Methods:** This was a retrospective study assessing all NAION patients presenting to tertiary institute over a 1-year period.

**Results:** Thirty cases were recorded. Profiling on the basis of age group, eye involved, onset (whether sudden or gradual), duration of symptoms, visual acuity at presentation, color vision, and optic disc assessment for crowding and visual field defects. Association with comorbidities like diabetes, hypertension, dyslipidemia, parkinsonism, and other medications. Correlation with blood parameters like ESR, CRP, platelets, and response to treatment.

**Conclusions:** This study is one its kind profiling patients of NAION at a tertiary eye care institute and establishing the correlation with various risk factors in Indian scenario.

## Remarkable Recovery of Visual Function in a Patient with Gene Confirmed Leber Hereditary Optic Neuropathy

First Author: Chiao-Ying **LIANG**

**Purpose:** We reported a remarkable recovery of

visual function in a patient with genetic confirmed (mtDNA14484 mutation) LHON.

**Methods:** Case report.

**Results:** The young male patient suffered from subacute visual loss at 14 years old. His presented BCVA was 6/60 bilaterally. Typical clinical signs of LHON such as dense cecentral scotoma and gradually temporal sector optic atrophy were noted. Genetic test revealed mitochondrial DNA 14484 point mutation and confirmed the diagnosis of LHON. Supportive treatment with coenzyme Q10 and antioxidants was given. His vision deteriorated for 2 months to 3/60 bilaterally. Fortunately, His vision began to recover 6 months later. His visual acuity gradually improved in the following 2 years. The latest follow-up in August 2015 at 18 years old showed BCVA 6/7.5 and diminished cecentral scotoma. The patient is satisfied with the current visual status although the temporal sector optic atrophy remained unchanged.

**Conclusions:** In Leber's hereditary optic neuropathy (LHON), spontaneous recovery has been well known. But it does not occur often. Patients with 14484 mutation show a higher incidence of visual recovery than did patients with the 11778 or 3864 mutations, and that visual loss may depend more on epigenetic factors. Life style adjustment, keeping away from environmental trigger factors, Coenzyme Q10, and antioxidants supplements are known as protective epigenetic factors.

### Sudden Visual Impairment in Sellar Region Tumor: A Case of Pituitary Apoplexy

*First Author:* Anindita **WICITRA**

*Co-Author(s):* Syntia **NUSANTI**, Mohamad **SIDIK**

**Purpose:** To report about clinical symptom and methods to diagnose pituitary apoplexy.

**Methods:** A case report.

**Results:** A 40-year-old male came with a complaint of blurry vision for 1 year. Two months before admission, he felt sudden worsening of his visual acuity. He went to private hospital and there was bleeding in his brain CT scan. His right eye visual acuity was 1/300 and his left best visual acuity was 6/12. Relative afferent pupillary defect was positive in the right eye. In fundoscopic examination, both of optic nerve heads were atrophied. Left eye visual field examination revealed temporal hemianopsia. Cerebral MRI showed a hyper intense lesion on both T1WI and T2WI sequence in sellar region that extends into supra sellar region with sign of sellar floor ballooning. The result of MRI contrast was relatively similar, and the hormonal examination result was within the normal limit. Then he was scheduled for tumor removal surgery from neurosurgery department.

**Conclusions:** Early diagnosis and prompt treatment are important to avoid complications and prevent

persistent ophthalmic and neurological deficits. Many ancillary examinations are needed to confirm the diagnoses of pituitary apoplexy. The treatment of pituitary apoplexy should be made by experts from a multidisciplinary team.

### The Effect of Oral Methylprednisolone for Acute Pediatric Retrobulbar Neuritis

*First Author:* Sri **WARDHANI**

*Co-Author(s):* Hartono **HARTONO**, Indra **MAHAYANA**, Tatang **TALKA GANI**

**Purpose:** This study was aimed to investigate the efficacy of oral methylprednisolone compared with intravenous methylprednisolone for treating acute onset pediatric retrobulbar neuritis.

**Methods:** This was a retrospective study conducted at a tertiary hospital in Yogyakarta. We reviewed medical records of pediatric patients ( $\leq 18$  years old) diagnosed with retrobulbar neuritis from January to December 2015. The data were then divided into 2 groups (oral methylprednisolone 1 mg/kg body weight (BW)/day for 14 days vs IV methylprednisolone 30-40 mg/kg BW/day for 5 days followed by 1 mg/kg BW for 11 days), comparing baseline visual acuity and final visual acuity.

**Results:** Ten patients (17 eyes), 6 male and 4 female, were included in this study, with age range of 8 to 17 years old (mean  $13.7 \pm 3.4$  years old). The mean follow-up time was  $2.84 \pm 2.66$  months. Seven patients (70%) had bilateral retrobulbar neuritis and 3 patients (30%) had unilateral disease. Six patients (10 eyes) received intravenous methylprednisolone for 5 days, continued with oral methylprednisolone 1 mg/kgBW/day, and 4 patients (7 eyes) received oral methylprednisolone 1 mg/kgBW/day. There were no significant differences of mean baseline VA ( $1.51 \pm 0.87$  vs  $1.55 \pm 0.71$   $P = 0.813$ ) and mean final VA ( $0.75 \pm 0.67$  vs  $0.60 \pm 0.31$   $P = 0.887$ ) between 2 groups.

**Conclusions:** The efficacy of oral methylprednisolone in treating acute pediatric retrobulbar neuritis was comparable with IV mega dose of methylprednisolone. Further study is needed to investigate the safety between those 2 regimens.

### Transient Visual Loss Associated with Aortic Dissection: A Case Report

*First Author:* Hui-Chen **CHENG**

*Co-Author(s):* An-Guor **WANG**

**Purpose:** To report a case of aortic dissection with initial presentation of transient visual loss.

**Methods:** Case report.

**Results:** A 46-year-old male complained of a sudden onset of visual floaters and blurring in both eyes after standing up. One hour later, another episode of visual blurring in the right eye was noted, which recovered spontaneously 5 minutes later. In the meantime, he

had intermittent chest tightness. The patient had a past history of coronary artery disease, hypertension, hyperlipidemia, and sleep apnea syndrome. He visited our emergency department, where serial examinations showed that best corrected visual acuity (BCVA) was 6/8.6 in both eyes and color sense was 2/15 in both eyes using Ishihara color plates. The fundus examination showed unremarkable findings. Brain magnetic resonance imaging (MRI) disclosed a 10 mm fusiform dilatation of right intradural vertebral artery and chest X-ray showed widening of mediastinum. Subsequent chest computer tomography showed type A aortic dissection with dissecting flap from aortic root extending to proximal right brachiocephalic trunk, orifice of celiac trunk, bilateral common iliac arteries, and left external iliac artery. The patient then received emergent ascending aorta grafting and innominate artery debranching. Two weeks after the operation, his BCVA improved to 6/6 in both eyes and color sense was 7/15, 8/15 in right and left eye separately using Ishihara color plates.

**Conclusions:** We reported a case of aortic dissection with the initial presentation of transient visual loss. Prompt and early diagnosis is essential for these patients and could be life-saving.

### Wyburn-Mason Syndrome: A Case Report

*First Author: Manoa PANJAITAN*

*Co-Author(s): Syntia NUSANTI, Julie Dewi Barliana WINARTO, Anggun YUDANTHA*

**Purpose:** To demonstrate a rare case of Wyburn-Mason Syndrome (WMS), in which arterio-venous malformation (AVM) develop within the retina, orbit, and brain.

**Methods:** An 11-year-old girl came with gradually decreasing vision of her right eye for 1 year. There was no history of significant ocular illnesses nor systemic disease. From examination, she had 7-degree exotropia with visual acuity of no light perception of the right eye. She was found to have retinal AVM in the right eye, characterized by large, tortuous, and dilated vessels. Her left eye was unremarkable. The patient did not have any cutaneous lesion, and denied symptoms associated with neurological deficit. Based on the clinical appearance, cerebral Magnetic Resonance Imaging (MRI) and Magnetic Resonance Angiography (MRA) test was planned to search for any similar AVM within the brain.

**Results:** The cerebral MRI-MRA test revealed vascular malformation in the basal cistern which extended to the right intraorbital region, reaching the retrobulbar area. Our patient was diagnosed as WMS based on AVM involving the retina, orbit, and brain. Because the right visual acuity had been decreased to no light perception, the retinal lesion could be observed periodically. She was consulted to Interventional Radiology Department and was planned to undergo

digital subtraction angiography (DSA) procedure, possibly with embolization for the AVM in the brain.

**Conclusions:** Patients with Wyburn-Mason Syndrome have AVM in multiple organs, including the retina, orbit, and brain as demonstrated in this case. Neuroimaging should be considered when retinal AVM is seen.

## Ocular Imaging

### Acute Macular Neuroretinopathy and Paracentral Acute Middle Maculopathy in Korean Patients

*First Author: Byung Gil MOON*

*Co-Author(s): Lee JUNGHWA, Mingui KONG, Kyungmin LEE, Youngsook PARK, Joonhong SOHN*

**Purpose:** To report cases of AMN and PAMM as known a variant of AMN, and to introduce clinical characteristics and multimodal image findings including spectral-domain optical coherence tomography (SD-OCT) and OCT angiography (OCTA).

**Methods:** We reviewed patients suspecting AMN or PAMM, not typical retinal vascular obstruction for a 3-year period. PAMM was defined as hyporeflective parafoveal lesion on near-infrared (IR) image and hyperreflective band around the inner nuclear layer (INL) in SD-OCT. AMN was defined as hyperreflective band around the outer plexiform layer (OPL). We analyzed OCTA to localize the reduced flow signal in some patients.

**Results:** Five patients were diagnosed with PAMM and 1 patient was diagnosed with AMN, all of them had unilateral disease. Patients with PAMM presented with central or paracentral scotoma with or without decrease in visual acuity (VA). In follow-up visit, most patients showed recovery of VA and 2 patients had INL thinning. Patient with AMN presented with central scotoma with normal VA in her right eye. After 6 months of initial presentation, OPL and outer retinal layer were restored, but the central scotoma was not recovered. In OCTA, PAMM eyes showed the reduced flow signal in intermediate capillary plexus (ICP) and deep capillary plexus (DCP).

**Conclusions:** Considering the clinical characteristics of the disease, it seems to mostly be classified as retinal vascular obstruction such as retinal artery occlusion on clinic. However, it is diagnosed easily using IR image and characteristic SD-OCT lesions. We hope that this case series can help in an understanding of AMN and PAMM.

## Assessing Leak Location Based on Geography of Neurosensory Detachment on Retro Mode Scanning Laser Ophthalmoscopy in Central Serous Chorioretinopathy

First Author: Vishal **GOVINDHARI**

Co-Author(s): **SUMIT**, Jay **CHHABLANI**, Abhilash **GOUD**, Dmitrii **MALTSEV**, Niroj **KUMAR SAHOO**

**Purpose:** To assess the relationship between the leak location and neurosensory detachment (NSD) on retro-mode scanning laser ophthalmoscopy (RM-SLO) in clinically diagnosed cases of central serous chorioretinopathy (CSCR).

**Methods:** RM-SLO (Nidek, Fremont, CA) images of CSCR cases were analyzed on ImageJ (NIH, Bethesda, USA). The angiographic leak location was predetermined and co-localized on the RM-SLO. NSD parameters, including maximum vertical and horizontal diameters (Vmax and H max), area, and circularity index were measured. Leak location parameters, including 2-dimensional location of leak from intersection of Vmax and Hmax, quadrant, and hemispherical location of leak with respect to fovea were measured.

**Results:** RM-SLO images of 52 eyes with CSCR were evaluated, which included 46 males and 6 females. The mean age was  $42.15 \pm 8.41$  years, while the mean logMAR best corrected visual acuity was 0.127 (Snellen's equivalent 20/26). A positive correlation was noted between 2-dimensional location of the leak and the area ( $r_s = 0.52$ ,  $P = 0.0001$ ), vertical ( $r_s = 0.49$ ,  $P = 0.0002$ ), and horizontal ( $r_s = 0.53$ ,  $P = 0.0001$ ) diameters of NSD. The area of NSD showed a statistically significant ( $P < 0.0001$ ) difference with respect to the hemispherical location of leak with superior more than inferior. The difference in mean Hmax for different leak locations was statistically significant ( $P = 0.01$ ), with the highest mean noted with superotemporal leak.

**Conclusions:** The 2-dimensional leak location is a reliable determinant of area, vertical, and horizontal extent of NSD. Superior leaks present with larger areas of NSD, while superotemporal leaks result in wider NSD. RM-SLO can be used to reliably correlate the leak location and NSD in cases of CSCR.

## Comparison of Retinal Nerve Fiber Layer Thickness in Elderly Diabetic Patients with and without Peripheral Neuropathy

First Author: Bonifacio **BUNO**

Co-Author(s): Darby **SANTIAGO**

**Purpose:** The primary goal of this study was to determine the relationship between diabetic peripheral neuropathy and retinal nerve fiber layer (RNFL) thickness among elderly Filipinos with type 2 diabetes mellitus.

**Methods:** This was a cross-sectional study involving 106 subjects aged 60 years or older with type 2

diabetes mellitus recruited from the General Medicine and Diabetes Clinics of a tertiary government hospital. The diagnosis of peripheral neuropathy was made by performing a 10-gram monofilament test. Peripapillary retinal nerve fiber layer thickness was measured using the optic disc cube  $200 \times 200$  protocol of the Cirrus HD-OCT. T-test was used to compare RNFL thickness in those with and without peripheral neuropathy. The effects of age, sex, duration of diabetes, presence or absence of peripheral neuropathy, and retinopathy status on global and quadrantal RNFL thickness was assessed using multivariate analysis.

**Results:** Compared to subjects without peripheral neuropathy, significant thinning of the superior ( $P = 0.011$ ), inferior ( $P = 0.004$ ), and global ( $P = 0.008$ ) RNFL thickness were observed in subjects with peripheral neuropathy. There were no significant differences in RNFL thickness in the temporal ( $P = 0.211$ ) and nasal ( $P = 0.263$ ) quadrants between the 2 groups. Multivariate regression analysis revealed that presence of peripheral neuropathy has a significant effect on their superior ( $P = 0.036$ ), inferior ( $P = 0.010$ ), and global ( $P = 0.024$ ) RNFL thickness. Other factors such as age, sex, duration of diabetes, and retinopathy had no effect on global and quadrantal RNFL thickness.

**Conclusions:** RNFL thinning in the superior, inferior, and global indices on OCT has a significant correlation with diabetic peripheral neuropathy.

## Correlation of Mean Macular Thickness Using Optical Coherence Tomography with Near Visual Acuity in Patients with Diabetic Maculopathy

First Author: Darshana **RATHOD**

**Purpose:** To find the correlation between mean macular thickness and near visual acuity in patients of diabetic maculopathy.

**Methods:** This prospective study included 100 eyes of 76 patients with diabetic retinopathy with Clinically Significant Macular Edema (CSME). Diabetic patients with CSME were included in our study. Exclusion criteria included all patients with hazy ocular media, high myopia, pseudophakia, debilitating systemic disease, prior laser treatment, and any other macular pathology like macular degeneration, macular dystrophy, or macular hole. Detailed history including history of duration of diabetes and hypertension taken. Slit lamp examination was undertaken. Fundus examination was done using +90D lens Slit lamp biomicroscopy and Indirect ophthalmoscopy. Best corrected visual acuity (BCVA) for near vision was measured using Jaeger's chart. Spectral domain optical coherence tomography (OCT) was done to measure macular thickness.

**Results:** LogMAR near visual acuity measurement changed proportionally to a change in central macular thickness measurement. Correlation coefficient

obtained was 0.899, indicating a very strong correlation between near visual acuity and mean macular thickness.

**Conclusions:** Mean macular thickness as obtained from OCT is strongly related to near visual acuity in patients of diabetic maculopathy.

### Creating En Face and Cross-Sectional Corneal Tomograms Using Submicron Spatial Resolution Optical Coherence Tomography

First Author: Wei Li **CHEN**

**Purpose:** We reported a prototype of full-field optical coherence tomography (FF-OCT) system with isotropic sub-micron spatial resolution in the en face and cross-sectional views to observe corneal, limbal, and conjunctival structures in rabbit and rat eyes.

**Methods:** We set up a FF-OCT with broadband light source made from Ce3+:YAG single-cladded crystal fiber, pumped by a 1-W, 445-nm laser diode. The center wavelength and bandwidth are respectively 560 and 95 nm, giving the OCT system a high axial resolution of 0.9  $\mu\text{m}$ . We used this homemade OCT to observe the en face, cross-sectional, and 3D view of the cornea, limbal, and conjunctival structures in rabbit and rat eyes. Quantitative and qualitative data were provided.

**Results:** This FF-OCT can provide quantitative and qualitative data of rabbit/rat corneal structures with submicron resolution. The ridge-like structure of the limbus, corneal nerve bundles, and conjunctival vessels in rabbit and rat eyes can both been seen, both in vitro or in vivo. It also clearly identified the vessel walls and red blood cells in a rabbit model of corneal neovascularization.

**Conclusions:** This FF-OCT can provide a much improved quality of corneal structure than conventional OCT for cornea. It was expected to facilitate corneal disease diagnosis and treatment.

### Deep Neural Network-Based Method for Detecting Central Retinal Vein Occlusion Using Ultrawide-Field Fundus Ophthalmoscopy

First Author: Daisuke **NAGASATO**

Co-Author(s): Hiroki **MASUMOTO**, Yoshinori **MITAMURA**, Masanori **NIKI**, Hideharu **OHSUGI**, Hitoshi **TABUCHI**

**Purpose:** We aimed to assess 2 machine-learning technologies with deep learning (DL) and support vector machine (SVM) algorithms for detecting central retinal vein occlusion (CRVO) using ultrawide-field fundus images and investigated their performance.

**Methods:** A total of 125 images from 125 CRVO patients and 238 images from 202 non-CRVO normal subjects were included for analysis in this study. Sensitivity and specificity were calculated for the DL and SVM models.

Furthermore, receiver operating characteristic curve was prepared, and the area under the curve (AUC) was calculated.

**Results:** The sensitivity of the DL model for the diagnosis of CRVO was 98.4% [95% confidence interval (CI), 94.3-99.8%], specificity was 97.9% (95% CI, 94.6-99.1%), and AUC was 0.989 (95% CI, 0.980-0.999). In contrast, the sensitivity of the SVM model was 84.0% (95% CI, 76.3-89.3%), specificity was 87.5% (95% CI, 82.7-91.1%), and AUC was 0.895 (95% CI, 0.859-0.931). The DL model outperformed the SVM model with all indicators ( $P < 0.001$ ).

**Conclusions:** CRVO is a disease possibly resulting in vision loss. But early diagnosis of CRVO enables blindness prevention. Hence, the proposed DL-based model can be used with ultrawide-field fundus ophthalmoscopy to accurately diagnose CRVO and improve medical care in remote habitations, where it is difficult for patients to attend an ophthalmic medical center.

### Five-Year Changes in Anterior Segment Parameters in an Older Population in Urban Southern China: The Liwan Eye Study

First Author: Yu **JIANG**

Co-Author(s): Mingguang **HE**, Wei **WANG**, Decai **WANG**

**Purpose:** To investigate the longitudinal changes in static and dynamic anterior segment optical coherence tomography (AS-OCT) parameters and their predictors.

**Methods:** In November 2008 and November 2013, subjects underwent ocular examinations and AS-OCT imaging under dark and light conditions. Customized ZAAP software was used to analyze horizontal AS-OCT scans. Univariate and multiple linear regression was used to identify baseline predictors for 5-year changes in trabecular iris space area at 500  $\mu\text{m}$  (TISA500) in dark.

**Results:** A total of 186 (71.81%) subjects who underwent AS-OCT examinations in 2008 and 2013 were included for analysis. The mean age of analyzed subjects was  $64.7 \pm 7.0$  years, and 60.2% were female. Overall, there was a trend of narrowing of angle in dark, with decreased angle width parameters, anterior chamber parameter, increases in iris thickness parameters, and lens vault at 5 years (all  $P < 0.05$ ) in dark. Similar trends of parameter of light-to-dark changes were observed. After adjusting for age and sex, the following baseline parameters were associated with a greater decrease in TISA500 at 5 years: TISA500, IT750, ACA ( $P < 0.05$ ).

**Conclusions:** Angle width decreased, iris increased, and light-to-dark changes declined during the 5-year follow-up. Subjects with greater baseline wider angle width and more pronounced dark-to-light changes experienced greater angle narrowing at follow-up.

## Morphological Change of CNV in AMD After Treatment on OCTA

First Author: Hisaya **ARAKAWA**

Co-Author(s): Tomohiro **IIDA**, Ichiro **MARUKO**, Ruka **MARUKO**, Mei **SASAMOTO**, Kodama **YUKARI**

**Purpose:** To evaluate the morphological change of treatment naive choroidal neovascularization (CNV) after intravitreal anti-vascular endothelial growth factor injection in optical coherence tomography angiography (OCTA).

**Methods:** Fifteen eyes (15 patients, mean 72.5 years) with CNV due to age-related macular degeneration were examined in the current study. CNV images of the outer retina in OCTA were analyzed using ImageJ. Size, vessel density (VD), and the number of vessels, terminal ends, and branches of CNVs were measured in the outer retina of OCTA during the follow-ups.

**Results:** Mean CNV size ( $\text{mm}^2$ ) significantly decreased from 1.35 at baseline to 1.20 at 3 months ( $P = 0.01$ ), however it did not differ from 1.34 at 6 months ( $P = 0.56$ ). Mean VD gradually decreased from 0.650 at baseline to 0.641 at 3 months ( $P = 0.09$ ), and 0.631 at 6 months ( $P = 0.02$ ). Mean number of blood vessels and the terminal ends significantly decreased from 170 and 532 at baseline to 147 and 464 at 3 months ( $P < 0.01$  and  $P = 0.03$ , respectively), but there was no difference at 6 months (149, 470,  $P = 0.09$ ,  $P = 0.05$  respectively). There was no difference in mean number of branches before and after treatment (both  $P = 0.6$ ).

**Conclusions:** CNV size decreased once after treatment and returned to the baseline level at 6 months. On the other hand, the blood vessel density decreased at 6 months. Since there is no difference in the number of vessels, terminal ends, and branches at 6 months, CNV might be narrowing and shortening, although CNV shape remained.

## Multicolor Imaging in Central Serous Chorioretinopathy: A Quantitative and Qualitative Comparison with Fundus Autofluorescence

First Author: Vishal **GOVINDHARI**

Co-Author(s): Jay **CHHABLANI**, Roberto **GALLEGO-PINAZO**, Ramachandran **NAIR**, Dolz-Marco **ROSA**, Sumit **SINGH**

**Purpose:** The aim of the study is to compare the findings of multicolor imaging (MCI) and fundus autofluorescence (FAF) in central serous chorioretinopathy (CSCR).

**Methods:** MCI and FAF images (Spectralis, Heidelberg engineering, Germany) of CSCR were analyzed. Imaging correlates of 6 clinical findings – retinal pigment epithelium (RPE) atrophy, RPE alterations, neurosensory detachment (NSD), subretinal deposits, pigment epithelial detachments (PED),

and pachyvessels were recorded using ImageJ (NIH, Bethesda, USA). Quantitative analysis included number of lesions and cumulative area of the lesions, while qualitative analysis included the presence or absence along with definition of the lesions. Single masked observer performed the measurements twice with good repeatability.

**Results:** Fourteen eyes of 10 patients with CSCR were evaluated. The mean age was  $51.5 \pm 10.1$  years. Mean logMAR visual acuity was 0.259 (Snellen's equivalent 20/36). In comparison to FAF, MCI showed higher number as well as of higher mean cumulative area of RPE atrophic areas ( $7.32 \pm 6.98$  vs  $6.66 \pm 6.53 \text{ mm}^2$ ,  $P = 0.133$ ) and RPE alterations ( $16.89 \pm 12.24$  vs  $16.47 \pm 13.78 \text{ mm}^2$ ,  $P = 0.727$ ). A similar trend was noted with respect to the mean cumulative area of NSD ( $11.8 \pm 5.38$  vs  $11.58 \pm 8.6 \text{ mm}^2$ ,  $P = 0.917$ ) and PED ( $1.93 \pm 1.63$  vs  $1.68 \pm 1.44 \text{ mm}^2$ ,  $P = 0.132$ ). Detection rate of subretinal deposits was equal for both imaging modalities while the definition of all the clinical findings was better on MCI compared to FAF.

**Conclusions:** MCI is of great value in understanding various changes at different anatomical levels in the clinical spectrum of CSCR and appears to be superior to FAF. MCI can be an imaging modality of choice in documenting and following-up structural changes in eyes with CSCR.

## Novel Use of EDI-OCT for Detection of Submacular Hemorrhage in the Presence of Dense Preretinal Hemorrhage: A Case Series of 3 Patients

First Author: Niall **CROSBY**

**Purpose:** To describe the relative findings of enhanced-depth imaging optical coherence tomography (EDI-OCT) and standard spectral-domain optical coherence tomography (SD-OCT) in a series of patients with subhyaloid or sub-internal limiting membrane (sub-ILM) hemorrhage.

**Methods:** A case series of 3 patients in which both EDI-OCT and conventional SD-OCT were used to attempt to image the retinal layers below a dense pre-retinal hemorrhage.

**Results:** In all 3 patients, the presence of a thick sub-ILM or subhyaloid hemorrhage prevented imaging of the retinal structures by standard SD-OCT. The use of EDI-OCT allowed visualization of the underlying retina and showed the presence or absence of submacular hemorrhage.

**Conclusions:** In cases of dense pre-macular hemorrhage caused by retinal macroaneurysm, polypoidal choroidal vasculopathy, or retinal trauma, it can be difficult to image the underlying macula with conventional SD-OCT. The use of EDI-OCT, which is widely available, can help ophthalmologists decide whether there is submacular blood requiring surgical

displacement.

## Preoperative Detection of Posterior Capsule Rupture with Anterior Optical Coherence Tomography in a Patient with a Traumatic Cataract: A Case Report

*First Author:* Yoshiko **YAMAWAKI**

*Co-Author(s):* Masaomi **KUBOTA**, Tadashi **NAKANO**, Ryo **TERAUCHI**, Akira **WATANABE**, Tomoyuki **WATANABE**

**Purpose:** We reported the case of a patient in whom posterior capsule rupture was confirmed preoperatively with optical coherence tomography (OCT; CASIA2), and a favorable outcome was achieved with vitreous surgery and intrascleral intraocular lens (IOL) fixation.

**Methods:** The patient, a 46-year-old man, was referred to our department due to an injury that resulted from his left eye being directly hit by an elastic band. At the initial examination, his left visual acuity was 0.02. He exhibited hyphema and strong corneal edema, making it difficult to confirm the state of the lens. One week after injury, a traumatic cataract was observed. Despite the lack of clarity under slit lamp microscopy, anterior segment OCT was able to confirm posterior capsule rupture in the post pole position of the lens.

**Results:** We attempted lens removal via suction after an anterior capsulotomy. However, as posterior capsule rupture was confirmed in accordance with the OCT findings, the lens was treated with a vitrectomy. As we speculated that Zinn's zonule rupture had also occurred, the anterior capsule was removed, and the IOL underwent intrascleral fixation. Postoperatively, the patient's left visual acuity improved to 1.2.

**Conclusions:** We were able to preoperatively confirm posterior capsule rupture using anterior segment OCT in a patient with a traumatic cataract, in whom the cataract had progressed. This finding could be useful for selection of surgical strategy in similar cases.

## Trash to Treasure RetCam: Smartphone Fundus Photography

*First Author:* Prithvi **CHANDRAKANTH**

**Purpose:** How to prepare the Trash to Treasure (T3) RetCam with used materials in the OPD and take anterior segment - fundus photos and videos efficiently in minutes. Smartphone fundus photography has become an alternative to document, analyze, and share pictures and videos of the optic nerve and retina. But what if you don't have the proper device to align your smartphone and the condensing lens in the outpatient department (OPD) and you need to take a picture. That's when the T3 RetCam comes in handy, which you can actually build with the used materials from OPD in just a few minutes.

**Methods:** The Empty hand-sanitizer bottle was taken and the bottle bottom was cut and modified so as to

house the 20D lens and the bottle top was stuck to the phone cover and phone in a proper alignment. Keeping the flash on in continuous mode, images and videos of the dilated fundus were captured at ease without an expensive sophisticated machine.

**Results:** T3 RetCam - An innovative method to prepare a smartphone fundus photography device with the used materials in OPD such as the sanitizer bottle.

**Conclusions:** 1. Good quality retina photograph and videos can be taken anytime anywhere, that are comparable to other fundus cameras. 2. Capturing anterior segment photos besides the fundus photographs. 3. Recycling the used OPD materials to decrease environmental burden and reduce the carbon footprint - GO GREEN 4. An inexpensive and stable device which can be used for teleophthalmology in rural health centers and camps.

## Ultrasonographic Evaluation in a Case of Idiopathic Intracranial Hypertension

*First Author:* Darshana **RATHOD**

*Co-Author(s):* Samir **SERASIYA**

**Purpose:** To assess the efficacy of B-Scan Ultrasonography in idiopathic intracranial hypertension (IIH).

**Methods:** A case of an 18-year-old, obese female who presented with a history of headaches and gradually progressive dimness of vision in both eyes for 4 months. Detailed history was elicited. On examination, best corrected visual acuity (BCVA) was noted in both eyes. Anterior segment examination was done with slit lamp biomicroscopy. Fundus examination was done with +90D lens slit lamp biomicroscopy and indirect ophthalmoscopy. Magnetic Resonance Imaging (MRI) and Magnetic Resonance Angiography (MRA) were ordered. Ultrasonographic B-Scan (USG B-SCAN) was performed. Lumbar puncture was done.

**Results:** On examination, BCVA was 6/60 in both eyes. Anterior segment examination was within normal limits with normal pupillary reaction. On fundus examination, bilateral disc oedema with fullness of veins noted. MRI and MRA were normal. USG B-SCAN was done which showed increase in optic nerve sheath diameter to 6.30 mm in right eye and 6.70 mm in left eye with a "CRESCENT" sign. Presence of the echolucent arachnoidal fluid is in the crescent shape around optic nerve. Lumbar puncture showed increased ICP to 26 mm Hg. Patient was diagnosed to have IIH. Patient was put on tablet acetazolamide and syrup glycerol, and she improved.

**Conclusions:** USG B-Scan provides out-patient testing and real-time imaging in cases of IIH. It can be done urgently and hence proves to be a useful adjuvant in the diagnosis and management of patients with IIH.

## Validity of Mydriatic 3-Field Fundus Photograph Using Portable Fundus Camera for Mild Diabetic Retinopathy

First Author: Patriotika **MUSLIMA**

Co-Author(s): Erwin **ISKANDAR**

**Purpose:** To determine the validity of mydriatic 3-field fundus photograph using portable fundus camera as a screening tool for mild diabetic retinopathy detection.

**Methods:** This study was a diagnostic test using cross sectional methods. One hundred eyes of diabetes mellitus patient underwent mydriatic 3-field fundus photography using portable fundus camera, followed with standard mydriatic 7-field fundus photography using tabletop fundus camera. Images were graded independently by a vitreoretina specialist for the presence of no or mild nonproliferative DR. The validity was assessed as the main outcome.

**Results:** In comparison with the standard mydriatic 7 field fundus photography, the sensitivity and specificity of portable mydriatic 3-field fundus photographs for detection of mild DR were 80% (95% CI: 64.1-90.0%) and 98.5% (95% CI: 91.8-99.7%).

**Conclusions:** Mydriatic 3-field fundus photographs with portable fundus camera can be an effective method for the screening of mild diabetic retinopathy with high sensitivity and specificity.

## Ocular Oncology & Pathology

### A 13-Year-Old Male Presenting with a Large Brow Mass: Pilomatrixoma

First Author: Faye **LEVINA**

Co-Author(s): Anthony Christopher **ORTIZ**, Erwin **PALISOC**

**Purpose:** Pilomatrixoma, also known as Malherbe's calcifying epithelioma, is a benign skin tumor arising from outer root sheath cell of the hair follicle. It is most commonly found on the face and neck. In the orbit, it is usually located in the intercanthal and at the brow area. It usually presents as a red or bluish well-circumscribed solitary subcutaneous nodule. Tumors usually measure 0.5 cm-3 cm in size. It grows slowly and attains its full size over 6 to 12 months. This paper aimed to present an unusual case of a Pilomatrixoma in a pediatric patient that presented as a rapidly growing large brow mass, to which its size has been the largest reported on the brow up to date.

**Methods:** This is a case report.

**Results:** The patient presented with a 4 x 3.3 cm x 3.3 cm foul smelling, pedunculated, round right brow mass, with necrotic tissue and ulcerations at the base.

The presumed diagnosis was squamous cell carcinoma. He underwent incision biopsy of the tumor, with the preliminary histopathology result of pilomatrixoma. The patient then underwent excision biopsy with skin grafting. Histopathological examination of the mass revealed a tumor that consisted of prominent ghost cells, with basaloid cells noted at the periphery, which is typical of pilomatrixoma.

**Conclusions:** Pilomatrixoma is a rare benign skin tumor and is often misdiagnosed at the clinic. The diagnosis of pilomatrixoma is only established after excision and histological examination. Complete surgical excision is the treatment of choice.

### A 5-Year Review of Enucleated Pseudoretinoblastoma

First Author: Aubhugn **LABIANO**

Co-Author(s): Rolando Enrique **DOMINGO**

**Purpose:** To report the prevalence and types of pseudoretinoblastoma in enucleation specimens submitted to a national university ocular pathology laboratory from July 2013 to June 2018.

**Methods:** Pathology records were reviewed to identify instances when enucleated eyes clinically suspected to have retinoblastoma had a different diagnosis on histopathological examination. Hematoxylin-eosin-stained sections of these cases were re-examined. Clinical data were extracted from the pathology examination request forms and hospital patient charts when available.

**Results:** Of the 196 eyes with suspected retinoblastoma, 8 eyes (4.08%) of 8 patients had pseudoretinoblastoma. Age at enucleation ranged from 1 month to 12 years, and 7 out of 8 patients were 5 years old or younger. The sex ratio was 1:1. The most common presenting symptom was leukocoria. Diagnostic tests done prior to surgery included a B-scan ocular ultrasound and cranio-orbital computed tomography scan. The ocular conditions mimicking retinoblastoma consisted of persistent fetal vasculature (2 eyes), retinal dysplasia (2 eyes), hamartoma of the retinal pigment epithelium (1 eye), choroidal hemangioma (1 eye), uveal prolapse with vitreous hemorrhage (1 eye), and optic nerve glioma with corneal rupture (1 eye).

**Conclusions:** The mismatch rate between the clinical diagnosis of retinoblastoma and the histopathologic result was similar to our center's rate from 2003 to 2012 and was 50% lower than the rate from the 2003 to 2008 period. Clinicians, in addition to performing a thorough clinical evaluation, should endeavor to judiciously utilize the available and appropriate diagnostic means in order to differentiate retinoblastoma from pseudoretinoblastoma.

## A Case of Vitreomacular Traction with Marked Peripheral Vitreoretinal Adhesion: A Clinicopathological Study

First Author: Yukiko **SHIBATA**

Co-Author(s): Akio **FUJIYA**, Susumu **ISHIDA**, Satoru **KASE**, Kousuke **NODA**

**Purpose:** Vitreomacular traction syndrome (VMTS) occurs when an incomplete posterior vitreous detachment (PVD) leads to vitreous traction at the macula, resulting in subsequent macular distortion and visual impairment. We herein reported a case of VMTS with marked peripheral vitreoretinal adhesions.

**Methods:** Case report.

**Results:** A 38-year-old woman complained of blurred vision and floaters in her left eye. When she visited a nearby clinic 1 month later, visual acuity was 1.0 OD and 0.6 OS. Slit lamp examination revealed shallow anterior chamber OU. Axial length was 21 mm OU. Fundus examination and optical coherence tomography showed VMTS with traction retinal detachment (TRD). Due to deterioration of TRD, she was referred to our department 5 months after the initial presentation. Her visual acuity was 0.15 OS. Pars plana vitrectomy with cataract surgery was scheduled. Since there were marked vitreoretinal adhesions in the peripheral area at 360 degrees, creation of a complete PVD was not successful. Vitrectomy finished after the removal of the proliferative membrane adjacent to the optic disc and internal limiting membrane. Histopathological analysis of the membrane and cytological examination of vitreous fluid using cell block technique showed aggregation of mononuclear cells. In addition, immunohistochemical study demonstrated the positive signals for glial fibrillary acidic protein in the mononuclear cells. Whereas the TRD was resolved, visual acuity remained 0.08 OS due to disruption of the ellipsoid zone 6 months after vitrectomy.

**Conclusions:** Marked peripheral vitreoretinal adhesion in VMTS may be caused by proliferation of glial cells in the vitreoretinal interface.

## A Case Report of an Unusual Presentation of Ocular Rhabdomyosarcoma

First Author: Jiyeon **KIM**

**Purpose:** To report an unusual presentation of a young girl who was referred to the ophthalmology team with a 1-day history of acute unilateral ptosis and proptosis post trauma. The biopsy later confirmed that she has ocular rhabdomyosarcoma originating from superior rectus muscle.

**Methods:** A 7-year-old girl was referred by her general practitioner with a 1-day history of ptosis and proptosis in her right eye after falling over and knocking her head against the floor the day before. On examination, she had marked proptosis in her right eye associated

with partial ptosis. Vision was unaffected and she had normal pupil reaction to light and accommodation. On examination, she had a large granulomatous tissue arising from the superior aspect of her right globe. The rest of the eye examination was unremarkable.

**Results:** The case was investigated with both blood tests and imaging studies. The orbit CT scan showed that she had a large tumor extending from the right superior rectus muscle, suspicious of thyroid eye disease or rhabdomyosarcoma. A provisional diagnosis of rhabdomyosarcoma was made. She was taken into the theatre for biopsy, which later confirmed the diagnosis.

**Conclusions:** Rhabdomyosarcoma can present with a short duration of symptoms and signs. This case report shows how a patient can present even with just a 1-day history. Therefore, if a patient presents with a suspicious looking orbital lesion, rhabdomyosarcoma should be considered as a potential diagnosis, especially in young age.

## Complications of Intravitreal Melphalan for Vitreous Seeding in Retinoblastoma

First Author: Hussain **KHAQAN**

**Purpose:** To elaborate the complications of intravitreal melphalan for treatment of vitreous seeding.

**Methods:** A total of 105 eyes of 105 retinoblastoma patients were enrolled between January 2015 and January 2018. Injection of melphalan was prepared in operation room under aseptic measures. After eye confirmation by indirect ophthalmoscopy, injection of intravitreal melphalan was performed at 3 to 3.5 mm from limbus using 27 gauge needle of 1 cc syringe and immediately 2 cycles of freeze thaw cryotherapy was done at injection site upon removal of needle. Eyeball was copiously irrigated to lessen the surface toxicity. After injection eye pad was applied, patients were instructed to instill topical moxifloxacin 0.5% eye drops 4 times a day for 1 week and advised follow-up at first post-injection day and then at the 3rd week. At each follow up, eye examination was done by indirect ophthalmoscopy and retinal images were recorded using retcam MII for comparison with previous ones.

**Results:** A total of 105 eyes that had seeding of retinoblastoma showed post injection complications from minor to major that included: conjunctival hemorrhages (n = 22), cataract formation (n = 12), retinal toxicity (n = 8) in the form of peripheral salt and pepper retinopathy, and 1 eye that developed unexplained visual loss after the 4th intravitreal injection and later on phthisis bulbi. No intraocular hemorrhages or retinal detachment were observed in any cases. No other complications noted.

**Conclusions:** Severe complications are rare but need long-term follow-up and large data to conclude the complications of intravitreal melphalan.

## Deep Learning Distinguishes Pathological Images of Mucosa-Associated Lymphoid Tissue Lymphoma from IgG4-Related Disease

First Author: Masato **AKIYAMA**

Co-Author(s): Yuya **FUJII**, Yusuke **SANO**, Koh-hei **SONODA**, Mika **TANABE**, Hiroshi **YOSHIKAWA**

**Purpose:** To investigate the utility of deep learning system for the pathological diagnosis of intra-orbital tumors.

**Methods:** For the training set, we used 1450 pathological images of the orbital mass regions which were surgically obtained from 11 patients with IgG4-related disease (574 images) and 19 patients who were diagnosed as mucosa-associated lymphoid tissue (MALT) lymphoma (876 images). For the validation set, we randomly selected 10 images from each of 5 patients with MALT lymphoma and 5 patients with IgG4-related disease who were not included in the training set. All pathological images were obtained as high-resolution JPEG format files (1200 x 900 pixels) using a  $\times 20$  objective lens. We conducted a deep learning by applying fine-tuning of the pre-trained model (VGG16) by Keras (ver. 2.1.5) on TensorFlow (ver. 1.6.0) backend. The predictive accuracy was evaluated by area under the curve (AUC) of receiver operating characteristics (ROC) curve in the validation set.

**Results:** In the validation set, the AUC of ROC was 0.884. The overall concordance between clinical and predicted diagnoses was 87.8%. We observed 90.0% sensitivity and 72.0% specificity for detecting MALT lymphoma. Among the 5 individuals with MALT lymphoma, 2 individuals (40%) were correctly diagnosed in all the 10 images as MALT lymphoma.

**Conclusions:** Although further improvement of predictive accuracy is warranted for clinical use, our results suggest that deep learning systems may contribute to the pathological diagnosis of intra-orbital tumors.

## Evaluation of Optic Nerve Head and Macular Parameters Pre- and Post-External Beam Radiotherapy in a Patient with Head and Neck Tumor

First Author: Tan **CK**

Co-Author(s): Wan Hazabbah **WAN HITAM**

**Purpose:** To compare mean optic nerve head and mean macula parameters pre- and 6 months post external beam radiotherapy in patients with head and neck cancers.

**Methods:** This was a cross-sectional study. 30 patients histologically diagnosed head and neck cancers from 1 hospital were recruited from December 2016 to August 2017. Ocular examination included macula thickness and optic nerve head parameters (disc area, rim area, cup volume, cup disc ratio, and retina nerve fiber layer

thickness) were evaluated using optical coherence tomography (OCT) provided by Stratus OCT (Carl Zeiss Meditec, Inc., Dublin, CA, USA). Six months following radiotherapy, similar assessment was carried out and the finding was analyzed using SPSS, comparing mean findings pre- and post-radiotherapy using paired *t*-test.

**Results:** Optic nerve head mean retinal nerve fiber layer thickness (RNFL) pre-radiotherapy was 92.23  $\mu\text{m}$  (SD = 12.14) while post radiotherapy was 93.07  $\mu\text{m}$  (SD = 11.71), show statistical significant thickening of  $P = 0.047$  ( $P < 0.05$ ). Within optic nerve head RNFL, inferior quadrant mean RNFL thickness pre-radiotherapy was 117.47  $\mu\text{m}$  (SD = 27.67), while post radiotherapy was 120.60  $\mu\text{m}$ , with statistically significant thickening of  $P = 0.041$  ( $P < 0.05$ ). Mean macula thickness of all 4 quadrants and others optic nerve head parameters show no statistically different pre- and post-radiotherapy.

**Conclusions:** Optic nerve head RNFL thickness could be used as a predictor or early indicator for development of radiation optic neuropathy. Further research and larger studies need to be conducted before we can further draw the conclusion of other parameters related to early exposure to radiation.

## Extramedullary Plasmacytoma of Orbit Masquerading as Retrobulbar Hemorrhage Following Peribulbar Block

First Author: Bijaya **BHUSAL**

Co-Author(s): Gulshan Bahadur **SHRESTHA**

**Purpose:** To report a case of solitary extramedullary plasmacytoma of lacrimal gland masquerading as retrobulbar hemorrhage following peribulbar block for cataract surgery.

**Methods:** A 60-year-old male was posted for right eye cataract surgery. After peribulbar block, he developed right eye periorbital swelling with tense eyeball. Surgery was abandoned and patient was managed conservatively in the line of retrobulbar hemorrhage. Next day the swelling subsided and on examination a diffuse mass was felt in the superolateral aspect of right orbit. CT scan orbit revealed a homogeneously enhancing mass in right lacrimal region. Right eye lateral orbitotomy with excisional biopsy of the mass was done.

**Results:** Histopathology confirmed plasmacytoma of lacrimal gland. Multiple myeloma screening was negative and a solitary extramedullary plasmacytoma arising from the right lacrimal gland was diagnosed. The patient was subsequently referred for radiotherapy.

**Conclusions:** Extramedullary plasmacytoma of orbit is a rare tumor. It is very rare to diagnose a solitary plasmacytoma of orbit masquerading as retrobulbar hemorrhage following peribulbar block.

04

## Eyelid Malignancies: Bangladesh Scenario

First Author: Syeed **KADIR**

Co-Author(s): Golam **HAIDER**, Rajendra **MAURYA**,  
Murtuza **NURUDDIN**, Nishat **PARVEEN**

**Purpose:** To assess the rate, and explicate the clinical features and management strategies of eyelid malignancies in Bangladesh.

**Methods:** We analyzed 314 patients with histological confirmed malignant eyelid tumors in 2 tertiary eye care hospitals of Bangladesh, from January 2008 to June 2018.

**Results:** Of the total, the rate of Sebaceous gland carcinoma (SGC) was 42.04% (132 cases), followed by Basal cell carcinoma (BCC) at 36.62% (115 cases), Squamous cell carcinoma (SqCC) at 19.11% (60 cases), Malignant melanoma at 1.91% (06 cases), and clear cell carcinoma at 0.032% (01 case). 52.54% of patients were male and 47.46% were female. The mean age of all patients was 58.79 years (34-94 years). Among the patients of basal cell carcinoma, pigmented lesion was in 89% of cases. Invasion to orbit was found in 31 cases (9.87%), involvement of Lymph node was in 24 cases (7.34%), and metastasis was assessed in 2.73% of cases. Frozen section biopsy was performed in 165 cases (52.54%), excision biopsy was done in 45.13% cases, and 13 cases (4.14%) needed orbital exenteration. A new reconstruction procedure named triangular musculocutaneous flap was performed in 27 cases (8.59%) to reconstruct the moderate eyelid defect following local resection.

**Conclusions:** Various clinical and histopathology proven malignant eyelid tumors were noted in the eyelids, where sebaceous gland carcinoma was highest in occurrence in Bangladesh. Early diagnosis and treatment play a key role in reducing morbidity and mortality.

## Eyelid Tumors in a Major Health Center in Yogyakarta

First Author: Annisa **AYUNINGTYAS**

Co-Author(s): Banu **DIBYASAKTI**, Datu **RESPATIKA**, Agus **SUPARTOTO**, Purjanto **UTOMO**

**Purpose:** This study aimed to investigate the prevalence of eyelid tumors in one health center.

**Methods:** A total of 94 patients were enrolled in a descriptive study. The data were taken retrospectively from medical records. All patients were diagnosed with eyelid tumors from 2017 to 2018 by histopathological examination.

**Results:** Among subjects, 56 (59.6%) were male and 38 (40.4%) were female. No difference in laterality (OD 46% vs OS 50%) was found. Sebaceous carcinoma was found in 15 (16%) patients, followed by squamous cell carcinoma (SCC) 13 (13.8%), basal cell carcinoma (BCC) 11 (11.7%), epidermoid cysts 7 (7.4%), non-Hodgkins

lymphoma 7 (7.4%), and others. We also found that 11 (11.7%) patients showed an inflammation appearance only. The therapy was varied: extirpation and biopsy (39.4%), wide excision (28.7%), excision and biopsy (18.2%), exenteration (10.6%), and orbitotomy (3.2%).

**Conclusions:** The eyelid tumor was found equally in the right and left eyes. Sebaceous carcinoma, followed by SCC and BCC, were the most common eyelid tumor found in this study. A further study is needed to determine the risk factors from each tumor.

## ICRB Group C and Group D Retinoblastoma: An Aggressive Treatment Approach and Outcome

First Author: Manabjyoti **BARMAN**

**Purpose:** To evaluate efficacy and safety of combined intravitreal chemotherapy (Topotecan), transpupillary thermotherapy (TTT) / cryotherapy along with systemic chemotherapy in management of ICRB GR-C & D Retinoblastoma.

**Methods:** Retrospective analysis of Gr-C & Gr-D retinoblastoma cases undergoing systemic chemotherapy followed immediately by multiple intravitreal injections of Topotecan at 3-week intervals along with TTT/cryotherapy were done.

**Results:** A total of 26 eyes of 26 patients were analyzed. Average follow-up was 2.9 years. Regression of tumor achieved in 23 eyes. Two cases were found refractory to treatment, necessitating enucleation. One patient developed a new mass after regression of the primary. Repeat chemotherapy and EBRT was advised to the case with subsequent regression. One patient developed CNVM secondary to TTT, treated with Anti-VEGF. None of the patients developed metastasis during follow-up.

**Conclusions:** Intravitreal chemotherapy along with TTT/cryotherapy, started immediately after systemic chemotherapy with aggressive follow-up, appears effective and safe in the management of Retinoblastoma GR-C & D.

## Intraocular Lymphoma: An Atypical Presentation

First Author: Ramya **APPANRAJ**

**Purpose:** The purpose of this presentation was to discuss about an interesting case of non-Hodgkins lymphoma neck later on developed intraocular lymphoma.

**Methods:** A 53-year-old female presented with blurring of vision in the left eye for 1 week. She had non-Hodgkins lymphoma neck 6 months back and underwent treatment. Vision was 6/6 in right eye and 6/9 in left. Early lens changes with multiple retinal infiltrates in left eye noted diagnosed as metastasis uveitis.

**Results:** Blood investigations were all negative. No mass lesion noted in MRI. Vitreous tap was negative for malignancy and Fuch's profile. 2 years later, presented with 6/18 vision with retinal hemorrhages with subretinal infiltrates in left eye. MRI findings suggested lymphomatous deposits, and cytology revealed malignant cells.

**Conclusions:** This case was successfully treated with external beam radiotherapy. Points to discuss: Treatment options and Difficulties of subretinal biopsy.

### Lower Level of Progesterone Receptor Associated with the Long Exposure of Exogenous Progesterone in Females with Orbitocranial Meningioma

*First Author: Prima NURLAILA*

*Co-Author(s): Indra MAHAYANA, Datu RESPATIKA, Dhimas SAKTI, Agus SUPARTOTO*

**Purpose:** The purpose of this study was to investigate the association between level of Progesterone Receptor (PR) and length of exogenous progesterone exposure in females with orbitocranial meningioma.

**Methods:** We conducted a cross-sectional study that included 50 women (25 meningiomas and 25 non-meningiomas). All cases were confirmed by a multi-sliced head CT scan and histopathological examination following the surgical procedure. Age-matched controls ( $\pm 2$  years) were meningioma-free, confirmed by clinical examination and head CT scan. In both groups, the blood sample was drawn for examination of Progesterone Receptor (PR), Estrogen Receptor  $\alpha$  (ER $\alpha$ ), and Estrogen Receptor  $\beta$  (ER $\beta$ ) mRNA expression level using quantitative Polymerase Chain Reaction (qPCR).

**Results:** The mean age of meningioma group was  $46 \pm 4.93$ , while in non-meningioma group was  $47 \pm 5.25$  years old. Meningioma group had a longer exposure of exogenous progesterone (mean duration  $13.11 \pm 6.93$  years) than non-meningioma group (mean duration  $5.32 \pm 2.96$  years) ( $P < 0.05$ ). The mean level of PR mRNA expression in meningioma group was significantly lower than in non-meningioma group ( $P < 0.05$ ). While the mean level of ER $\alpha$  mRNA expression in meningioma group was significantly higher than in non-meningioma group ( $P < 0.05$ ). There was a significant association between lower level expression of PR with the longer exposure of exogenous progesterone in females with orbitocranial meningiomas ( $P < 0.05$ ).

**Conclusions:** We found that low level of PR expression and high level of ER expression were correlated with the incidence of meningioma. Thus, ER and PR may involve in the pathogenesis of meningioma.

### Masquerading as the Masquerader!

*First Author: Utkarsha PADWAL*

*Co-Author(s): Indumati GOPINATHAN, Anuradha K. MURTHY, Akshay NAIR, S NATARAJAN*

**Purpose:** To report the rare case of a trichoblastoma of an eyelid, which was masquerading as the sebaceous cell carcinoma.

**Methods:** A 59-year-old female presented with right upper eyelid mass of 6 months duration. The mass was progressively increasing in size and ulceration was noted with 1 episode of bleeding on scratching. It was painless and non-tender on touch. On examination, the nodular mass approximately measured  $1.2 \times 0.6 \times 0.4$  cm. No regional lymphadenopathy was noted. Clinically – based on the location, age, history, complaints and appearance – the primary differential diagnosis was sebaceous gland carcinoma (SGC). The patient underwent excisional biopsy with 4 mm surgical margins with eyelid reconstruction using a Cutler-Beard flap in 2 stages.

**Results:** The pathological diagnosis was trichoblastoma, a benign hair follicle tumor originating from follicular germinative cells. The head, particularly the scalp, is a common site, but the eyelid is a rare site. Trichoblastomas are not aggressive unless they have been misdiagnosed or contain an element of basal cell carcinoma. Complete surgical excision is the treatment of choice. This presentation reviews the literature and discusses the pathology of trichoblastoma.

**Conclusions:** While in Asians SGC remains the most common malignant eyelid tumor, occasional cases like this remind us that every sinister lid mass is not always an SGC!

### Ocular Surface Squamous Neoplasia with Squamous Cell Carcinoma of Ala of Nose in a Patient with Xeroderma Pigmentosa: A Rare Case Report

*First Author: Krati GUPTA*

*Co-Author(s): Jayanta DAS, Saurabh DESHMUKH, Diva MISRA*

**Purpose:** To report a rare case of Ocular Surface Squamous Neoplasia with squamous cell carcinoma of ala of nose in a patient with xeroderma pigmentosa.

**Methods:** Case report with complete photo documentation of the lesion and the histopathological findings.

**Results:** We reported a case of a 19-year-old male, known case of xeroderma pigmentosa who presented to the outpatient department of our hospital with a chief presence of a large mass in the left eye (OS) for the past year. On examination his visual acuity was 6/6, N6 in right eye and perception of light positive with projection of rays accurate in OS. Slit lamp examination revealed a large grayish-white lesion with irregular

border and a feeder vessel in the bulbar conjunctiva and covering the entire cornea. USG b scan was normal in OS. An ulcerative lesion of around 0.6 x 0.6 cm was noted on the left ala of the nose. Excision biopsy was carried out, followed by application of MMC and amniotic membrane graft. The histopathological examination of the specimen showed neoplastic squamous cells. The patient was referred to an ENT specialist for ulcerative lesion over left ala of nose. Histopathology of the lesion revealed SCC of left ala of nose. The patient has maintained a best corrected visual acuity of 6/12 in OS over 5 years of follow-up.

**Conclusions:** To the best of our knowledge, this is a first of its kind case, not reported so far in the literature.

### Ophthalmomyiasis Interna in Ocular Malignancy: A Case Series

*First Author: Rajendra MAURYA*

*Co-Author(s): Syeed KADIR, Diva MISRA, Diksha Prakash SHARIN, Virendra P SINGH, Tanmay SRIVASTAV*

**Purpose:** Ophthalmomyiasis is a rare but very devastating ocular morbidity often seen in patients of ocular malignancy in tropical countries. The aim of this study was to describe the clinical spectrum, entomological features, and management outcome of ocular malignancy cases complicated by ophthalmomyiasis.

**Methods:** A total of 16 cases of various ocular malignancy complicated by infestations of maggots were evaluated for clinical presentation and complications. Maggots were mechanically removed after using oral Ivermectin and turpentine oil with chloroform and were sent for entomological study. All larvae were sent for scanning electron microscopic study.

**Results:** In 16 cases, the ocular / periocular carcinoma were complicated by myiasis. Predominant tumor was basal cell carcinoma (50.0%), followed by sebaceous gland carcinoma (18.75%) and lacrimal sac malignancy (12.50%). In 1 case, myiasis led to intracranial extension. In 7 patients, more than 100 larvae were removed. Most common species identified after surface study of maggots by using Scanning Electron Microscopy were *Dermatobia hominis*, *Wohlfahrtia magnifica*, *Hypoderma bovis*, etc. Complications and treatment outcome were discussed.

**Conclusions:** Ophthalmomyiasis is a rare and challenging disorder. If untreated, it can lead to blindness. Mechanical removal after suffocating the maggots is an important step. SEM study is an important tool for entomological identification.

### Orbital PNET: A Case Report

*First Author: Devanshi DESAI*

*Co-Author(s): Sanjiv DESAI, Rashmi SHARMA*

**Purpose:** To document, demonstrate and report on a

rare case of orbital PNET in a child and its response to treatment.

**Methods:** Prospective study of a case that presented to us in the Outpatient department.

**Results:** A 5-year-old boy presented with a painless, non-tender swelling in his RE and smallness of eye of 15 days duration. His visual acuity in the eye was 4 meters counting fingers and 6/9 in the sound eye with correction. Ultrasonography revealed a large orbital mass on the superior aspect of the globe compressing and flattening the globe contour. FNAC showed that the tumor was composed of round cells. Radionuclide bone scan showed mild increased tracer uptake with mildly increased vascularity seen involving superior aspect of right orbit, consistent with site of primary pathology. No scan evidence of distant skeletal metastasis was seen. An excision biopsy was subsequently done, and it showed small blue round tumor cells that were positive for CD-99 and vimentin but negative for Myogenin, CD-45, and Synaptophysin, clinching the diagnosis of primitive neuroectodermal tumor of the orbit. On starting myoablative chemotherapy with a 5-drug regimen, the tumor regressed completely to leave behind a trace scar on MRI.

**Conclusions:** A rare case of orbital PNET in a child is presented and its regression with aggressive chemotherapy is documented.

### Primary Intraocular Malignant Rhabdoid Tumor Mimicking Intraocular Retinoblastoma: A Rare Case Report

*First Author: Lindara PO*

*Co-Author(s): Rangsim AROONROCH, Chaow CHAROENKITKAJORN, Parin HUNTRAKOOL, Duangnate ROJANAPORN, Tharikarn SUJIRAKUL*

**Purpose:** To report a rare case of histopathological confirmed primary intraocular malignant rhabdoid tumor, who presented with clinical features of intraocular retinoblastoma.

**Methods:** Case report.

**Results:** A 2-day-old girl presented with unilateral leukocoria at birth. Right eye examination showed clear cornea, flat anterior chamber and iris neovascularization. A highly vascularized, yellowish mass was found behind iris obscuring the view of vitreous and retina. Ultrasonography showed a calcified mass occupied entire globe. Left eye was normal. Enucleation was performed. Pathological results showed malignant tumor with rhabdoid features involving ciliary body, iris, anterior chamber, and focal subretinal tumor seeding. Immunohistochemistry results showed positivity of cytokeratin (AE1/AE3), EMA (epithelial membrane antigen), CD34, and B-catenin expression, and negativity of desmin, myogenin, CD99, chromogranin A, synaptophysin, NES, CD56, HMB-45, S-100, and INI-1 expression. The histopathological

diagnosis was intraocular malignant tumor with rhabdoid features. Systemic work up including brain, chest, upper abdomen, and lower abdomen was normal. There was no evidence of renal tumors. Patient was alive and well without local tumor recurrence or systemic metastasis at the follow-up period of 12 months.

**Conclusions:** We reported a case of rare primary intraocular malignant rhabdoid tumor that presented with leukocoria and calcified mass at birth mimicking intraocular retinoblastoma. Intraocular malignant rhabdoid tumor should be on the list of differential diagnosis of intraocular retinoblastoma.

## Retinoblastoma at a Tertiary Level Teaching Hospital in Nepal

*First Author:* Jyoti **SHRESTHA**

**Purpose:** To describe clinical features, management, and outcomes of patients with retinoblastoma.

**Methods:** A prospective case series study was done between 2015 and 2017 at a tertiary eye teaching hospital, Nepal. The diagnosis of retinoblastoma was made on the basis of history, clinical examination, and radiological and histopathological studies. International classification of retinoblastoma (Shields) was used to clinically classify the retinoblastoma lesion and the management depended on the stage of the disease.

**Results:** A total of 33 patients with retinoblastoma fulfilled the inclusion criteria of the study, 21 male and 12 female with sex ratio: 1.75:1. Median age at diagnosis was  $30.34 \pm 13.37$  months. In 21% of cases the disease was bilateral. Leukocoria, red eye, and proptosis were common signs observed in 42%, 32%, and 17% of cases respectively. Enucleation and exenteration were the commonest modality of treatment. 6 patients died during the course of treatment and during follow up period.

**Conclusions:** Despite the advances in the field of retinoblastoma, the prognosis still remains poor due to late presentation in our hospital.

## Spectrum of Germline RB1 Mutations and Clinical Manifestations in Thai Retinoblastoma Patients

*First Author:* Chaow **CHAROENKITKAJORN**  
*Co-Author(s):* Takol **CHAREONSIRISUTHIGUL**, Rossukon **KAWEKHAW**, Lindara **PO**, Duangnate **ROJANAPORN**

**Purpose:** To identify and correlate germline RB1 mutations with clinical phenotypes in Thai patients.

**Methods:** Cross-sectional descriptive study. Blood sample taken from 52 consecutive retinoblastoma (RB) patients were analyzed for germline RB1 mutations by direct sequencing and multiplex ligation-dependent probe amplification (MLPA).

**Results:** Fifty-two consecutive retinoblastoma patients, 27 unilateral and 25 bilateral, were included in this study. Germline RB1 mutations were detected in 60% (31/52) of patients using direct sequencing and MLPA. RB1 mutations were identified in 92% (22/25) of bilateral RB patients. Interestingly, we found a high rate of germinal RB1 mutations in unilateral cases (33%, 9/27). Gross deletions of RB1 and partial deletion of exons were reported in 5 patients. Twenty-three distinct mutations as a result of base substitutions and small deletions were identified in 26 patients; 7 mutations were novel. Nonsense and splicing mutations were commonly identified in Thai RB patients. Furthermore, we found that a synonymous mutation in familial RB, resulting in a splicing error, caused different phenotypic expressivity in disease. Age at diagnosis of RB was not associated with the types of germline RB1 mutations but was correlated with laterality. The incidence of extraocular tumors was high in hereditary patients (83%, 5/6), particularly in unilateral cases (33%, 3/9), and was not associated with the age at the diagnosis.

**Conclusions:** This study, for the first time, provides data of RB1 genotypic spectrum of germline mutations and clinical manifestations in Thai RB patients. Our results highlight the importance of genetic testing in disease management of RB patients and their family members.

## The Incidence of Intraocular Tumors in Thailand: Analysis of 201 Consecutive Patients from a Tertiary Referral Center

*First Author:* Atasit **ROJANASAKUL**  
*Co-Author(s):* Parin **HUNTRAKOOL**, Duangnate **ROJANAPORN**, Tharikarn **SUJIRAKUL**, Thitiporn **THONGBORISUTH**

**Purpose:** To report the epidemiological characteristics of patients with intraocular tumors.

**Methods:** Retrospective review of 201 consecutive patients with benign and malignant intraocular tumors from a single tertiary referral center in Bangkok, Thailand, from January 2012 to June 2017.

**Results:** Of 201 patients, 83 (41%) were male. Malignant intraocular tumors accounted for 64% of cases. The 3 most common tumors were retinoblastoma (30%), uveal melanoma (18%), and intraocular metastases (10%). The tumor locations were choroid (49%), retina and retinal pigment epithelium (43%), iris (5%), and optic disc (3%). In patients age group of  $\leq 20$  years, the most common tumor was retinoblastoma (83%). In age group 21 to 39 years, the most common tumors were uveal melanoma (35%) and choroidal hemangioma (7%). In age group 40 to 59 years and over 60 years, the 3 most common tumors were uveal melanoma (27%, 23%), metastatic tumor (18%, 19%), and nevus (15%, 16%), respectively. In our populations, uveal melanomas presented at younger age when compared to Caucasian populations.

For intraocular metastases, breast carcinoma and lung carcinoma were the 2 most common primary tumor sites.

**Conclusions:** In Thailand, the most common benign intraocular tumor was choroidal nevus. The most common malignant intraocular tumor in children and adults was retinoblastoma and uveal melanoma, respectively. The reason for the early onset uveal melanoma in our populations is currently unknown and further genetic analysis of tumor specimens may be beneficial.

### The One That Got Away: A Case of Masquerade Syndrome

*First Author: Anelisa KOH*

**Purpose:** To present a rare case of a 42-year-old Filipino male with non-small cell lung adenocarcinoma with an initial and only complaint of blurring of vision of the left eye.

**Methods:** Case report.

**Results:** This was a case of a 42-year-old Filipino male, smoker, with a 1-year history of blurring of vision of the left eye with no other symptoms. Unremarkable review of systems and family history. He has recently completed a 6-month treatment for pulmonary tuberculosis. On examination of the affected eye, vision was 10/200 with relative afferent pupillary defect. Otherwise, anterior segment examination was normal. On dilated fundus examination, through clear media, vitreous cells, indistinct nasal border of the optic nerve, and poorly defined elevated amelanotic lesion with areas of pigment clumps in superior hemiretina were seen. Systemic examination was unremarkable. Assessment was Posterior uveitis, left eye with exudative retinal detachment.

**Conclusions:** Optical coherence tomography showed macular edema. Fluorescein angiography showed areas of blocked fluorescence on areas of hyperpigmentation, and hyperfluorescence with staining from nasal to supero temporal arcade. Tuberculin skin test was negative. Chest radiography showed a pulmonary mass, later confirmed by chest computed tomography (CT) scan. Histopathology showed adenocarcinoma of the right lung. Bone scan revealed positive bone metastasis. Assessment was Masquerade Syndrome secondary to probable choroidal metastasis secondary to lung adenocarcinoma. Patient was advised for systemic chemotherapy however patient was lost to follow up. Patient resorted to herbal medications. Five months after initial consult, relative revealed patient had expired.

## Ophthalmic Epidemiology, Telemedicine, Big Data & AI

### A Self-Sufficient Mobile Eye Clinic Model for Developing Countries

*First Author: Pavan KUMAR*

*Co-Author(s): Muralikrishnan JANANI*

**Purpose:** To describe the design, features, and advantages of a specially designed unique mobile eye clinic model (transformed bus-developed by us) to overcome the difficulties in providing eye care in remote and socially deprived areas.

**Methods:** A self-sufficient mobile eye clinic/bus was designed to penetrate remote areas to conduct eye camps with ease. Solar panels were mounted on top of the bus to generate needed electricity. The bus body 'opens up' and transforms into a camp site. Two doors on either end of the bus ensure a smooth unidirectional flow of patients. Adequate space was provided inside the bus for vision testing, automated refraction, complete eye examination including tonometry, fundus photography and ophthalmologist teleconsultation. Spectacle and medicines were dispensed inside the mobile clinic. Patients requiring surgery were transported back to the hospital on the same bus.

**Results:** An average of 16 community outreach activities were conducted per month in the villages around 40 kilometers from the base hospital. An average of 1728 patients were screened per month, 518 patients were given glasses, and 224 patients were taken to base hospital for cataract surgery. Only 4 staff were required to effectively conduct the outreach activity (1 driver cum automated refractor operator, 2 optometrists, 1 manager cum surgical counsellor, and 1 spectacle seller).

**Conclusions:** Self-sufficient mobile eye clinic overcomes limitations for providing eye care for the rural population and makes eye care accessible to the needy saving their time, money, and day.

### Air Pollution and Weather Change are Associated with First Occurrence of Allergic Conjunctivitis in Taiwan

*First Author: Yueh-Chang LEE*

**Purpose:** Allergic conjunctivitis (AC) is one of the common allergic diseases, which may be influenced by environmental factors. This study was to examine the association between the first occurrence of AC, air pollution, and weather changes in Taiwan.

**Methods:** A total of 120,879 eligible subjects were identified from the systematic sampling cohort database containing 1,000,000 insureds of the National

Health Insurance of Taiwan from 2004 to 2013 and were matched with data from the environmental monitoring stations adjacent to their locations of clinics. The case-crossover design, using the same subjects experiencing exposures at different time for cases and controls (diagnosis days and others), was applied in the study.

**Results:** We found that the first occurrences of AC were the most for youngsters by age (36.2%), women by gender (59.1%), and spring by season (29.3%). Multivariate logistic regression analyses indicated that carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), and temperature were positively associated with AC ( $P < 0.001$ ), while relative humidity was negatively related to AC ( $P < 0.001$ ).

**Conclusions:** Because CO and NO<sub>2</sub> together are considered a surrogate of traffic emission, which is easier to control than O<sub>3</sub> and temperature driven up by global warming, it is expected that efficient management and control of traffic emission could lower the probability of AC occurrences.

## Characteristic and Factors Related to Chronic Dacryocystitis Patients in Developing Countries

*First Author: Utpal KUNDU*

*Co-Author(s): Golam HAIDER*

**Purpose:** To evaluate the characteristics and factors related to chronic dacryocystitis patients in developing countries.

**Methods:** Cross sectional observational study in tertiary care eye hospital, January to June 2016. A total of 400 cases were interviewed.

**Results:** Mean age, 43.12 years (SD  $\pm$  15.114). Male to female ratio 1:2.51. 47% were middle age group (30-50 years). 54.2% lived in rural areas. Illiterate 30.5%, house worker 60%. Poor community 53%, nuclear family 59.8% and 15% had 3 or more family members. 55.8% lived in village cottage, 44.2% in building. 36.5% used to take bath in pond water. 61.5% respondents used to wipe excess watering from eye by their wearing clothes. 65.8% used wood as a source of fuel for cooking. 74.5% suffered from dacryocystitis. 74.2% had experience of itching and 69.2% had red eye. The study encountered that characteristics and factors of socio demographic, socio-economic, and personal hygiene had the following statistically significant evident. Respondents who used wearing clothes for wiping excess watering from their eye had more dacryocystitis than others ( $P < 0.002$ ). Those older than 40 years had more sufferers than those younger than 40 ( $P < 0.002$ ). Females were more prone to disease ( $P < 0.001$ ). House workers had more sufferers than other occupations ( $P < 0.01$ ). Respondents from rural areas had more sufferers ( $P < 0.03$ ).

**Conclusions:** People who lived in rural areas, taking

baths in ponds, females, house workers, and those who used wearing clothes for wiping excess watering from their eye are more prone to suffer from dacryocystitis.

## Geographic Distribution of Ophthalmologists in Japan: Comparison Between Ophthalmologists and Other Physician Subgroups in 2016

*First Author: Koichi ONO*

*Co-Author(s): Tatsuya MARUMOTO, Reiko UMEYA, Yuto YOSHIDA*

**Purpose:** To investigate the geographical distribution of ophthalmologists in Japan and compare it with other physician subgroups.

**Methods:** The number of physicians per 100,000 population by secondary medical district (344 areas) was calculated for 44 physician subgroups by using the data from physician censuses 2016 and the population censuses 2015. The Gini coefficients, income inequality measure that ranges from 0 (perfect equality) to 1 (perfect inequality), and 95% confidence intervals (95% CIs) were calculated for described physician specialties.

**Results:** The total number of ophthalmologists was 13,144 (2.2% of all physicians). There were 3 medical districts without an ophthalmologist. Median value (first quartile to third quartile) of physician to population ratio was 77.3 (58.5 to 98.1) per 100,000 for ophthalmologists. The most even distribution was observed for general internists [Gini: 0.160 (95% CI: 0.132 to 0.189)] and orthopedists [Gini: 0.177 (95% CI: 0.153 to 0.201)], followed by pediatricians [Gini: 0.212 (95% CI: 0.184 to 0.240)], and ophthalmologists [Gini: 0.216 (95% CI: 0.179 to 0.252)].

**Conclusions:** The geographical distribution of ophthalmologists was relatively better than other physician subgroups. We should monitor the number and the distribution of ophthalmologists and create any possible health policy to allocate human resources equally, in order to achieve better access to ophthalmic care for all Japanese citizens.

## Improving Cost-Effectiveness of Screening for Diabetic Macular Edema

*First Author: Jonathan CHAN*

*Co-Author(s): Victor CHONG, Ryo KAWASAKI, Ian WONG, Raymond WONG*

**Purpose:** To investigate the cost-effectiveness of different screening strategies for diabetic macular edema (DME).

**Methods:** Subjects recruited from a local screening service were screened for diabetic retinopathy using the current protocol, Strategy A, and compared with 3 alternative strategies using a simulation model. In Strategy B, macular hemorrhages or microaneurysms were not considered as surrogate marker for DME;

Strategy C utilized best corrected visual acuity instead of presenting visual acuity and added macular optical coherence tomography (OCT) for suspected DME cases; while Strategy D incorporated macular OCT for all cases. The 4 strategies were compared for sensitivity indexes, quality-adjusted-life-years gained, and overall cost-effectiveness.

**Results:** A total of 2277 subjects (mean age  $62.80 \pm 11.75$  years, 43.7% male) were recruited. With OCT central subfield thickness of greater than or equal to 290 microns used as a standard for identifying DME, the false-positive rate of strategies A and B was 87.1% and 79.8%, respectively. In terms of USD\$ per QALY gained, it was 7447.5, 8428.7, 5992.3, and 4113.5, respectively, for strategies A, B, C, and D. All 4 strategies can be considered as 'very cost-effective' when using Hong Kong's per capita gross domestic product (GDP) or < USD\$50,000 per QALY gained as references.

**Conclusions:** Although the current screening protocol can be considered as cost-effective, the high false-positive rate of DME contributes to unnecessary specialist referrals and use of medical resources. In this study, the greatest improvement in cost-effectiveness of DME screening was achieved by incorporating universal OCT into the screening protocol, as in Strategy D.

## Macular Hole in the Singapore Epidemiology of Eye Diseases Study

*First Author:* Ning **CHEUNG**

*Co-Author(s):* Ching-Yu **CHENG**, Shu Yen **LEE**, Yih-Chung **THAM**, Edmund **WONG**, Tien-Yin **WONG**

**Purpose:** To examine prevalence and factors associated with macular hole in Asians.

**Methods:** This is a cross-sectional population-based study of 9,978 Chinese, Malay, and Indian persons aged 40 years or older, residing in the general communities of Singapore. Full-thickness macular hole was ascertained from optical coherence tomography (OCT). Risk factors were assessed from comprehensive systemic and ophthalmic examinations, interviews, and laboratory investigations.

**Results:** The prevalence of macular hole was 0.15% (15 out of 9978 participants). Compared to those without macular hole, participants with macular hole were significantly older ( $P < 0.01$ ), more likely to be male ( $P = 0.02$ ), and have hypertension ( $P = 0.02$ ) or diabetes ( $P = 0.04$ ). In multivariable analysis, older age [odds ratio (OR) 1.04; 95% confidence interval (CI): 1.00, 1.09] and male gender (OR 3.64; 95% CI: 1.02, 13.03) were associated with prevalent macular hole. Prevalent macular hole was not associated with any ocular factors (eg, cataract, axial length, spherical equivalent refraction) except for poorer visual acuity (mean logMAR best corrected visual acuity was 0.12 without macular hole vs 0.75 with macular hole;  $P < 0.01$ ).

**Conclusions:** In this large population-based study of Asians based on OCT, the prevalence of macular hole was 0.15%. Older age and male gender were factors positively associated with prevalent macular hole.

## New Innovation in Glaucoma Management: NIO Glaucoma Mobile App

*First Author:* Pankaj **BENDALE**

*Co-Author(s):* Aditya **KELKAR**

**Purpose:** Glaucoma diagnosis flow chart begins with suspicion on clinical examination. Many times, a patient gets over-investigated depending on strong clinical suspicions. So, the NIO glaucoma mobile app was designed to sort out those patients who really need further work-up and those who can probably be serially followed with only a disc photo.

**Methods:** Five ophthalmologists used the app whenever they felt a case required further glaucoma work-ups. App score was calculated. Patients were subjected to a detailed glaucoma work-up including perimetry, pachymetry, OCT RNFL analysis, and a baseline DISC photo. Single glaucoma specialist reviewed patient again with all investigations and app scores.

**Results:** A total of 134 patients were enrolled. Scores above 10 in 82 cases and less than 10 in 52 cases. Mean age in both groups was  $65 \pm 5.6$  years and  $62.4 \pm 8.6$  years in both eyes. Glaucoma work-up being positive, and patient was actually put on medications after glaucoma specialists' opinions were 62 out of 82 in cases having app scores more than 10. Glaucoma work-up being negative, and patients were just serially asked to follow up after glaucoma specialists' opinions were 46 out of 52 in cases having app scores less than 10. Significant P value ( $P = 0.036$ ).

**Conclusions:** We conclude that with the help of this app, we can judiciously use resources and can definitely avoid a lot of unnecessarily detailed glaucoma work-up (Perimetry, OCT RNFL analysis), which is cost-saving for patients.

## Prevalence and Severity of Symptomatic Dry Eye Disease in an Urban Chinese Community

*First Author:* Kendrick **SHIH**

*Co-Author(s):* Jimmy **LAI**, Venice Sze-Wai **LI**, Jeffrey **LO**, Alex Lap Ki **NG**, Sophie **YEOW**

**Purpose:** To describe the prevalence and severity of symptomatic dry eye disease in Hong Kong, and to determine the utility of the Symptom Assessment in Dry Eye (SANDE) visual analogue scale in Hong Kong.

**Methods:** A total of 279 consecutive subjects were recruited from the community in Hong Kong. Subject demographics were collected. They further underwent Ocular Surface Disease Index (OSDI) and SANDE questionnaires, followed by tear meniscus

height measurement (average of 3) using the Oculus Keratograph 5M device. Using the 2017 Asia Dry Eye definition, we considered symptomatic dry eye to be present in subjects with OSDI scores greater than 12. OSDI and SANDE scores were compared between different subject demographics. Correlation analysis was used to determine the relationship between patient demographics, OSDI and SANDE scores.

**Results:** Amongst our 279 subjects there were 55 males and 221 females. Mean age being  $58.9 \pm 18.4$  years. The prevalence of symptomatic dry eye was 27.2%, with a mean OSDI score of  $23.6 \pm 18.3$ . Female subjects had statistically significant higher OSDI scores ( $25.15 \pm 18.85$  vs  $17.66 \pm 14.68$ ) and SANDE scores ( $36.39 \pm 25.17$  vs  $24.40 \pm 21.26$ ). The overall mean TMH score was  $0.256 \pm 0.09$  mm. There was a weak but significant correlation between subject age and OSDI score ( $r = 0.134$ ) and a strong positive correlation between OSDI and SANDE scores ( $r = 0.6$ ).

**Conclusions:** There is a high prevalence of symptomatic dry eye in the Hong Kong population, with female gender and older age being risk factors for more symptomatic disease.

## Prevalence of Corneal Astigmatism Before Cataract Surgery in Indian Population

*First Author: Pawan PRASHER*

**Purpose:** To study the prevalence of corneal astigmatism before cataract surgery in Indian population.

**Methods:** Chart review of patients who underwent cataract surgery over a period of 2 years was done and preoperative keratometric measurements were collected and analyzed.

**Results:** The mean age of 2316 patients (2502 eyes) was  $59.54 \pm 10.96$  years. The corneal astigmatism was less than 1.0 diopter (D) in 796 eyes (59.37%), 1.0 to 1.99 D in 716 eyes (28.62%), 2.0 to 2.99 D in 187 eyes (7.47%), and more than 3.0 D in 114 eyes (4.56%). The mean corneal astigmatism was  $1.04 \pm 1.04$  D and showed a gradual increase with age after the fourth decade. The astigmatism was with-the-rule in 709 (28.34%), against-the-rule in 1298 (51.88%), and oblique in 598 (23.9%) eyes. There was a shift in astigmatism from with-the-rule to against-the-rule with increase in age.

**Conclusions:** Over 40% of the Indian patients undergoing cataract surgery have more than 1.0 D of corneal astigmatism and may benefit from the use of toric intraocular lenses. These data can be useful in planning to make this technology available for the patients.

## Profile of Eye Health in Mount Agung Refugee Camp

*First Author: Ni Made SURYATHI*

*Co-Author(s): Juliari I GUSTI AYU MADE, I Wayan JAYANEGARA, Wayan SUTYAWAN*

**Purpose:** Bali is one of the provinces in Indonesia, with 5.633 km<sup>2</sup> area and 4.3 million people. Mount Agung is the highest mountain in Bali. A great eruption that happened in 1963 caused 1500 casualties. Mount Agung erupted again in June 2017, and still continues to today. A total of 122,500 people were evacuated. During the eruption, it released volcanic dust, gas, and cold lava. The purpose of this paper was to report on the eye health of refugees in Mount Agung refugee camp.

**Methods:** This was a descriptive study with a cross-sectional approach. Anterior and posterior eye examinations were done in some refugees camp.

**Results:** There were 267 patients that had eye examinations, consisting of 168 (63%) female and 99 (37%) male with most patients aged 50-60 years. Foreign body sensation is the most complaint 68 (25.4%), continue with watery 66 (24.7%), blurr 65 (24.3%), red eye 45 (16.8%), and mix complain 23 (8.6%). Visual acuity of both eyes are moderate visual impairment 116 (43%), early visual impairment 99 (37%), normal 38 (15%), and severe visual impairment 14 (5%). Dry eye is the most diagnosis 108 (40%), follow with conjunctivitis 75 (28%), cataract 58 (22%), and refractive disorder 26 (10%).

**Conclusions:** The eruption of Mount Agung has effects on eye health, including dry eye and conjunctivitis. Hygiene sanitation is important to prevent the infectious diseases. Use of artificial drops is also needed to maintain the stability of tear production, due to the impact of volcanic gas and dust.

## Profile of Open Globe Injury and Concurrent Endophthalmitis in Eastern Nepal

*First Author: Anica SHAH*

**Purpose:** To study the profile of Open Globe Injury (OGI) in eastern Nepal and to establish the incidence of concurrent lens injury and endophthalmitis in those cases.

**Methods:** Retrospective, cohort study of 76 consecutive cases of OGI presenting to a tertiary eye care center from January 1, 2016 to December 31, 2016 was conducted.

**Results:** Out of 76 cases, 57 were male and 19 were female. Mean age of presentation was 26 years. 51 cases (67%) presented with OGI Zone 1 injury, 18 cases (24%) with OGI zone 2, and 7 cases (9%) with zone 3 injuries. Lens trauma was present in 38 cases (50%). Endophthalmitis was present in 17 cases (22%). The average timing of presentation of cases with

endophthalmitis was 3.5 days after injury. Presenting visual acuity in 55 cases (72%) was less than 3/60.

**Conclusions:** OGI is a leading cause of unilateral blindness. It frequently occurs in young age groups, consequently compromising their productivity. Lens trauma is very common in cases of OGI and adds up to the burden of vision loss. Endophthalmitis is a commonly associated morbidity and delayed presentation after the injury is one of the key factors leading to the condition. Since the majority of injury happens during work, awareness regarding prevention and presenting at the earliest possible time after the injury will help prevent the morbidity associated with OGI.

## Orbital and Oculoplastic Surgery

### A Novel Minimally Invasive Surgical Approach to Management of Lacrimal Gland Tumour

*First Author: Anisha AUGUSTIN*

*Co-Author(s): Rajini K. C, Sudha V*

**Purpose:** To report a case of mucoepidermoid carcinoma of lacrimal gland which was excised through a transconjunctival approach.

**Methods:** A 72-year-old male presented with a painless progressive protrusion of right eye for 8 years with a sudden increase in size noticed for 1 month. Examination showed: mild eccentric proptosis of right eye, mild lagophthalmos, a firm smooth swelling below the right superolateral orbital margin, extraocular movements, pupillary reactions, and fundus examination were normal. Differential diagnosis included: thyroid exophthalmos, lacrimal gland tumors, metastases, lymphoma, pseudotumor. Cavernous hemangioma CT head (plain and contrast) showed a right superolateral orbital swelling with mass effect on the right lateral rectus and optic nerve along with mild scalloping of adjacent bone. An excision biopsy was done through transconjunctival approach. Through a superolateral forniceal conjunctival incision, the tumor was identified and blunt dissection was done. Tumor of size 2.5 x 1.6 x 1.5 cm was removed.

**Results:** Postoperatively, there was a significant reduction in proptosis. Histopathology revealed high grade mucoepidermoid carcinoma. The patient was referred to the oncologist for further treatment.

**Conclusions:** In sharp contrast to the conventional lateral orbitotomy approach for lacrimal gland neoplasms, we could successfully remove the entire tumor through a transconjunctival approach thus minimizing the intraoperative manipulations, surgical scarring, and postoperative complications.

## An Endoscopic Approach in Management of Trapdoor Fracture

*First Author: Ranjana SHARMA*

**Purpose:** Orbital trapdoor fractures are most common in children and are defined by the lack of displacement of the involved bones. They lack external signs of trauma and ecchymosis, and this often misleads the seriousness of the injury. Those without tissue incarceration will have normal motility and minimal to no abnormal radiographic findings. Those with tissue incarceration will have abnormal motility if an extraocular muscle or connective tissue associated with the muscle is involved. Those patients with muscle entrapment are the ones of clinical concern and have to manage on time with minimal prior orbital tissue injury.

**Methods:** An 11-year-old male presented with repeated episodes of vomiting following a trivial injury around right orbit while playing. On examination, vision was 6/6 bilateral. Pupil was round, regular, and reacting without RAPD. There was no external sign of trauma; eye was quiet. However, there was restriction of ocular movement in dextro-elevation and supra-elevation of right eye. X-ray of orbit was normal, but CT scan of orbit showed right orbital blow-out fracture with herniation of orbital content into right maxillary sinus. After preoperative investigations, right orbital decompression with release of entrapped muscle was done endoscopically under general anesthesia by oculoplastic and ENT surgeon. Forced duction test was performed to confirm the release of entrapped muscle.

**Results:** Vision was normal with full extraocular movement achieved postoperatively.

**Conclusions:** Trapdoor fracture is common in children. It can be missed due to a lack of external signs. If muscle entrapment is seen, it can also be managed endoscopically with minimal orbital trauma.

## Atypical Location of a Rare Tumor in the Anterior Orbit

*First Author: Ansu JOHN*

*Co-Author(s): Debolina DEB, Meera MOHANAKUMAR, Priyadharshini PALANIYAPPAN, M RADHAKRISHNAN, Krishnima RAGHU*

**Purpose:** This was a rare case report of a middle-aged male who came with complaints of bilateral firm rubbery masses underneath eyelids with proptosis for 12 years, with no other systemic involvement.

**Methods:** Anterior segment was normal in both eyes with no restriction of extraocular muscles. MRI brain and orbit suggested reactive lymphoid hyperplasia.

**Results:** Since it looked like orbital fat herniation and was visible at the conjunctival aspect, differential diagnosis of lymphoma and orbital fat herniation through the septum were suspected. Incisional biopsy

was thus done which showed xanthogranuloma orbit which was confirmed by histopathology and immunohistochemistry. Although it is a benign condition, we had planned for cosmetic improvement for which the patient was not willing.

**Conclusions:** As xanthogranuloma usually involves the medial canthus in the upper lids, the rarity of the location of this poorly understood tumor has perked my interest in this case.

### Bilateral Complicated Microphthalmos with Bilateral Orbital Cysts: Options in Management

*First Author: John Arvin* **DELOS REYES**

*Co-Author(s): Stacey Anne* **SAU**, *Sandra* **WORAK**

**Purpose:** To report a case of bilateral complicated microphthalmos with bilateral orbital cysts managed with cyst excision and enucleation on 1 eye and observation on the other eye.

**Methods:** A 1-year-old male born at term to a 33-year-old by repeat caesarean section, with unremarkable prenatal/perinatal history, presented with inability to open his right eye, associated with interval appearance of a progressively enlarging bluish non-tender cystic mass in the right lower lid. No grossly identifiable structures on the right eye. The left eye, which fixates and follows, was small-looking with no gross deformities. Orbital computed tomography scan showed a lobulated, fluid attenuating mass  $\sim 3.5 \times 2.4 \times 2.5$  cm protruding on the right orbit with unidentifiable ocular structures while the left globe was small ( $\sim 16$  mm) with a retroorbital cystic mass  $\sim 1.4 \times 1.9 \times 1.4$  cm. He had a history of cleft lip/palate and multiple congenital cardiac anomalies. No chromosomal karyotyping was done.

**Results:** Examination under anesthesia was done on the left eye, revealing microcornea, inferior iris atrophy, posterior synechiae and dull red orange reflex. Excision of the right orbital mass, enucleation of a rudimentary right eye with implantation of orbital implant, with dermis fat graft and repair of inferior fornix was done. Histopathology revealed colobomatous cyst without formed ocular structures. The left eye remains functional and is being observed and managed conservatively.

**Conclusions:** No consensus with regards to management of microphthalmos with orbital cysts exists. Promotion of orbital development, preservation of the current visual function, and cosmesis should be considered.

### Case report: Destruction of the Eyeball by Recurrence of Periorbital Basal Cell Carcinoma

*First Author: Pei-Jane* **BAIR**

**Purpose:** To report a case of destruction of the eyeball

by recurrence of periorbital basal cell carcinoma.

**Methods:** Case report and review of the literature.

**Results:** A 74-year-old man without congenital oculomotor disturbance or other neurological disorder visited our ophthalmology outpatient department for chief complaint of right upper eyelid mass for a month. He had received surgical excision of the mass on the right upper eyelid with positive margin on the pathological examination 3 years ago, and it revealed basal cell carcinoma (BCC). This time his upper lid was retracted and had a lesion suspicious for BCC. The globe was inflamed and proptotic. He was referred to the oculoplastics service, and the lesion was confirmed the recurrence of BCC. Under detailed ophthalmology examination, the BCC had infiltrated the right globe and the retro-orbital region. He had extensive surgery to remove the tumor and subsequent skin grafting.

**Conclusions:** Orbital invasion by periocular BCC is an uncommon clinical presentation. Documented risk factors for orbital invasion by BCC include male gender, advanced age, medial canthal location, previous recurrences, large tumor size, aggressive histologic subtype and perineural invasion. Current therapeutic strategy remains extent globe destruction with orbital exenteration. In some appropriate patients, globe-sparing treatment may be considered. Moreover, radiotherapy and chemotherapy may play role in adjuvant therapies for advanced or inoperable cases. As the case in our presentation, the patient may need adjuvant therapy or regular ophthalmology examination for prevention of recurrence. Management of orbital invasion by recurrent BCC became challenging and complicated.

### Cellulitis-Like Lesion of Upper Eyelid Following Optic Nerve Meningioma

*First Author: Hung-Jui* **HSU**

*Co-Author(s): Chia-Yi* **LEE**

**Purpose:** To report a patient of optic nerve meningioma presented with cellulitis-like lesion of upper eyelid.

**Methods:** Case report and review of the literature.

**Results:** A 46-year-old female was in her usual health and presented with left eyelid swelling and mild ocular irritation in the left eye. She visited local clinic where lubrication was prescribed while shadow formation developed in the recent 1 year, and she came to our hospital for further survey. On examination, the visual acuities were 20/20 in both eyes and a normal intraocular pressure was found. However, left eyelid swelling, mild redness and local tenderness was observed which accompany with conjunctival congestion and full restriction of extraocular muscle movement at lateral side of the left eye. In addition, severe folding retina and peripheral visual defect with inferior dominant also presented. As a result, magnetic resonance imaging was arranged which

showed an eccentric mass encasing the left optic nerve and left optic nerve meningioma was impressed. The radiotherapy was arranged and no further metastasis was observed at the last follow-up.

**Conclusions:** The optic nerve meningioma could present as a cellulitis-like lesion of the eyelid. Careful and throughout evaluation for those atypical cellulitis is advocated.

### Clinical Effectiveness of Intubation Compared to Traditional External DCR for Primary NLD Obstruction

*First Author: Asif QAZI*

**Purpose:** To evaluate and compare the effectiveness and complications of silicone intubation alone for primary nasolacrimal duct obstruction (NLD) with classical dacryocystorhinostomy.

**Methods:** This was a retrospective analysis of 280 eyes of 138 patients over a period of 4 years. Symptomatic improvement and anatomical success documented postoperative short term (6 weeks) and long term (6 months). Psychosocial analysis was also done using preformed questionnaire.

**Results:** In intubation group, 90% patients had improvement in symptoms and 98% had anatomical success in early postoperative follow up, while 92% had functional improvement and 98% had anatomical success in dacryocystorhinostomy group. It reduced to 82% functional success and 90% anatomical success in late postoperative follow up for the intubation group, and, similarly, 88% and 94% functional and anatomical success respectively in dacryocystorhinostomy group. In dacryocystorhinostomy group, significantly higher intraoperative bleeding (75%) was noticed compared to intubation (10%). Similarly, a higher number of patients had postoperative bleed in dacryocystorhinostomy group. Greater than 50% of the patients in dacryocystorhinostomy group felt significant discomfort under local anesthesia compared to only 10% in intubation group. Overall, a fewer number of follow-ups were needed in intubation group, 2.1 compared to 4.2 in dacryocystorhinostomy group. Similarly, intraoperative time is significantly shorter in intubation group, a mean of 15.8 minutes compared to 43.2 minutes in dacryocystorhinostomy group.

**Conclusions:** Intubation alone for primary NLD obstruction is comparable with dacryocystorhinostomy group in outcome but with a significant reduction in cost and intraoperative discomfort.

### Clinical Factors Affecting the Outcome of Orbital Decompression in Thyroid Eye Disease

*First Author: Jugchawin KANOKKANTAPONG*

*Co-Author(s): Kanjana LEELAPATRANURAK, Mingkwan LUMYONGSATIEN, Aree NIMITWONGSAKUL, Sunisa SINTUWONG, Nattawut WANUMKARNG*

**Purpose:** To identify factors that affected the improvement of visual acuity (VA) and reduction of proptosis from orbital decompression (OD) in thyroid eye disease (TED).

**Methods:** The medical records of 28 eyes were reviewed. Univariate and multivariate linear regression analyses were performed to assess factors that correlate with the change in VA and proptosis.

**Results:** VA was significantly improved after OD in dysthyroid optic neuropathy (DON) compared to non-DON eyes (logMAR  $1.45 \pm 0.76$  to  $0.21 \pm 0.03$ ,  $P = 0.001$  and  $0.14 \pm 0.12$  to  $0.15 \pm 0.17$ ,  $P = 0.8$  respectively). Preoperative VA had a significant positive effect on improvement of VA ( $B = 0.950$ ,  $P < 0.001$ ). The mean proptosis was reduced from  $21.4 \pm 2.5$  to  $17.2 \pm 3.7$  mm ( $P < 0.001$ ). Number of walls removed had a significant positive effect on reduction of proptosis ( $B = 1.276$ ,  $P = 0.008$ ).

**Conclusions:** OD significantly improved VA and reduced proptosis. The improvement of VA was related to preoperative VA. The reduction of proptosis was related to number of walls removed.

### Comparative Study on Dacryocystorhinostomy Surgery with Silicone Tube Intubation and without Silicone Tube Intubation

*First Author: Ravi BHANDARI*

**Purpose:** To compare the outcome of dacryocystorhinostomy surgery with silicone tube intubation and without silicone tube intubation.

**Methods:** This was a hospital-based retrospective comparative case study in which data from 87 subjects operated for dacryosystitis were analyzed, of which 49 subjects were with silicone tube intubation and 38 were without silicone tube intubation. Study data were obtained from hospital records in which subjects were followed up on 1 week, 1 and a half months, and 3 months postoperatively.

**Results:** Three months after surgery, 72 of 87 (82.76%) were followed up on. Of 39 with the silicone tube, 35 (89.7%) had patent ducts, and of the 33 without the silicone tube 29 (87.9%) had patent ducts on lacrimal syringing which was considered a success of the surgery. Only 4 patients in each group, 10.3% with silicone tube and 12.1% without silicone tube, had regurgitation of mucous or pus (failure) on lacrimal syringing. The 2 groups did not differ significantly on

success rate ( $P = 0.54$ ).

**Conclusions:** Dacryocystorhinostomy with silicone tube intubation and without silicon tube intubation procedure offer similar success rates or outcomes.

## Comparison of Outcome Between Frontalis Brow Suspension Surgery and Supramaximal Levator Resection in Ptosis with Poor Levator Function

*First Author: Rajibul ISLAM*

*Co-Author(s): Bulbul ISLAM*

**Purpose:** To compare the surgical outcomes of the 2 procedures.

**Methods:** A total of 30 patients were selected according to inclusion criteria and were divided into 2 groups. Patients in group A underwent supra maximal levator resection surgery and in group B underwent frontalis brow suspension with different materials.

**Results:** The mean improvement of PFH & MRD 1 (at 6 months) between the groups was insignificant. The correction of ptosis deteriorated 6.66% in group A and 20% in group B at 6 months. Both the groups had some complications. Undercorrection, overcorrection, and lid notching was 6.66%, and exposure keratopathy was 13.33% in group A with no stitch granuloma. Undercorrection was 40% and exposure keratopathy was 20% in group B with no overcorrection or lid notching. Stitch granuloma occurred in 13.33% of patients in group B; group A showed no granuloma formation. One patient from group A and 3 patients from group B needed revision surgery with excellent to good results. Three patients from group B did not undergo revision surgery as the degree of asymmetry was acceptable to the patient.

**Conclusions:** Ptosis with poor levator function is difficult to manage even for the most experienced surgeon. Frontalis brow suspension with fascia lata is the gold standard due to its satisfactory postoperative outcome without undercorrection in the long run that happens with the synthetic materials. But harvesting of fascia lata is often difficult and time-consuming. Supra-maximal levator resection may be a better offer to the patient.

## Congenital Lower Eyelid Coloboma Reconstruction in Amniotic Band Syndrome: A Case Report

*First Author: Kurnia DENISA*

*Co-Author(s): Hernawita SUHARKO*

**Purpose:** To demonstrate the technique and the right timing of managing congenital eyelid coloboma, a part of rare syndromic variants.

**Methods:** A 1-month-old girl presented with lower eyelid coloboma of her right eye and anophthalmia of the left eye due to facial cleft anomaly. On her right

eye, there was also eyelid retraction, lagophthalmos, inferior lacrimal punctum stenosis, and inferior corneal cicatrix.

**Results:** Tenzel semicircular flap reconstruction was performed on her right eye when she was 1-year-old, after she underwent facial cleft reconstruction. Corneal lubricant was given to preserve ocular surface while waiting for the eyelid surgery. The surgery consideration depends on the eyelid defect and the corneal exposure. Postoperatively, there was no ectropion, entropion, or lagophthalmus.

**Conclusions:** Eyelid coloboma may present as a relative emergency, especially in children. The surgery in pediatric patients should be performed as early as possible if there is corneal exposure that may threaten the ocular surface. Surgeon must also consider wisely regarding the surgery technique due to amblyopia as a result of occlusion postoperatively in several techniques. Other facial cleft deformities that present with eyelid coloboma should be repaired first before performing eyelid reconstruction.

## Development and Psychometric Property of Thai Graves Ophthalmopathy Quality of Life Questionnaire

*First Author: Mingkwan LUMYONGSATIEN*

*Co-Author(s): Krit PONGPIRUL, Kanokrat PORNPANICH, Sumalee VANGVEERAVONG, Benjama KEERATIDAMKERNGSAKUL*

**Purpose:** To evaluate the validity and reliability of Thai version Graves' Ophthalmopathy Quality of Life (Go-QoL) questionnaire.

**Methods:** Forward and backward translations were performed independently by 4 translators with extensive experience in both English and Thai languages. Seventy patients at thyroid clinic responded to the Thai translated version at their first visit and then 2-3 weeks afterward. Validity was assessed by content validity index (CVI) and correlation with clinical severity whereas reliability was evaluated by Cronbach's alpha and intraclass correlation coefficient.

**Results:** Thai version GO-QoL showed high CVI (0.89) and significantly different clinical severity ( $P = 0.0015$ ). It showed good reliability on high intraclass correlation coefficient (0.921) and high Cronbach (0.883).

**Conclusions:** The Thai version GO-QoL has good validity and reliability. It is also applicable to evaluate the clinical severity in Thai patients.

## Evisceration with Dermis-Fat Grafts and Prosthesis in Phthisis Bulbi

*First Author: Magdalena TRISANTI*

**Purpose:** To report a case of phthisis bulbi with unclear history managed by evisceration with dermis-fat grafts (DFGs) and prosthesis.

**Methods:** A 20-year-old male who assumed had history of trauma several years ago came with phthisis bulbi. Evisceration was taken under general anesthesia on the damaged eye and implanting the DFGs from the gluteal part into the shrunken bulbi. Intraoperatively, the sulcus and fornix were observed and showed in a good condition; therefore, socket reconstruction was not needed. Both the implant and prosthetic eye were inserted to its place and tarsorrhaphy was performed.

**Results:** Patient was given anti-inflammation for fast recovery. The tarsorrhaphy was released 1 week after surgery. DFGs were able to augment both volume and surface area. Not only do the fat and dermis provide a soft tissue and surface lining with vascular support respectively, but also as a temporary biologic dressing. For 1 month follow-up, there was no sign of implant extruded and good cosmetic results were achieved.

**Conclusions:** Evisceration provides improved cosmesis and motility with an orbital implant such as DFGs. Inadequate replacement of a volume deficit by an orbital implant and ocular prosthesis can lead to enophthalmos and depression of the upper eyelid. DFGs are convenient, inexpensive, and do not cause local reactions or disease transmission.

### Eyelid Sebaceous Carcinoma: Validation of the 8th Edition of the American Joint Committee on Cancer T Staging System and the Prognostic Factors for Local Recurrence, Nodal Metastasis, and Survival

*First Author: Shu-Lang LIAO*

**Purpose:** To investigate the clinicopathological features and prognostic factors for eyelid sebaceous gland carcinoma (SGC) in an ethnic Chinese population and to validate the performance of the T category of the 8th edition AJCC staging systems, with the aim of providing information for refinements.

**Methods:** A total of 63 patients with the pathological diagnosis of SGC were enrolled in this retrospective study. The clinicopathological features, treatments, and outcomes were collected. Prognostic factors associated with the outcome of local recurrence, regional lymph node metastasis, and tumor-related death, as well as specific presentations, such as pagetoid spread and intracranial extension, were analyzed. Homogeneity, discriminatory ability, and monotonicity were used to compare the 7th and 8th staging systems.

**Results:** Positive surgical margin was a poor prognostic factor for all outcomes. Local recurrence was associated with more aggressive histopathological features and surrounding structure invasions. Regional lymph node metastasis was associated with younger age and borderline associated with larger tumors. The T category of 8th edition showed better homogeneity regarding local recurrence and regional lymph node metastasis, while the T category of 7th edition had

better monotonicity. Tumors classified as T2c or worse had higher risk of regional lymph node metastasis, while tumors T3b or worse in the 8th edition had more tumor-related death.

**Conclusions:** Patients with higher T category are at risk of regional lymph node metastasis and tumor-related death. Further refinement of the T category of AJCC staging system can focus on the discriminatory ability for local recurrence and monotonicity.

### Four-Dot Visual Field Defect as a Sign of Orbital Apex Syndrome

*First Author: Hung-Jui HSU*

*Co-Author(s): Chia-Yi LEE*

**Purpose:** To report a special 4-dot visual field defect after the development of orbital apex syndrome.

**Methods:** Case report and review of the literature.

**Results:** A 52-year-old male was under his usual health who admitted to our hospital due to bilateral chronic paranasal sinusitis and right sphenoid sinusitis. The functional endoscopic sinus surgery was performed and the patient discharged 3 days after the surgery. However, acute onset decrease of vision associated with diplopia was found and he came to our hospital for help. On examination, the best-corrected visual acuity was 20/200 in the right eye and 20/25 in the left eye. In addition, the restricted extraocular muscle movement and decreased corneal sensation were also observed thus orbital apex syndrome was impressed. For the further evaluation, visual field test was arranged which yielded 4 blind spot in the central of each quadrante. Due to the postoperative status, infection was suspected and antibiotic therapy of Augmentin and Metronidazole were prescribed. The visual acuity in the right eye recovered to 20/25 and the diplopia was subsided. The latest visual field test revealed a normal mean deviation without prominent defect.

**Conclusions:** Four-dot visual field defect is a rare condition but may change to develop in orbital apex syndrome, which would improve after proper management.

### Hemifacial Spasm: The Misery of Twitching Eyes and Face is More Common in Women and Responds Well with Botox

*First Author: Nishat PARVEEN*

*Co-Author(s): Golam HAIDER, Ava HOSSAIN, Syeed KADIR, Mukti MITRA*

**Purpose:** To observe the incidence, efficacy, and effects of Botox in hemifacial spasm (HS) patients of both sexes.

**Methods:** Prospective observational study carried out from June 2015 till June 2018. Follow-up of a total of 76 patients with HS has been done over a 3-year

period after injecting Botox. The patients were divided into 2 sex groups, male and female, and 3 age groups: younger (10-48 years), middle-aged (50-59 years), and older (60-90 years). Informed consent and detailed history were taken. After taking all the standard precautions for Botox injection, 5-7 (mean 6) sites for injecting 1.5 to 2.0 IU of the toxin were selected depending upon the severity and duration of the problem.

**Results:** Among a total of 76 patients of HS, 51 were female and 25 were male. The desirable effects of the injection appeared in almost all patients within 48 hours. The effect persisted for almost 3 months or more in all female cases. Surprisingly, the injection worked very well in female patients. In 25 females, the effect persisted for up to 5-6 months.

**Conclusions:** The study showed a comparatively better result in females. Factors like non-smoking, reduced exposure to sunlight, and fineness of Orbicularis oculi and Orbicularis oris muscles may be the factors for increased efficacy in females.

### Inverting Papilloma Arising from the Lacrimal Sac

*First Author: Elaine OMAÑA*

*Co-Author(s): Franklin KLEINER, John KLEINER*

**Purpose:** To report a rare case of Inverting Papilloma originating from the lacrimal sac in tertiary hospital.

**Methods:** Case report.

**Results:** Inverting papilloma is uncommon in the lacrimal sac. It more often presents in the maxillary sinus, ethmoid sinus, and the lateral wall of the nasal cavity. This was a case of a 69-year-old, Filipino male, who presented with a 2-year history of a gradually enlarging left medial canthal mass and tearing. There were no ophthalmoplegia, visual disturbances, proptosis, or pain, but there was globe displacement superolaterally. Other ophthalmologic examinations were unremarkable at the time of examination. Orbital CT scan revealed: Heterogeneously enhancing mass extending to ipsilateral nasolacrimal canal and nasal cavity causing mass effect. There was a note of a suspicious area of hyperostosis. Patient was referred to the Department of Otolaryngology Head and Neck Surgery for co-management. Punch biopsy was done, and histopathology revealed inverting papilloma. Combined surgical management of anterior maxillectomy via lateral rhinotomy approach and dacryocystectomy was done. Intraoperatively, there was note of adhesions to bone in the area of the lacrimal sac corresponding to the area of hyperostosis on CT scan. Postoperative recovery was unremarkable with unchanged visual acuity and extraocular muscle movement.

**Conclusions:** This is a case of an inverting papilloma involving the lacrimal sac and nasolacrimal duct that

was managed with combined anterior maxillectomy via lateral rhinotomy approach and dacryocystectomy for complete resection. We recommended complete resection of the tumor to minimize recurrence. Origin in the lacrimal sac area was confirmed by intraoperative findings which correlated with CT scan findings.

### Lacrimal Gland Tumors: Clinical Profile and Association of Histopathological and Radiological Findings

*First Author: Sharmin AHMED*

*Co-Author(s): Nesar AHMED, Golam HAIDER, Hasan JAWAD, Syeed KADIR, Mukti MITRA*

**Purpose:** To explore the baseline clinical profile of lacrimal gland tumors and to see the association of histopathological and radiological findings of them at a tertiary care center in Bangladesh.

**Methods:** It was a retrospective observational study of all suspected epithelial tumors of the lacrimal gland surgically excised at a tertiary care center in Bangladesh from 2009 to 2017. A total of 71 cases of suspected lacrimal gland tumors were enrolled. Meticulous history taking and clinical examinations were done to evaluate the lesion. The CT scan was done to localize the lesion and diagnosis was confirmed by a histopathological study.

**Results:** A total of 71 cases were evaluated. Of them, the male:female ratio was 0.61:1. Age range was from 10 to 70 years with mean  $\pm$  SD age  $34.64 \pm 15.43$  years. Among them, Pleomorphic Adenoma was most common with 44 cases (62%) and the other 27 cases were malignant (38%). Among the malignant only 1 case was mucoepidermoid carcinoma and the others were adenoid cystic carcinoma. Of all cases on the CT scan, 24 (33.8%) were diagnosed with bony erosion present. There was a statistically significant relation between histopathological and radiological findings,  $P < 0.001$  on chi-squared test.

**Conclusions:** Pleomorphic adenoma was the most common tumor of lacrimal gland in our country and most of the malignant cases can be suspected preoperatively with radiological imaging.

### Lacrimal Sac Rhinosporidiosis: Clinical Profile and Surgical Management by Modified Dacryocystorhinostomy

*First Author: Murtuza NURUDDIN*

**Purpose:** To describe the clinical profile and surgical management of patients with lacrimal sac rhinosporidiosis.

**Methods:** This was a retrospective interventional case series. A total of 45 patients, who were clinically diagnosed as isolated lacrimal sac rhinosporidiosis between October 2009 to July 2017, were included in

the study. Detailed history, including whether there was exposure to stagnant bathing water, was noted. All patients underwent modified dacryocystorhinostomy (DCR) under general anesthesia.

**Results:** Out of 45 patients, 29 were male and 16 were female. Rhinosporidiosis was more prevalent in the 25 to 34 years age group. The most common clinical presentation was a doughy swelling over the lacrimal sac area, present in all cases. A total of 28 patients (62.22%) had a history of bathing in stagnant water. After modified DCR operation, all patients were followed for 1 year and only 4 patients had recurrence of their disease.

**Conclusions:** Patients with lacrimal sac rhinosporidiosis usually present with a soft, doughy swelling in the lacrimal sac area. Bathing in stagnant water is a common risk factor. A modified DCR yields excellent outcomes.

### Medialization of Lateral Canthus: A Novel Technique to Substitute Usual Permanent Tarasorrhaphy

*First Author: Roopa HIREMATH*

**Purpose:** The usual technique of permanent tarsorrhaphy involves creating a raw surface on the corresponding surface of the lid margin and approximation. This will be more unstable and create a pinched appearance at the lateral canthus. In our technique, part of the lid margin, which includes the lashes, was excised and making a raw surface on lid margin, followed by approximation, will shift the lateral canthus medially.

**Methods:** Included 11 patients with lagophthalmos post Bell's palsy (7), chemical burn (2), and fascial anomaly (1). Patients underwent a detailed history, visual acuity, and a thorough ocular examination with special attention to the cornea and proptosis for exposure keratitis. Amount of lagophthalmos (with photos), whether associated with paralytic ectropion. Surgical technique: Operating site was infiltrated with 2% lignocaine. 7-10 mm horizontal incision was made 1 mm away from lid margin starting from the lateral canthus, and at the corresponding site 1-2 mm depth incision was made at gray line. These 2 incisions were combined and part of the anterior lid margin containing lashes was removed. Similar procedure was done on the upper lid. The 2 lid margins were pulled laterally and sutured with a 6-0 absorbable suture. Bolster was placed. Postoperative care: topical antibiotic ointment for 3 weeks, oral NSAID, and antibiotics were prescribed for 5 days. Bolster removed after 1 week.

**Results:** Postoperatively, corneal exposure was reduced, and patients had better cosmetic outcome (photographic comparison). None had infection or repeat surgery.

**Conclusions:** Medialization of lateral canthus is a novel

technique with reduced corneal exposure and a good cosmetic outcome, creating strong lid apposition and reducing infection.

### Method of Dacryostoma Formation Using Controlled Ablation Method During Endonasal Endoscopic Dacryocystorhinostomy

*First Author: Mikhail SHLYAKHTOV*

**Purpose:** Clinical estimation of safety and efficacy of a gentle method of dacryostoma formation during EEDCR on the basis of coblation method.

**Methods:** We have operated on 22 patients with unilateral obstruction of the vertical part of the lacrimal tract – 5 males (22.7%) and 17 females (77.3%). All the patients underwent EEDCR with bicanalicular stenting. Under endoscopic control, cold plasma ablation of nasal mucosa was performed with the electrode of Coblator II ArthroCare unit (USA). A bone perforation was performed with mill cutters up to baring of the lacrimal sac wall. The sac was filled with mixture of collargol and viscoelastic in transcanalicular way. Under endoscopic control, cold plasma ablation of the lacrimal sac medial wall fragment was performed until exit of the dye into the nasal cavity.

**Results:** Post-op follow-up period was 3 to 12 months. Use of controlled ablation contributed to restoration of lacrimal passage in 20 of 22 cases (91%). In 2 cases, scarring of the rhinostomy was seen within 8 to 12 weeks period which was associated with treatment regime violation by the patients. No complications were seen during operations. The duration of surgery in standard cases varied from 15 to 20.5 minutes.

**Conclusions:** Use of cold plasma ablation of soft tissues during EEDCR allows highly efficient forming of an adequate nasolacrimal anastomosis. Injection of dyed viscoelastic into the lacrimal sac as an indicator of medial wall perforation during rhinostomy formation significantly reduces the risk of underlying structures damage which reduces frequency of recurrence due to scarring of anastomosis.

### Orbital Apex and Its Effects: A Case Series of Traumatic Orbital Apex Syndrome

*First Author: Prem SAI*

*Co-Author(s): Sivaraja GOWTHAMAN, Gainathi KAMBAM, Pratima SAHU, Elfride SANJANA*

**Purpose:** To present a case series of traumatic orbital apex syndrome.

**Methods:** We reported 3 cases of traumatic orbital apex syndrome. On examination, all 3 patients had vision of perception of light, complete ptosis, limitation of movements in all directions of gaze, corneal anesthesia, and decreased sensation on affected side of the face with grade IV relative afferent pupillary

defect. Fundus examination was normal in both eyes.

**Results:** Neuroimaging helped in determining the mechanism of optic nerve injury. Intravenous methylprednisolone was indicated in 1 patient.

**Conclusions:** Traumatic orbital apex syndrome is an uncommon complication which occurs due to craniomaxillary fracture with an incidence of less than 1%. This case series is being presented because of its rarity and the importance of the role of neuroimaging, in not only determining the diagnosis but also in planning management.

### Orbital Chronic Hematic Cyst with Optic Nerve Compression: Case Report

*First Author: Ya-Hui WANG*

*Co-Author(s): Ming-Shuan CHIANG, Mei-Xue LOI, Chien-Liang WU*

**Purpose:** To report a case of orbital chronic hematic cyst with optic nerve compression.

**Methods:** Case report.

**Results:** A 30-year-old female without a special underlying disease suffered from left eye redness with periorbital ecchymosis. Blurred vision in progress of left eye was noted. The presenting vision was 0.4 with correction and pre-operation vision was 0.2 of left eye. The intraocular pressure was within normal limits. Color vision test of Ishihara plate reading was 13/13 (OU), and some defect (red shift to pink, OS) was noted. Hertel's exophthalmoscopy revealed OS 2 mm more proptosis than OD. No relative afferent pupil defect in both eyes was noted. Extraocular movement showed no significant limitation. Diplopia was showed when looking upward and left sided. Dilated fundus examination revealed retinal striae (OS). Orbital computed tomography showed 1 soft tissue nodule about 17.5 x 14.4 x 17.3 mm at retroglobal and intraconal location of left orbit abutting inferior aspect of optic nerve and posterior-medial-inferior aspect of left eyeball. Magnetic resonance imaging study of orbit before and after gadolinium enhancement revealed heterogeneous high signal on T1 phase with enhancement. Surgical removal of orbital tumor under general anesthesia was done. The pathology result was a chronic hematic cyst.

**Conclusions:** Patient age must be considered when evaluating a patient with a possible orbital malignancy. A careful history and systemic and ocular examination was also important. The incidence and clinical features of the various tumors and pseudotumors should allow the clinician to provide better care for the patient with a suspected orbital mass.

### Orbital Lymphoma Masquerading as Thyroid Orbitopathy

*First Author: Wen-Hsin CHENG*

*Co-Author(s): Cheng-Hsien CHANG*

**Purpose:** To report a case of orbital lymphoma mimicking thyroid orbitopathy.

**Methods:** Case report.

**Results:** A 55-year-old male patient presented with a history of proptosis OU for 6 months and limited ocular motility OU for 2 months. Thyroid function tests revealed euthyroid status. Orbital CT scan showed hypertrophy of extraocular muscles (superior rectus muscle) mimicking thyroid orbitopathy (TO). Microsomal and thyroglobulin antibodies were all negative. However, TSH receptor antibody was elevated. He had poor response to the pulse methylprednisolone therapy. Biopsy revealed the lacrimal gland was involved with mucosa-associated lymphoid tissue lymphoma (MALToma). Subsequent blood test of IgG4 was positive and bone marrow was negative for malignancy.

**Conclusions:** Biopsy should be performed in patients with unusual extraocular muscle involvement (ie, superior rectus muscle) and poor response to pulse steroid therapy. MALToma or IgG4-related should be in the differential diagnosis list.

### Orbital and Periorbital Tuberculosis: A Clinical Profile

*First Author: Golam HAIDER*

*Co-Author(s): Sharmin AHMED, Syeed KADIR, Mukti MITRA*

**Purpose:** To report the clinical profile and evaluation of orbital and periorbital tuberculosis.

**Methods:** Prospective observational case series study done at orbit and oculoplasty clinic of tertiary eye care hospital from June 2000 to May 2017. Clinical evaluation, CT scan of orbit, Mantoux test, and a histopathological study were the diagnostic tools to confirm the diagnosis of orbit and periorbital tuberculosis (TB).

**Results:** A total of 12 patients were evaluated in this study, 8 male (66.7%) and 4 female (33.3%). Age varied from 13 years to 70 years. Mean age was  $41 \pm 1.82$ . Presented with: orbital abscess (16.67%), orbital SOL along with lid swelling (16.67%), Isolated lid growth (33.33%), recurrent chalazion like lesion (8.33%) and conjunctival lesion (25%), upper orbit (8.33%), inferomedial quadrant (16.67%), lacrimal gland (8.33%), orbital abscess (16.67%), MT test positive (16.67%). Histopathology reported tuberculous granuloma. All the patients were cured except one due to non-compliance. So further biopsy was done, and patient was treated with long course of anti-TB drugs. On subsequent follow up, the patient was cured.

**Conclusions:** Orbit and periorbital involvement of tuberculosis is rare. Though our country is an endemic zone for pulmonary TB, sometimes diagnosis is delayed and short course of anti-TB therapy is sufficient. But long course of anti-TB therapy with steroid is often needed to prevent recurrence of orbit and periorbital TB.

### Outcome of Diode Laser Assisted Endoscopic DCR

*First Author: Utpal KUNDU*

**Purpose:** To study the outcomes of diode laser assisted endoscopic DCR.

**Methods:** This hospital-based prospective non-randomized interventional clinical trial included 49 patients with chronic dacryocystitis at National Institute ENT from December 2015 to August 2016. Success and complications were assessed by evaluating the patient at 1 week, 1 month, 2 months, and 3 months postoperatively by nasal endoscopy and sac patency test. Success was defined as an absence of epiphora and patency of lacrimal drainage system.

**Results:** Mean age with SD was  $44.96 \pm 15.807$  (range 13-70 years). Patients between age group 40-60 years was the highest (40.8%). Females were predominant [35 (71.4%)] over males. Male to female ratio was 1:2.5. Septoplasty for DNS in 8 (16.33%) cases, turbinoplasty in 1 case were performed. Complications were injury to middle turbinate, sump syndrome, synechia, and granulation tissue formation. Overall success rate of DCR was seen in 88.6% cases.

**Conclusions:** Laser assisted endoscopic DCR surgery eliminates the need of conventional external DCR. It is easy to perform, cosmetically good, high tech, and has an excellent outcome.

### Outcome of External and Endoscopic Dacryocystorhinostomy: A Propensity Score Matched Analysis

*First Author: Nualporn SRIMUANG*

**Purpose:** To compare success rate between external (Ex) and endoscopic (En) dacryocystorhinostomy, using propensity score to control for confounders.

**Methods:** A total of 158 patients who underwent Ex or En in 2016 were reviewed. Demographics, operative data, and lacrimal patency were analyzed. Propensity score matching was used to control for age, gender, universal coverage (UC) scheme, and surgeon experience.

**Results:** 73 Ex and 121 En were performed in 158 patients (age 60.11 years, female 79.81%, UC 38.97%, staff surgeon 50.23%). Ex were significantly more female (71.95% vs 84.73%;  $P = 0.024$ ), more UC (58.54% vs 26.72%;  $P < 0.001$ ), and less performed by staff (23.17% vs 67.18%;  $P < 0.001$ ) than En. No statistical

difference of success rates (96.61% vs 89.29%;  $P = 0.124$ ).

**Conclusions:** External and endoscopic DCR have comparable success rates. Propensity score match analysis is useful for comparing the outcomes of a non-randomized study.

### Pleomorphic Adenoma of Orbital Ectopic Lacrimal Gland Associated with Swollen Optic Disc

*First Author: Zin HTOON*

*Co-Author(s): Htar HTAR, Thet NAING, Ko THANT, Le' ZIN*

**Purpose:** To describe a case of pleomorphic adenoma arising from ectopic lacrimal gland associated with swollen optic disc.

**Methods:** A retrospective case report illustrating clinical, radiographic, intraoperative, and histological features.

**Results:** A 63-year-old lady presented with gradually increasing non-axial proptosis of left eye for a 2-year duration. There was downwards and outwards displacement of left eyeball by a hard, palpable mass in the supero-medial part of left orbit. Examination of left eye showed corrected visual acuity of counting fingers 3 feet, relative afferent pupillary defect, superior choroidal folds, and optic disc swelling. Examination of right eye was normal. Computerized tomography demonstrated an extra-conal, well circumscribed mass lesion occupying supero-medial part of the left orbit  $2.3 \times 2.3 \times 3.7$  cm in greatest dimensions with some areas of calcification and mild heterogeneous contrast enhancement. There was bony excavation of roof and medial wall of left orbit and indentation of supero-medial globe. Complete surgical excision of tumor was performed through anterior orbitotomy. No connection between the tumor and lacrimal gland was noted intraoperatively. The histopathology showed an encapsulated tumor composed of nests and strands of cuboidal-shaped epithelial cells and myoepithelial cells supported by loose myxoid and hyalinized calcified stroma. The mass was diagnosed "a pleomorphic adenoma arising from ectopic lacrimal gland".

**Conclusions:** Pleomorphic adenoma arising from ectopic lacrimal gland in orbit is rare (3 cases reported). To our knowledge, this is the first case of extra-conal orbital pleomorphic adenoma arising from ectopic lacrimal gland associated with signs of optic neuropathy.

### Recurrent Squamous Cell Carcinoma of Lid with Orbital Extension: A Case Report

*First Author: Samreen MEHFOOZ*

*Co-Author(s): Dr.akhil AGARWAL, Dr.Amrita BAJPAI, Dr.neelima MEHROTRA*

**Purpose:** To assess recurrent squamous cell carcinoma

of lid with orbital extension.

**Methods:** A case of a 52-year-old patient asymptomatic for 2 years presented with a mass on left lower lid. It was of pea size initially and was growing in size. The patient was diagnosed with L/E recurrent squamous cell carcinoma of lid with orbital extension. On examination, fungating mass of 6 x 9 cm arising from LL covering the UL and upper part of cheek, a rough, irregular, and nodular surface, bled upon touch. Excision biopsy and CECT was done. The patient was planned for excision of mass with left orbit exenteration under general anesthesia.

**Results:** The margins were sent for frozen section which came negative. Partial thickness skin graft was taken from thigh and was sutured with remaining exposed margins. Medicated packing with pressure bandaging was done. Packing was left for 2 weeks for the graft uptake. The patient will be later given ocular prosthesis.

**Conclusions:** Surgical excision for squamous cell carcinoma aims to remove the entire tumor with preservation of as much normal tissue as possible. But radical surgical excision is required for aggressive tumors. Faster histological confirmation can be achieved by frozen section control, and reconstruction can take place. Extension into the orbit and sinuses typically requires more extensive surgery (exenteration, sinusectomy) with subsequent radiation therapy.

### Scleral Dan Upper and Lower Eyelid Laceration After Blunt Trauma

*First Author: Maria RIANDIKA*

*Co-Author(s): Harijo Wahjudi Budi SUSILO*

**Purpose:** To manage scleral dan upper and lower eyelid laceration after blunt trauma.

**Methods:** A case report. A 40-year-old man presented to the emergency department with blurred vision and bleeding of the left eye. Patient had a history of being struck by a steel pipe 2 hours before being admitted. Visual acuity was light perception with soft intraocular pressure on palpation. Siedel test was negative. Anterior segment examination showed laceration on both the upper and lower eyelid, 180° chemosis, hyphemia, dan a negative fundal reflex on posterior segment examination. He had an ocular trauma score of 2. Computerized tomography (CT) scan showed irregularity of the left eye. The patient was sent to the operating room immediately for repair of the wounds.

**Results:** The patient underwent exploration of the left eye and suture of the upper and lower eyelid. Exploration revealed scleral laceration exposing the vitreous on the superior temporal region of the eyeball. It was 3 cm in length extending posteriorly and later sutured. Lacerations of the upper and lower eyelid were 7 cm and 2 cm respectively and also sutured. Visual acuity of the patient after surgery was

hand movement. Ultrasonography done after surgery revealed vitreous opacity most likely due to vitreous hemorrhage.

**Conclusions:** Repair of scleral and eyelid lacerations caused by blunt trauma must be done immediately to save the eyeball and ensure a better visual outcome.

### Seven Novels and Three Known Mutations in FOXL2 in 10 Chinese Families with Blepharophimosis Syndrome

*First Author: Bingying LIN*

*Co-Author(s): Danping HUANG*

**Purpose:** We aimed to investigate the genetic basis of BPES in 26 Chinese families that included 78 patients.

**Methods:** We performed ophthalmological examinations on each family member. We used Sanger sequencing to screen FOXL2 exons and their flanking sequences. We also performed bioinformatics studies, structural modeling and pathogenicity evaluations on all identified variations. Literature was reviewed and genotype-phenotype correlation analysis was performed.

**Results:** The patients had typical manifestations of BPES. Ten mutations were identified in 10 of the 26 families. Among these, 7 were novel mutations. These included the 6 truncating mutations, p.Glu69\*, p.Gly256Glyfs\*14, p.Ala14Serfs\*135, p.Pro333Profs\*200, p.Pro290Leufs\*70, and p.Pro157Profs\*91, and 1 missense mutation, p.Tyr59Cys. The mutations were scattered within the gene, and no mutational hotspots were found. Genotype-phenotype correlation analysis showed that frameshift or nonsense mutations were correlated with type I BPES, while in-frame or missense mutations were associated with type II BPES.

**Conclusions:** We report the largest BPES cohort in China thus far as well as 7 novel mutations in FOXL2. The identification of novel mutations has not only expanded the mutational spectrum of the gene (which is valuable for mutation detection-based screening) but also suggests that most mutations within the Chinese population may not have been characterized yet.

### Small B-Cell Lymphoma Masquerading as Recurrent Chalazion: An Atypical Presentation

*First Author: Pei-Jane BAIR*

*Co-Author(s): Chia-Yi LEE*

**Purpose:** To present a case with small B-cell lymphoma that resemble to recurrent chalazion.

**Methods:** Case report and review of the literature.

**Results:** An 82-year-old female with diabetes mellitus and regularly followed up at our hospital presented with left lower eyelid swelling mass. On examination, a palpable nodule with yellowish discharge was found

so antibiotic treatment was prescribed. However, the swelling sensation and the size of nodule had fluctuated in the following months despite repeated antibiotic therapy. Thus, excisional biopsy was performed and the specimen obtained demonstrated diffuse proliferation of small-to-moderate lymphoid cells with abundant clear cytoplasm. The further immunohistochemical staining revealed high level expression of CD20 and Bcl-2. Accordingly, small B-cell lymphoma was diagnosed and the positron emission tomography was arranged which revealed no distal metastasis. The rituximab and CHOP chemotherapy protocol was performed by the hematological department and no further metastasis was observed in the following 1 year.

**Conclusions:** Small B-cell lymphoma may masquerade as recurrent chalazion similar to sebaceous gland carcinoma.

### Successful Management of Fusariosis Preseptal Cellulitis in a Patient with NK/T-Cell Lymphoma

*First Author: Hasiana LUMBAN GAOL*

*Co-Author(s): Gisela Haza ANISSA, Lukman EDWAR*

**Purpose:** To present a rare case of preseptal cellulitis caused by *Fusarium* spp. and its proper management.

**Methods:** A 36-year-old male complained of a swollen eyelid on his left eye 1 week before admission, with pain and yellowish discharge. He had a history of rhinosinusitis 5 months ago and wide necrotic lesion on tip of the nose, resembling a mucormycosis infection. On examination, left eyelid was edematous and hyperemic with yellowish discharge and minimal conjunctival injection. Intraocular pressure was normal, cornea was clear with quiet anterior chamber, and retina was within normal limits. Culture of sinonasal specimen showed growth of *Fusarium* spp. Patient was initially treated with intravenous Amphotericin B. On the sixth day of treatment, he showed an anaphylactic reaction related to Amphotericin B. The antifungal agent was changed into 200 mg intravenous Voriconazole every 12 hours. Immunohistochemistry result of nose lesion showed NK/T-Cell lymphoma. Patient then received chemotherapy with Carboplatin 450 mg, Etoposide 150 mg, and Ifosfamide 2250 mg.

**Results:** The patient showed significant improvement after treatment. Edema was seen notably decreasing, no eye discharge, and culture of sinonasal specimen after 1 month of Voriconazole injection showed no growth of fungi.

**Conclusions:** Ancillary testing such as specimen culture and immunohistochemistry is important for proper diagnosis and relevant treatment of the rare disease. Voriconazole is a drug of choice, including in amphotericin B-allergic cases.

### Superior Ophthalmic Vein Thrombosis: A Rare Complication of Orbital Cellulitis

*First Author: Katrina Beatrize MANAS*

**Purpose:** Isolated superior ophthalmic vein thrombosis (SOVT) is a rare complication of orbital cellulitis. This may lead to life- and vision-threatening conditions.

**Methods:** A case report of a patient with isolated superior ophthalmic vein thrombosis was described in detail with its clinical characteristics, radiographic features, and management.

**Results:** A 24-year-old male had a 5-day history of pustule on the nose progressing into orbital cellulitis. Clinical findings included bilateral proptosis, chemosis, ophthalmoplegia, ptosis, and reduced visual acuity. A blood culture revealed the presence of Methicillin-resistant *Staphylococcus aureus*. Computed tomography (CT) scan of the cranium and orbit confirmed bilateral proptosis and also revealed isolated bilateral superior ophthalmic vein dilatation, demonstrating SOVT. There was normal enhancement and no concurrent thrombosis of the cavernous sinus. The patient was maintained on intravenous Vancomycin during his admission. Magnetic resonance imaging (MRI) after 3 weeks showed improvement and decreased superior ophthalmic vein dilatation. After treatment, there was complete resolution of orbital signs.

**Conclusions:** SOVT is a rare complication of orbital cellulitis and can lead to devastating complications. Recognition can be done through an adequate history, physical examination, and a high index of suspicion. Confirmation may be done through radiologic evaluation with CT and MRI scans. Dilatation of the superior ophthalmic vein is an important sign and should alert physicians of SOVT so that prompt management can be initiated.

### Surgical Intervention for Advanced Orbital Cellulitis: Case Series

*First Author: Yulia AZIZA*

*Co-Author(s): Umar Said DHARMABAKTI, Febriani ENDIYARTI, Made SUSIYANTI*

**Purpose:** To present clinical features and outcomes of advanced orbital cellulitis on adults that required surgical intervention.

**Methods:** All cases of orbital cellulitis from December 2017 until May 2018 were included in this case series. The demographic data, clinical manifestations, treatments and managements, clinical outcomes, and microbiological culture results were evaluated.

**Results:** Four cases of orbital cellulitis were included in this study. The mean age was 38.5 years old (range, 26-57 years). The main complaint of all patients was eyelid swelling and 2 patients had visual deterioration. All cases were in advanced stage and had already

gotten oral antibiotic. However, the diseases were still progressing. All patients had orbital and sinuses Computed Tomography (CT) scan examination, resulting in 2 cases with condensate frontal and ethmoid sinuses (one of them had subperiosteal abscess and the other had nasolacrimal duct involvement) and 2 cases with ethmoid and maxilla sinuses involvement. All patients received intravenous antibiotic on the admission day and had Functional Endoscopic Sinus Surgery (FESS) for drainage and debridement on 48 hours after antibiotic treatment, except for 1 case that had FESS and also orbital decompression immediately on the admission day. Improvement of the clinical features was found in all cases, but 1 case still had visual loss.

**Conclusions:** Surgical management is the main treatment for advanced orbital cellulitis that significantly eradicates local infection and inflammation, thus preventing the risk of further complication. Surgical approach is based on the origin of infection.

### Surgical Outcome of Orbicularis Myectomy in Essential Blepharospasm

*First Author: Riffat **RASHID***

*Co-Author(s): Nazmul **HAQUE ROBI**, Syeed **KADIR**, Sadia **SULTANA***

**Purpose:** To study the surgical outcome of orbicularis oculi myectomy as a treatment for benign essential blepharospasm.

**Methods:** This prospective interventional case series study was conducted in the department of oculoplasty in an eye hospital. We included 4 patients, clinically diagnosed as benign essential blepharospasm of both sexes, during the study period. All 4 patients underwent orbicularis oculi myectomy surgery. Patients were followed up for 1 year.

**Results:** This study included 6 eyes of 4 patients diagnosed as benign essential blepharospasm. The age of the patients ranged from 53 to 65 years. Number of male patients was 1 and female patients were 3. Right eye was operated on in 4 patients and the left eye in 2 patients. Postoperatively, all 4 of them had significant relief from spasms. One patient complained of mild spasms in 1 eye after 6 months of surgery.

**Conclusions:** In fit and healthy patients, orbicularis myectomy is the surgical treatment of first choice, because of its longer effect and fewer complications.

### Unocular Vision at the End of the Tunnel: Rare Presentation and Management of Unilateral Rosai-Dorfman Disease of the Orbit

*First Author: Suhas **PRABHAKAR***

*Co-Author(s): Debolina **DEB**, S Anandha **LAKSHMI**, Meera **MOHANAKUMAR**, Krishnima **RAGHU***

**Purpose:** To report a rare manifestation of Unilateral

Rosai-Dorfman Disease involving the left orbit in a young adult and its effective management.

**Methods:** Presenting the rare case of a 17-year-old male with unilateral progressive enlargement of the left eye over the past 10 years. The patient gave a history of surgical debulking done outside. On examination, left eye showed a multilobulated, compressible mass occupying the left orbit, causing an eccentric proptosis measuring 35 mm. Relative afferent pupillary defect was present. No pulsation or bruit was elicited. Extraocular movements were restricted in the left eye. Fundus examination revealed left disc pallor. Right eye examination was within normal limits.

**Results:** The following series of investigations were done. CT orbit showed an infiltrative soft tissue lesion involving the left orbit encasing the intraorbital structures, along with extensive spread to adjacent sinuses. Incisional biopsy done was suggestive of an inflammatory pathology with numerous plasma cells and Russell bodies. IHC correlation showed positive results for S100, CD68, CD138, and CD20, along with IgG4 and IgE. A definitive conclusion of Left Eye Unilateral Rosai-Dorfman Disease with Consecutive Optic Atrophy was made. Radiotherapy and systemic steroids were initiated for a period of 4 months. On follow-up in 6 months, a repeat scan showed a significant reduction in the bulk of the lesion.

**Conclusions:** Rosai-Dorfman disease may be suspected in young individuals with bilateral and rarely unilateral progressive proptosis. Patients with functional difficulty secondary to the recurrence following surgical debulking may be treated with a combination of systemic steroids and radiotherapy, with positive results.

## Pediatric Ophthalmology & Strabismus

### 17 Cases of Acute Acquired Comitant Esotropia in Young Patients

*First Author: Hirohito **IIMORI***

*Co-Author(s): Akiko **HIKOYA**, Yoshihiro **HOTTA**, Miho **SATO**, Hiroko **SUZUKI**, Yu **WANG***

**Purpose:** To identify characteristics of young patients without neurologic diseases who develop acute acquired comitant esotropia (AACE).

**Methods:** We reviewed the medical charts of patients who were consecutively referred to the Hamamatsu University Hospital with AACE from January 1, 2016 to December 31, 2017. Inclusion criteria were acute or subacute onset of comitant esotropia in patients aged between 6 and 30 years. Patients with neurological disorders, congenital eye diseases, amblyopia visual acuity defects (best corrected vision less than 0.6),

and common forms of esotropia, such as consecutive esotropia, infantile esotropia, and accommodative and partial accommodative esotropia were excluded. Patient medical histories and ophthalmological and orthoptic records were collected.

**Results:** Seventeen patients were identified, with a mean onset age of 14.2 (7-26) years. The mean age at referral was 15.8 (9-27) years. The average distance deviation angle was 26.4 (6-50) prism diopter (PD) and the average near deviation angle was 29.5 (0-50) PD. One 7-year-old boy showed Swan type AACE following monocular occlusion for amblyopia. The remaining 16 patients showed refraction. Three patients showed mild hyperopia (between +0.50 and +1.25 D), and 13 showed myopia (between -0.75 and -13.00 D). Patients with hyperopia were 6 - 7 years old, and those with myopia were 12-26 years old. Eight patients with myopia reported excessive near work including a video display such as smartphone use.

**Conclusions:** Most patients with AACE showed myopia, and extensive visual display terminal use may trigger AACE in young patients.

### A Relationship Between Attention Deficit with Hyperactivity Disorder and Amblyopia

*First Author: Ya-Chi HUANG*

**Purpose:** To evaluate whether attention deficit with hyperactivity disorder is associated with refraction problems.

**Methods:** A cross-sectional study from January 2014 to January 2017. Cases with a diagnosed attention deficit with hyperactivity disorder and amblyopia were included. The intersection of these 2 groups were analyzed. For children enrolled in groups, the following data were recorded: uncorrected visual acuity, cycloplegic refraction, ocular motility, and binocular function.

**Results:** We included 83 patients from 3 to 15 years old in this study. The prevalence of attention deficit with hyperactivity disorder was greater among children with vision problems. Vision problems included amblyopia, strabismus, convergence insufficiency, and nystagmus. Amblyopia was the most related.

**Conclusions:** Our analyses suggest that children with vision impairment may be more likely to be diagnosed with attention deficit with hyperactivity disorder than children in the general population. Ophthalmologists should be aware that patients with amblyopia are at increased risk of having attention deficit with hyperactivity disorder.

### Accuracy of Computed Tomography Scan and Magnetic Resonance Imaging for Detection of Pathologic Risk Factors of Retinoblastoma

*First Author: Atchareeya WIWATWONGWANA*

*Co-Author(s): Pichaya KULNIWATCHAROEN, Ponsak MAHANUPAB, Pannee VISRUTARATNA, Damrong WIWATWONGWANA*

**Purpose:** To determine the diagnostic accuracy of computed tomography scan (CT scan) and magnetic resonance imaging (MRI) for detection of pathologic risk factors of retinoblastoma.

**Methods:** Medical records of retinoblastoma patients from January 1, 2008 to June 30, 2018 were reviewed. Findings on CT scan or MRI, specifically in regard to characteristics that indicate pathologic risk factors (post-laminar optic nerve, choroidal, scleral, and anterior segment invasion) were assessed by a pediatric radiologist. Only patients who had undergone primary enucleation were included in the statistical analysis. Presence of pathologic risk factors was confirmed from histopathology. Accuracy, specificity, sensitivity, negative, and positive predictive value of CT and MRI in detecting pathologic risk factors were analyzed.

**Results:** A total of 68 eyes of 56 patients diagnosed with retinoblastoma were identified. Forty-four patients had undergone primary enucleation. Of these, CT scan was performed preoperatively in 28 patients and MRI in 16 patients. Diagnostic value for detecting pathologic risk factors was compared between CT and MRI. For postlaminar optic nerve invasion, the accuracy of CT scan versus MRI was 50% vs 86.7%, 50% vs 62.5% for choroidal invasion, 64.3% vs 81.2% for scleral invasion, and 67.9% vs 56.2% for anterior segment invasion.

**Conclusions:** Overall, MRI yielded a higher diagnostic value for detection of pathologic risk factors for retinoblastoma. In cases when the globe is salvaged, MRI may be a more accurate modality for careful monitoring of pathologic risk factors, which is mandatory in planning further management.

### Acute Acquired Incomitant Esotropia Related to Nutritional Status

*First Author: Pei-Tzu KUAN*

**Purpose:** We report a case of acute diplopia caused by acquired incomitant esotropia. Vitamin B12 deficiency is presumably the cause.

**Methods:** A case report.

**Results:** A 67-year-old male denied any ocular operation had blurry vision for 4-5 days. He reported that the floor look likes uneven. Looking at nearer target was more bothering than looking straight ahead. He also reported he has cardiovascular disease and just undergone the third percutaneous coronary intervention 2 weeks ago. On ocular examinations,

visual acuity of the right eye was 2/10 and of the left eye was 1/10. Slit lamp revealed grade 1 nuclear sclerosis; fundoscope showed normal foveal reflex without signs of maculopathy. Meanwhile, 6 prisms diopter deviation in the primary position and 15 prisms in downgaze position were measured. Eye movement is full. Incomitant esotropia was impressed. Brain MRI and serial neurologic evaluations only revealed diffuse brain atrophy and subcortical atherosclerotic encephalopathy related to probably previous brain insult or aging. But lower titer of vitamin B12 as 157 pg/mL has been disclosed. After vitamin B12 supplement treatment, his symptoms total resolved within 2 weeks.

**Conclusions:** Acute Incomitant esotropia in elderly people may be related to nutritional factors. Reverse or improvement of symptoms could be achieved through promptly management.

### An Optical Coherence Tomography Comparison of Macular Thickness and Volume in High Myopia and Low Myopia in Indonesian Children

*First Author: Kianti DARUSMAN*

**Purpose:** To evaluate the characteristics of macular thickness and macular volume in high myopic and low myopic Indonesian children.

**Methods:** Prospective, consecutive, case control study.

**Results:** A total of 176 eyes (88 in each group), of overall mean age  $12.64 \pm 3.14$  were evaluated. High myopic group was older  $13.74 \pm 2.87$  compared to low myopic group  $11.55 \pm 3.05$ . Average spherical equivalent for high myopia was  $-7.18 \pm 1.20$  diopters (D) and  $-1.11 \pm 0.77$  D for low myopia. The number of female subjects was higher in both groups: 61.4% in high myopic group and 62.5% low myopic group. The mean thicknesses of all 4 quadrants of the outer macula and inner temporal quadrant of the inner macula were significantly thinner in high myopic group compared to low myopic group ( $P < 0.05$ ). Macular volume of high myopic group was also significantly reduced compared to low myopic group ( $P < 0.05$ ). Linear regression analysis result showed that age did not have any influence in the macular thickness, and high myopia remained as the only factor leading to thinning of the macula area.

**Conclusions:** In children with high myopia, overall macular thickness and volume are reduced significantly. These structural differences should be considered in the clinical assessment of high myopic children.

### Ankyloblepharon Filiforme Adnatum

*First Author: Idham ARIFIN*

*Co-Author(s): Ratna DOEMILAH*

**Purpose:** Ankyloblepharon filiforme adnatum is a rare

congenital malformation characterized by partial or complete fusion of the eyelids. It may be present as an isolated finding or in association with other anomalies. Surgical correction should be performed promptly to minimize any risk of occlusion amblyopia.

**Methods:** This is a case report of a 1-month-old female neonate with chief complaint bilateral adhesion between upper and lower eyelids. There were no other congenital abnormalities. She was born aterm by spontaneous delivery. There was no similar congenital malformation in her family and no systemic disease, and no history of prenatal drug.

**Results:** Visual acuity in both eyes fixed and follow. In this patient the band of ankyloblepharon filiforme adnatum was cut using scissors one by one with general anesthesia. Evaluation after 3 months, there was no readhesion.

**Conclusions:** Ankyloblepharon filiforme adnatum is a rare congenital malformation. Treatment consists of a simple surgical resection of the fibrous band, and it should be performed after the baby is born.

### Ankyloblepharon Filiforme Adnatum: Case Report

*First Author: Umesh BHAMMARKAR*

*Co-Author(s): Aparna C, Sirisha NAGA, Aloka SHAH, Sunil VIDAP*

**Purpose:** We reported a case of a newborn presenting with isolated Ankyloblepharon filiforme adnatum at birth, treated in the first week of life.

**Methods:** The term baby was born from a cesarean section on May 19, 2018. Delivery was uneventful, and birth weight was 2720 g. Prenatal screenings were unremarkable. Initial evaluation of a full-term newborn some hours after birth showed the presence of partial fusion of both upper and lower eyelids by a central, narrow band of tissue, arising from the grey lines.

**Results:** Initial physical examination of the baby showed the presence of central thin tissue bands connecting left upper and lower eyelids in both eyes. The band of tissue was retracted anteriorly with a squint hook, clamped for 10 seconds, and excised with Vannas scissors at the level of each eyelid margin. There was no sign of distress and no bleeding. Surgical correction should be performed promptly to minimize any risk of occlusion amblyopia and enable full examination of the eye.

**Conclusions:** Ankyloblepharon filiforme adnatum is a rare congenital condition, which can be easily missed at first clinical examination at birth due to ocular edema and eyelid swelling. Accurate examination of eyelids represents a fundamental part of neonatal physical evaluation before discharging the newborn, both to avoid future functional problems like impaired vision or amblyopia and because eyelid malformations could be a sign of multisystemic disease.

## Augmented Superior Rectus Transposition with Intraoperative Botulinum Toxin Injection for Large Angle Chronic Sixth Nerve Palsy: A Case Report

First Author: Chih-Yu **CHEN**

**Purpose:** To evaluate the result of augmented superior rectus transposition (SRT) with intraoperative botulinum toxin injection for treatment of large angle chronic sixth nerve palsy.

**Methods:** A case of a 54-year-old female patient, presented with 75 Δ PD esotropia, combined with obvious hypotropia of right eye in primary position. She was a case of right traumatic sixth nerve palsy for 3 years with chin-up and face turned to the right. There was a filtration bleb on the upper limbus of right eye due to acute attack of PACG after the trauma. Augmented superior rectus transposition (suture was placed 3 mm posterior to the insertion of SR, transposition to the upper border of lateral rectus, a posterior fixation 8 mm from the insertion with 25% of LR and sclera pass was done, combined with intraoperative botulinum toxin injection of right medial rectus, and bilateral medial rectus muscle recessions. (od 6.5 mm, os 4.5 mm) on December 2017.

**Results:** Complete ptosis with lateral gaze limitation (-2) (od) and nasal limitation (-1) (ou) was found 2 weeks after the operation. Four weeks later, slight exotropia and hypertropia (od) and ptosis (3+) was found; Six months later, there was no diplopia on the primary, left with six prism-diopters right hypertropia and no ptosis. 15 to 20-degree lateral gaze across the midline could be achieved after the SRT surgery.

**Conclusions:** Augmented superior rectus transposition (SRT) with intraoperative botulinum toxin injection may be a selective method for the treatment of large angle chronic sixth nerve palsy.

## Bilateral Coloboma: A Case Report

First Author: Jeselle **LAGRADA**

**Purpose:** To examine the presentation, clinical features, and management options for a pediatric case of bilateral coloboma.

**Methods:** Case report.

**Results:** Bilateral coloboma involving the anterior to posterior structures can result in a significant visual impairment. Initial evaluation of patient included complete ophthalmologic examination to identify all structures affected. Our patient presented late at the clinic, already at 12 years of age, without prior intervention. Systemic review revealed no associated involvement. Our patient had very poor visual acuity (VA OD 10/200, OS 20/200), microphthalmia OD, corectopia/keyhole pupil OU, right-beating jerk nystagmus, esodeviation OD, dislocated lens OD, cataract OD, and retinal detachment OD.

Prognostication and management plans aiming for best possible visual acuity were assessed. Best corrected visual acuity was given with plan for lensectomy with transscleral intraocular lens insertion for the dislocated lens. Observation was opted for the retinal detachment due to the poor prognosis.

**Conclusions:** The case presented a rare condition of bilateral coloboma with various complications in a pediatric patient. Management options were limited to low vision rehabilitation and addressing specific complications.

## Bilateral Ectopic Lenses: Atypical Inferonasal Lens Subluxation and Anterior Lens Luxation in Marfan Syndrome

First Author: Nora **DAHLIA**

Co-Author(s): Hariwati **MOEHARIADI**

**Purpose:** To report a rare case of bilateral ectopic lenses in Marfan syndrome, a genetic connective tissue disorder affecting ocular, musculoskeletal, and cardiovascular systems.

**Methods:** Diagnosis was based on history-taking, best-corrected visual acuity (BCVA), anterior segment examination, intraocular pressure (IOP) measurement, physical examination, chest X-ray, and echocardiography.

**Results:** A 12-year-old girl had complained about blurry vision in left eye (LE) for 4 months. She had a history of high myopia in both eyes (BE) for 8 years. History of Marfan Syndrome in family and siblings was negative. BCVA of right eye (RE) and LE were 1/60 cc S-18,00 C-1,50x90°, and became 6/9 and 1/60 with no improvement with pinhole. Right anterior segment examination found iridodonesis, phacodonesis, and inferonasal lens subluxation which is an atypical presentation in Marfan Syndrome, while LE examination found iridodonesis and anterior lens luxation. IOP was normal in BE. Physical examination of the patient showed positive wrist and thumb sign, while chest X-ray showed dextroscoliosis. Cardiovascular abnormality, including dilatation of the aortic root and mitral valve prolapse, revealed during echocardiography. Patient was diagnosed with RE inferonasal lens subluxation and LE anterior lens luxation due to Marfan Syndrome. Patient underwent LE intracapsular lens extraction. Post-surgery visual outcome was 1/60 cc S+10,00 and became 6/9. Soft contact lens was prescribed for BE, while lens extraction was planned for RE. Bisoprolol 1.25 mg has been given by Pediatric Department.

**Conclusions:** Diagnosis and management of bilateral ectopic lenses in Marfan syndrome requires multisystem approaches due to ophthalmology and systemic manifestations.

## Bimedial Rectus Resection as a Satisfactory Surgical Option in Managing Convergence-Insufficiency Intermittent Exotropia

First Author: Gisela Haza **ANISSA**

Co-Author(s): Anna **BANI**

**Purpose:** CI-type IXT is characterized by a greater exodeviation at distance of at least 10Δ. Several techniques of surgery have been developed for this condition, with no consensus existing on which is best. Bilateral recessions or resections, with or without slanting, are among them. Here we reported a favorable surgical outcome of bimedial resections (BMR) without slanting out of the various options.

**Methods:** Case report.

**Results:** A 10-year-old boy with 6/6 OU visual acuity presented with intermittent outward squint for 5 years before admission, seen over 50% of the day. Patient had no complaints of diplopia or asthenopia, and was unable to comply to orthoptic exercises. The adduction was normal, with a near deviation of 30Δ X(T) and 15Δ X(T) at distance. A remote near point of convergence (NPC) of 13 cm was shown. An average surgical target of 25Δ was chosen through performing a 5 mm BMR without slanting. At 1 month post-surgery, the patient showed only an exophoria of 2Δ at near; and at 2 months, 4Δ X at near and 2Δ PD X at distance. The NPC had increased to 7 cm.

**Conclusions:** In addition to the type of surgery, the key of CI-IXT is also in determining the target deviation. In this case, using the average deviation between distance and near as a target, and performing BMR without slanting showed satisfactory results.

## Clinical Profile of Nonstrabismic Binocular Vision Anomalies in Patients with Asthenopia

First Author: Saurabh **DESHMUKH**

Co-Author(s): Nilutparna **DEORI**, Krati **GUPTA**, Damaris **MAGDALENE**, Diva **MISRA**

**Purpose:** To report the clinical profile of nonstrabismic binocular vision anomalies (NSBVA) in patients with asthenopia in North-East India.

**Methods:** A hospital-based study was conducted on 131 patients from age group 10-40 years attending the vision therapy clinic. Patients were divided into age groups of 10-20 years, 21-30 years, and 31-40 years. A detailed orthoptic evaluation was carried out, including sensory and motor testing, and a diagnosis was made comparing various orthoptic parameters of the particular patients.

**Results:** Of the 131 patients, 81 were female and 50 were male. The number of patients was 62 in the 10 - 20 years age group, 49 in 21 - 30 years age group, and 20 in 31 - 40 years age group. The prevalence of NSBVA in the age group 10 - 20 years was 69.35%, 21 - 30 years was 67.35%, and 31 - 40 years was

50.00%. It was observed that the most common NSBVA was convergence insufficiency across all age groups followed by accommodative insufficiency and convergence excess.

**Conclusions:** Early detection of NSBVA is important because these deviations may decompensate without treatment and become strabismic, resulting in loss of stereopsis and development of suppression. Early detection and treatment provide the best opportunity for academic success in school going age groups.

## Clinicodemographic Profile and Survival of Retinoblastoma Patients in North India

First Author: Rajendra **MAURYA**

Co-Author(s): Syeed **KADIR**, Om Prakash Singh **MAURYA**, Diva **MISRA**, Diksha **SAREEN**, Virendra P **SINGH**

**Purpose:** To determine the clinicodemographic characteristics, survival rates, and risk factors for children with retinoblastoma in this region.

**Methods:** In this retrospective, observational case series, 86 children were reviewed from February 2015 to August 2018. Socio-demographic characteristics, clinico-radiological features, histopathologic variables, treatment outcomes, and survival rates were analyzed.

**Results:** A total of 102 eyes of 86 patients with retinoblastoma were studied. There were 64 males and 22 females. Age at presentation was 3 months to 6 years (median 1 year). Majority (83.72%) belonged to lower socioeconomic status. Positive family history was found in 3 cases. 81.40% of patients had unilateral involvement and 18.60% had bilateral involvement. The most common mode of presentation was proptosis with orbital invasion (49.02% of eyes), followed by leukocoria (44.12% of eyes) and squint (6.86% of eyes). 17.65% of eyes had large fungating orbital mass. Histopathological high-risk features were present in 41.18% of eyes. 11.63% of patients had lymph node metastasis and 5.81% of patients had distant metastasis. Patients were managed by primary enucleation (39.53%) and neoadjuvant chemotherapy (62.79%), while exenteration was performed in 13.95% of cases. In 6.98% of cases, radiotherapy followed by enucleation was done. Two patients died during treatment. The 3-year survival rate was 45.71% for unilateral cases and 37.50% for bilateral cases (Kaplan Meier method).

**Conclusions:** The most common mode of presentation of retinoblastoma in Northern India is proptosis. Delayed presentation is due to ignorance and lack of awareness. The proptosis and frequent extraocular spread at the time of presentation is the cause of low survival.

## Evaluating Effect of Strabismus Surgery on Reading-Related Skills in Chinese School-Aged Children with Intermittent Exotropia and Constant Exotropia

First Author: Julie **LOK**

Co-Author(s): Henry **LAU**, Wilson **YIP**

**Purpose:** To evaluate the effect on reading-related skills including Chinese and English in school aged Chinese children with intermittent exotropia (IXT) after strabismus surgery.

**Methods:** Chinese children at age 6-8, who underwent a strabismus operation for constant exotropia and intermittent exotropia in our cluster, were recruited. They underwent a serial assessment on their type and angle of strabismus by the same team of experienced pediatric ophthalmologists and orthoptists. All recruited children went through a series of reading skills tests 8 weeks before and 4 to 8 weeks after the operation. The reading test includes developmental eye movement test (DEM test) and a one-minute reading test (traditional Chinese characters). Ocular motility and stereo-acuity were measured by the same team of pediatric ophthalmologists and orthoptists as well.

**Results:** A total of 19 children aged  $78 \pm 11$  m (11 boys) underwent strabismus operation for IXT. Success rate of horizontal misalignment correction yielded in 13 (68.4%) children. Pre- and post-op developmental eye movement tests showed insignificant results in all tests. However, there was significant improvement ( $P = 0.036$ ) in Chinese character reading test pre- and post-op gaining from  $36.7 \pm 17.3$  words/min to  $41.4 \pm 19.5$  words/min with improvement in stereoacuity.

**Conclusions:** Apart from effective correction of strabismus misalignment and improvement of cosmesis, strabismus operations in intermittent exotropia may also potentially enhance the reading ability of children in particular pattern-recognition characters.

## Evaluation of Compliance of Patching for the Treatment of Amblyopia

First Author: Md.Ashiqur **AKANDA**

**Purpose:** To evaluate compliance of amblyopic patients to patching, and to identify reasons of poor compliance and suggest methods to overcome the problem.

**Methods:** We conducted a cross-sectional, retrospective study that included 74 families with a child diagnosed with unilateral amblyopia (age range, 3-16 years) and attending the Pediatrics Ophthalmology clinic at National Institute of Ophthalmology & Hospital, Dhaka (a tertiary eye hospital). Data were collected through interviews and from hospital charts. In the interviews we asked questions that sought information with regard to 4 aspects (domains): knowledge, attitude, insight, and community's effect.

A score representing each domain was given to every family, and then we correlated these scores with family's compliance percentage.

**Results:** When correlated with compliance, the insight and attitude domains showed a statistically significant correlation; P value 0.002 and 0.004, respectively. However, the knowledge and community's effect domains were not; P value 0.084 and 0.114, respectively. Other qualitative factors affecting compliance were identified with open questions. Quotes from families of what they think can improve compliance are shown.

**Conclusions:** To improve compliance, merely educating patients is not sufficient and more efforts should be undertaken toward ensuring a true sense of the problem and its impact. Factors affecting compliance due to the physical properties in the patch itself should be addressed too (heat, irritation, poor adhesive material, and design).

## Evaluation of the Effect of Age and Type of Congenital Nasolacrimal Duct Obstruction in the Outcome of Primary Probing in Children

First Author: Lakshmi **SREEDHARAMURTHY**

Co-Author(s): Deepti **JOSHI**, Anjana Kuri **KURI**, Krishnaprasad **R**

**Purpose:** To study the effect of age and type of Congenital Nasolacrimal Duct Obstruction (CNLDO) in the outcome of primary probing in children.

**Methods:** A prospective interventional study of 192 eyes of 120 children aged between 3 months and 72 months with CNLDO was done. Patients were divided into 4 groups based on age, group A (less than 6 months), group B (6 months-12 months), group C (12 months-36 months), group D (greater than 36 months). Based on intraoperative examination, CNLDO was categorized as simple membranous obstruction at the end of NLD or complex obstruction of common canaliculus, sac/NLD. Outcome measures were defined as successful based on patent sac syringing intraoperatively and absence of clinical signs of NLDO at 12 weeks postoperatively.

**Results:** The average age of patient and probing was  $48.35 \pm 22.29$  and  $13.32 \pm 7.96$  months respectively. Membranous obstruction was found in 85% of patients and a significant correlation between the type of obstruction and success of probing was found ( $P < 0.0001$ ). The overall cure rate of 85.71%, 83.33%, 64.29%, and 33.33% was noted in groups A, B, C, and D respectively. Statistically significant correlation existed between age and outcome of probing as well ( $P < 0.001$ ). Considering type of obstruction and age as confounding factor, age is the major determinant factor in assessing success rate of probing in CNLDO.

**Conclusions:** Primary probing maintains a high success rate in CNLDO up to 12 months, moderate success rate

up to 36 months, and low after 36 months. Yet NLD probing should remain the initial treatment of choice even in older children, as there is some evidence of success.

### Headache and/or Asthenopia Due to Convergence or Fusion Insufficiency with or without Refractive Error and Pen Exercise

*First Author: Mohammad **MOSTAFA HOSSAIN**  
Co-Author(s): Mamunur **CHOWDHURY**, Quazi **IFTEKHAR**, Sidratul **MUNTAHA NAZNIN**, Shifat **TOUFIQE***

**Purpose:** The study was conducted to know the prevalence of headaches and/or asthenopia for convergence insufficiency (CI) or fusion insufficiency (FI) with or without refractive error (RE) and also to see the effectiveness of pen exercise.

**Methods:** Data for this interventional longitudinal prospective study were collected from patients with complaints of asthenopia and/or headaches. Patients were evaluated by taking detailed histories and thorough examinations with dry or cycloplegic refraction and orthoptic evaluation, which includes near point of convergence (NPC), fusional convergence amplitude (FA), and exophoria. Hyperopia was undercorrected and myopia was full corrected, and pen exercise was advised in CI or FI.

**Results:** Out of 248 patients, 36 were aged less than 10 years, 205 were aged 10-20 years, and 7 were aged 21-30 years. 121 (48.8%) patients had FI only, 39 (15.7%) had FI with CI, 59 (23.8%) had exophoria, and 82 (33.0%) had RE, of which 22 (8.9%) had only RE without FI or CI. Relief of headaches and improvement in NPC were observed in 91.5% of patients with CI; relief of headaches and improvement in FA were noted in 93.6% of patients with FI; and 92.2% of patients with only RE had relief of headaches with correction of RE only.

**Conclusions:** Many patients suffered from headaches or asthenopia for CI or FI, which may be associated with exophoria. CI or FI is often associated with RE. RE should be determined and corrected properly. Pen exercise is useful for CI or FI.

### Horizontal Muscle Surgery in Large Constant Alternating Exotropia: 3 or 4 Muscle Surgery?

*First Author: Rani **SARI**  
Co-Author(s): Gusti **SUARDANA***

**Purpose:** To demonstrate management of large exotropia alternate by performing 3 muscle surgery or 4 muscle surgery.

**Methods:** This is a case report. A 34-year-old male patient with complaint of squint outward on both eyes since he was born. Patient used spectacles since elementary school. The best corrected visual acuity

(BCVA) was 6/8.5 on the right eye, 6/6 on the left eye. On prism cover test there was 95  $\Delta$ D exotropia at near examination, the distance examination showing 110  $\Delta$ D exotropia. Patient underwent 3 lateral muscle surgeries, lateral rectus muscle recess on both eyes, and medial rectus muscle resect on the right eye. One day after surgery, the Hirschberg was 30° XT.

**Results:** Large-angle constant exotropia gives a negative impact on the way patients see themselves and are perceived by others. The benefits of surgical treatment of exodeviations in adults are well proven, not only improving a patient's psychosocial functioning, but also, in some cases, restoring binocular vision. Patient underwent 3 lateral muscle surgeries, lateral rectus muscle recess on both eyes and medial rectus muscle resect on the right eye. Patient was planning to do a second surgery and a medial rectus muscle resect on the left eye to improve his primer position.

**Conclusions:** Three and 4 muscle surgeries were both effective for correcting large angle exotropia across a wide range of preoperative angles and ages. Consideration of surgery depends on angle of deviation and surgeon preference.

### Hummelsheim Procedure and Recession of Medial Rectus Muscle in Managing Diplopia Caused by Abducens Nerve Paralysis

*First Author: Bachtiar **WICAKSONO**  
Co-Author(s): Anna **BANI**, Gusti **SUARDANA***

**Purpose:** To demonstrate the success of combining Hummelsheim procedure and medial rectus muscle recession in managing diplopia caused by abducens nerve paralysis.

**Methods:** This is a case report with a 39-year-old male post-chemoradiation due to nasopharyngeal carcinoma who complained of double vision since 6 months ago. There had been no signs of tumor recurrence based on Magnetic Resonance Imaging (MRI) since 2 years after chemo. The abduction of the left eye was completely limited with a 20 PD esotropia in primary position. Diplopia was most noted on left temporal gaze with range of fusion at 15-25 PD base out. We performed Hummelsheim procedure and medial rectus muscle recession to achieve ocular alignment, due to the positive forced duction test of the medial rectus muscle.

**Results:** After 3 months, the eyes in primary position were orthophoric and the diplopia resolved, although the left eye abduction only gave slight improvement.

**Conclusions:** Hummelsheim and recession of medial rectus muscle are effective in managing diplopia caused by abducens nerve paralysis.

## Incidence, Characteristics, and Treatment Outcome of Retinopathy of Prematurity in Hong Kong

First Author: Michelle **FAN**

Co-Author(s): Lawrence **IU**, Connie **LAI**

**Purpose:** To investigate the incidence, characteristics, and treatment outcome of retinopathy of prematurity (ROP) in Hong Kong.

**Methods:** Medical records of all premature infants who received ROP screening between 2014 and 2017 in a tertiary hospital of Hong Kong were reviewed. The primary outcome measure was development rate of ROP of any stage. Secondary outcome measures include development rate of severe ROP requiring treatment, change of ROP rate with respect to years, and outcome of ROP treatment.

**Results:** A total of 321 infants were included. The mean gestational age at birth (GA) was 29 weeks and 5 days  $\pm$  18 days. The mean birth weight (BW) was 1215  $\pm$  345 grams. ROP of any stage developed in 75 infants (23.4%), and their mean GA was 27 weeks and 1 day  $\pm$  15 days and mean BW was 879 g  $\pm$  248 grams. Severe ROP requiring treatment was developed in 11 infants (3.4%). All ROP regressed successfully after treatment (100%). Eight infants required 1 single treatment (72.7%) and 3 required 2 treatments (27.3%) to have ROP regression. The ROP development rates and treatment rates were similar among different years ( $P = 0.3114$  and  $P = 0.3956$  respectively).

**Conclusions:** In conclusion, ROP is a significant problem among premature infants in Hong Kong. Treatment outcome was satisfactory, and multiple treatments may be necessary.

## Intravitreal Anti-VEGF Injection as a Primary Treatment for Aggressive Posterior Retinopathy of Prematurity: A Case Report

First Author: Dian **YULIA**

**Purpose:** To report the effectiveness of intravitreal anti-VEGF therapy for AP-ROP. Retinopathy of prematurity (ROP) is a proliferative retinal disease on premature babies, which is a major problem of childhood blindness in developed and developing countries. Aggressive posterior ROP (AP-ROP) is characterized by any plus disease, or stage 3 disease in zone 1, or posterior zone 2 which require treatment, according to Early Treatment ROP standards.

**Methods:** A case report of a baby girl, twin, 15 days old, who was hospitalized in perinatology unit with gestational age (GA) of 29 weeks, postmenstrual age (PMA) of 31 weeks, birth weight (BW) of 1170 grams, suspicion of sepsis, and Continuous Positive Airway Pressure use for 15 days. On ROP screening examination, it showed dilated and tortuous blood vessels, with intraretinal hemorrhages in zone I of both

eyes. The patient was diagnosed with AP-ROP, and intravitreal anti-VEGF bevacizumab injection with dose of 0.625 mg/0.025 mL on both eyes was given.

**Results:** Two weeks after injection, on retina examination with RetCam showed significant improvement on both eyes, demonstrating resolution of blood vessels, markedly regression of intraretinal hemorrhages, and dilatation and tortuosity of blood vessels in zone I. However, the dilated and tortuous blood vessels, with intraretinal hemorrhage covering the macula, were still present on the left eye, but slowly regression was shown in 1 month.

**Conclusions:** Timely ROP screening and immediate treatment with intravitreal bevacizumab on patient with AP-ROP showed good significant result. Long-term and routine follow-up on retinal vascularization and side effects of anti-VEGF injection is still needed.

## Juvenile Myasthenia Gravis: A Rare Case

First Author: Dheveya **SINNAYA**

Co-Author(s): Sangeeta **KUGANASAN**

**Purpose:** To report a rare case of juvenile myasthenia gravis.

**Methods:** Single observational case report.

**Results:** An 8-year-old Chinese girl with no known premorbid history presented with right eye ptosis which was preceded by an episode of upper respiratory tract infection. Her droopy eyelid was persistent for months and her mother noticed it worsening progressively throughout the day. On examination, best corrected visual acuity for both eyes was 6/6. There was right eye ptosis obscuring the visual axis that improved with ice pack test. Both eyes had unequal degree of ophthalmoplegia, and no other neurological deficit was elicited. Anterior segment and fundus examination of both eyes was normal. Cogan's lid twitch and fatigability was present. Serum Acetylcholine antibody receptor was positive. CT scan showed features of acute on chronic sinusitis with normal findings of the brain and orbit. She was started on oral pyridostigmine. She presented again 6 weeks later with complaint of difficulty in chewing and smiling. The case was co-managed with a pediatric neurologist and the patient was then started on tapering dose oral prednisolone. She has been symptom-free for the past 4 months since commencement of treatment.

**Conclusions:** Juvenile myasthenia gravis is a rare, autoimmune condition of childhood that shares many characteristics with that of the common adult form of the disease.

## New Lens Designed for Measuring Refraction and Ocular Deviation in Infants

First Author: Kinei **RA**

**Purpose:** Testing refraction and ocular deviation in

the infant age group is notoriously difficult due to development, short attention spans, and co-operation. The aims of this article were to describe the newly designed retinoscopy lens and 6-step miniature prism lens set and discuss possible clinical applications.

**Methods:** 1. New retinoscopy lens for infants: 9 PMMA minilens with one diopter (D) step are inlaid within a 5 cm round plastic disk. 2. A new 6-step miniature prism set for measuring ocular deviation: Six PMMA mini prism lens with commonly needed prism diopters (PD) step were inlaid within a 5 cm rectangular plastic disk.

**Results:** 1. The disk has a circular rack for easy holding. This retinoscopy lens set consists of 4 disks, ie, minus disk with 1 D step, plus disk with 1 D step, +10 D disk and +20 D disk. The lens sets provide a wide power range of -9 D to +39 D in a manner of single disk or stacked disks usage. The retinoscopy lens is held in a fashion to that in indirect ophthalmoscopy. 2. During splitting prism measurement, a genuine prism holder with sliding fixation mechanism in frontal plane is used. This pocket-size prism set consists of 3 different commonly needed prism strengths, namely 2 PD to 35 PD. The prism lens sets provide a wide power range of 2 PD to 80 PD in a manner of single disk or split disks usage in frontal plane.

**Conclusions:** These 2 devices offer the advantages of being compact and portable, quick to perform and easy to use for both patient and examiner.

## Novel Predictors of Treatment-Requiring Retinopathy of Prematurity

*First Author: Mitsuru* **ARIMA**

*Co-Author(s): Kohta* **FUJIWARA**, *Koh-hei* **SONODA**, *Shoko* **TSUKAMOTO**

**Purpose:** Retinal hypoxia is the core pathophysiology of the progression of retinopathy of prematurity (ROP). To prevent visual loss caused by ROP, we attempted to identify useful predictors from circulatory and pulmonary dysfunctions, and create a predictive model of the development of treatment-requiring ROP (TR-ROP).

**Methods:** Infants with  $\leq 32$  weeks of gestational age (GA) and/or  $\leq 1500$  grams of birth weight (BW) were enrolled in this retrospective study. In addition to parameters of baseline (GA and BW), we listed parameters of circulatory failure [late-onset circulatory collapse (LCC), sepsis, patent ductus arteriosus requiring ligation, anemia requiring blood transfusion, intraventricular hemorrhage and periventricular leukomalacia] and parameters of respiratory failure [use history of oxygen, continuous positive airway pressure (CPAP) and bronchopulmonary dysplasia] as candidate predictors. The relationship of these factors to TR-ROP onset was investigated using multivariable logistic regression analyses.

**Results:** Among 418 infants, 195 infants developed ROP

and 76 infants developed TR-ROP. Multivariable logistic regression analyses supported the following factors were useful for predicting TR-ROP from all infants and infants with any ROP: GA ( $P < 0.0001$  and  $< 0.0001$ ), LCC ( $P = 0.01$  and  $0.03$ ) and CPAP ( $P = 0.002$  and  $0.0005$ ). The comparison of areas under receiver operating characteristic curves indicated the combination of GA, BW, LCC and CPAP was better than the combination of GA and BW to predict TR-ROP from all infants and infants with any ROP ( $P = 0.006$  and  $0.009$ ).

**Conclusions:** Our results suggested infants with a history of LCC and CPAP support have a high incidence of TR-ROP.

## Nystagmus with Head Shaking and Tilting: A Rare Case of Spasmus Nutans

*First Author: Maria Isabel* **UMALI**

**Purpose:** Spasmus nutans is a rare idiopathic disorder characterized by the classic triad of nystagmus, head nodding, and head tilting. This case highlighted the need for a complete examination to rule out any underlying cause for the nystagmus before diagnosing a patient with this rare disease.

**Methods:** We presented a case of childhood nystagmus in an otherwise healthy 23-month-old boy. The nystagmus was first noted at 16 months and was associated with head shaking and head tilt. There was no associated blurring of vision or any other ophthalmologic signs or symptoms.

**Results:** Complete physical and neurological exam was done which showed normal results. Binocular visual acuity was tested using Teller II cards and results were normal for age. Patient was orthophoric at primary gaze with no noted eye preference. Cycloplegic refraction is +2.0 D sphere for both eyes and was non-amblyogenic for age. Dilated fundus exam showed no rod cone dystrophies. Cranial MRI was unremarkable with no note of optic nerve glioma.

**Conclusions:** Spasmus nutans is a diagnosis of exclusion. As such, diseases such as optic nerve glioma and rod cone dystrophies which may also present as spasmus nutans must first be ruled out. Further testing with electroretinogram is ideal, however cannot be tolerated at the present patient's age. Close follow-up and monitoring for amblyopia or refractive errors is planned for this patient. To the author's knowledge, this is the first case of spasmus nutans reported in this location.

## Ocular Alignment After Bilateral Medial Rectus Recession in Esotropic Patients with Spinocerebellar Atrophy

*First Author: Bo Young* **CHUN**

*Co-Author(s): Dean* **CESTARI**

**Purpose:** To compare the surgical outcomes in patients

with spinocerebellar atrophy (SCA) with esotropia who underwent bilateral medial rectus (BMR) recession and those in esotropic controls without neurologic disorders.

**Methods:** The medical records of the patients with SCA who underwent strabismus surgery for esotropia between 2006 and 2015 were reviewed retrospectively. Five SCA patients with esotropia (group 1) and 10 age-matched esotropic controls without neurologic disorders (group 2) who underwent BMR recession were included in this study. Data collection included pre and postoperative deviation measurements and amount of surgical recession performed. Surgical success rates and the amount of esodeviation corrected per millimeter of BMR recession between groups were compared.

**Results:** There was no difference in mean preoperative esodeviations between groups (18 prism diopters (PD) and 16.4 PD, respectively). Mean esodeviations were 4.8 PD and 1.1 PD on postoperative day 1; 6.4 PD and 3.2 PD at final follow-up for groups 1 and 2. The surgical success rate for group 1 was 40% and that for group 2 was 60%.

**Conclusions:** SCA patients with esotropia demonstrated slight undercorrection following BMR recession compared with esotropic controls without neurologic disorders. Our findings support the condition that surgeons should consider increasing the amount of BMR recession when planning strabismus surgery for esotropic patients with SCA.

## Ocular Complicated and Prognosis in an Infant with Rare Coagulation Factor XIII Deficiency: Case Report

*First Author: Yan-Ting CHEN*

**Purpose:** To report the clinical presentation and prognosis of an infant with rare coagulation factor XIII deficiency with long-term follow-up.

**Methods:** We reviewed the chart record, ophthalmic examinations, image studies, and lab data of this infant with rare coagulation factor XIII deficiency complicated with severe orbital hematoma and strabismus. We also followed-up this case for 4 years and monitored her final visual prognosis.

**Results:** This 10-month-old female infant fell down from her bed with a mild frontal contusion and was sent to our hospital. Initially, there was only a small frontal hematoma without any intracranial hemorrhage. But the internal bleeding persisted dramatically and flowed into right orbital area rapidly. This hematoma pushed the eyeball outward and downward progressively just within 2 days. Mild elevated intraocular pressure, limited ocular movement, right hypotropia, and exotropia were also noted. Lab studies showed decreased fibrinogen with normal PT, APTT levels. Coagulation factor XIII deficiency was diagnosed later,

and the bleeding conditions were finally controlled with cryoprecipitate. She is 4-year-old now and shows good visual prognosis with persisted recombinant coagulation factor XIII therapy.

**Conclusions:** Orbital hematoma is a common complication after head trauma, but it could be a dangerous condition in some special cases. Disproportionate orbital hematoma could be a sign of other systemic problems, and careful surveying could prevent patients from severe ocular complications or even life-threatening conditions.

## Orbital Cellulitis Following Surgical Treatment for Esotropia Associated with High Myopia: A Case Report

*First Author: Li-Chung CHI*

**Purpose:** To report a case with esotropia associated with high myopia experiencing orbital cellulitis after undergoing modified Yokoyama procedure.

**Methods:** Case report.

**Results:** Esotropia associated with high myopia, commonly known as heavy eye syndrome, is characterized by late onset of extreme restrictive hypotropia and esotropia. As staphylomatous change of the highly myopic globe elongates on temporal and superior quadrant, the course of superior rectus muscle is shifted medially and that of rectus muscle is shifted inferiorly. The result is a globe restricted in hypotropic and esotropic position. Modified Yokoyama procedure, also known as muscle union surgery of the superior and lateral rectus muscles, is an effective surgical treatment for heavy eye syndrome. A 70-year-old male with extreme restrictive esotropia (50+40 prism diopters) and hypotropia was measured before strabismus surgery. Bilateral muscle union surgery of the superior and lateral rectus muscles without scleral fixation was performed. On the following day after surgery, only moderate amount of uncorrected esotropia was noted; no signs of infection were presented. Unfortunately, severe pain and swelling of left eye was noted 2 weeks after surgery. Despite aggressive medical and surgical treatment, left eye infection progressed from orbital cellulitis to scleral ulceration, purulent endophthalmitis, and eventually phthisis.

**Conclusions:** Orbital infection and endophthalmitis following strabismus surgery are rare. But once it occurs, it often results in severe adverse conditions despite early and aggressive treatment.

## Outcomes of the Use of Anti-VEGF Therapy and Laser Surgery in the Treatment of Patients with Retinopathy of Prematurity in Mongolia

First Author: Tsengelmaa **CHULUUNBAT**

Co-Author(s): R.V. Paul **CHAN**, Altankhuu **MOLOM**, Baylag **MUNKHUU**, Wei-Chi **WU**, Baljinnyam **BATTSETSEG**

**Purpose:** To investigate the outcomes of intravitreal anti-vascular endothelial growth factor and laser surgery in the treatment of retinopathy of prematurity (ROP) in Mongolia.

**Methods:** This was a prospective cohort study of premature infants with treatment-requiring ROP who received intravitreal injections on 25 patients (IVB 20 and IVR 5), laser surgery on 7 patients, and combined therapy on 4 patients (IVB+Laser 1 and IVR+Laser 3) in 2017.

**Results:** A total of 1469 premature infants with BW  $\leq 2000$  g and/or GA  $\leq 34$  weeks were screened for ROP during the study period. A total of 36 infants who received treatment had a mean GA of  $29.09 \pm 1.7$  weeks, and mean BW of  $1384.3 \pm 125.42$  g. After receiving treatment, 5 of 36 (13.8%) patients had at least 1 eye that did not respond to treatment and progressed to retinal detachment. Nine eyes of 5 patients had progression of ROP despite treatment (4 patients had bilateral progression and 1 patient had progression in 1 eye). The mean age at time of injection was  $35.63 \pm 1.8$  weeks postmenstrual age. Mean time of follow-up was 12.0 months (range: 4-16). No significant local or systemic complications related to the IVB injections were observed at the most recent follow-up examination.

**Conclusions:** After treatment, resolution of ROP was noted in approximately 86.2% of the patients who had treatment requiring ROP. 13.8% of patients treated with IVB, IVR, laser and combined treatment, however, had at least 1 eye that did not respond and progressed to retinal detachment.

## Partial Oculomotor Nerve Palsy Caused by Neurosyphilis

First Author: Chiao-Ying **LIANG**

**Purpose:** To report a case with neurosyphilis with initial presentation of weird oculomotor palsy and Argyll Robertson pupil.

**Methods:** Case report.

**Results:** A 25-year-old man presented with acute onset of EOM limitation of left eye with diplopia for 4 months. There were limitations of upgaze and medial gaze of the left eye, causing 18 PD exotropia and 9 PD left hypotropia. The intraocular findings were all negative except bilateral pupillary paresis. Tracing back his history, he had suffered from

some weird neuromuscular symptoms for 4 years, including intermittent sharp pain in legs, dysuria, and hypersomnia. The presentation of cranial nerve palsy, pupillary paresis (Argyll Robertson pupil), and multiple neuromuscular dysfunction arouses the suspicion of neurosyphilis. Screen lab test show strongly positive syphilis infection titer (FPR reactive 256 DIL, TPHA reactive  $>1:5120$ , FTA-ABS 3+, HIV neg). Lumbar puncture result (CSF VDRL 16X reactive) confirmed the diagnosis of neurosyphilis. Brain MRI was done with negative finding. After antibiotics treatment of Ceftriaxone inj 2 gm IVA QD for 2 weeks, the follow-up lumbar puncture show CSF VDRL 2X reactive. Although the Ceftriaxone treatment accomplished the treatment goal (syphilis titer decrease for more than 4-fold), all the symptoms/signs persisted.

**Conclusions:** Neurosyphilis is still a significant disease with a complex neurological presentation. Early diagnosis and treatment of neurosyphilis is crucial due to potential persistent disabilities that can be easily treated or even prevented.

## Pediatric Tubulointerstitial Nephritis and Uveitis Syndrome Presented with Neuroretinitis

First Author: Emily **SU**

**Purpose:** To describe an uncommon ocular presentation in a case of pediatric tubulointerstitial nephritis and uveitis syndrome (TINU).

**Methods:** A case report and review of literature.

**Results:** An 8-year-old female was brought in to seek medical attention with 2 weeks of bilateral photophobia and decreased vision. Patient had a history of upper respiratory infection 3 weeks prior to presentation and otherwise insignificant past medical history. Initial exam revealed bilateral reduced vision, anterior chamber inflammation, and significant macular star with optic disc edema. Systemic workup showed abnormal urinalysis suggesting probably TINU. TINU is a rare disease entity, classically associated with female, younger age, bilateral anterior nongranulomatous uveitis, and renal dysfunction. Uveitis and nephritis may not occur at the same time, and either can precede the other. In addition to bilateral anterior uveitis, cases of unilateral uveitis and posterior involvement also have been reported.

**Conclusions:** We described a pediatric TINU patient with neuroretinitis as a rare ocular finding for this syndrome. TINU may be an underdiagnosed syndrome due to asynchronous presentation of uveitis and nephritis, and mild self-limited symptoms. TINU is an important differential diagnosis for pediatric female patients with bilateral uveitis, as permanent severe renal dysfunction and reduced visual acuity are potential feared sequelae.

## Prevalence of Accommodative and Non-Strabismic Binocular Dysfunctions Among Children

First Author: Nilufa **AKTER**

Co-Author(s): Md.Nasimul **CHOWDHURY**, Jewel **GUPTA**, Golam **HAIDER**, Syeed **KADIR**

**Purpose:** To determine the prevalence of accommodative and non-strabismus binocular dysfunction among pediatric age group (6-18 years).

**Methods:** It was a prospective hospital-based study. Study period was September 2015 to September 2016. Age group 6-18 years, 187 children, Vision 6/6 in both eyes having headaches and asthenopia. Studies were done in Tertiary eye care center. Patients having ocular media opacity, inflammation, and misalignment were excluded. Measurement of visual acuity, pupillary reaction, cover test, Extra Ocular Motility, near point of convergence (push-into-double), amplitude of accommodation (push-into-blur), MEM dynamic retinoscopy, accommodative facility ( $\pm 2.00$  DS flipper lenses), negative relative accommodation, positive relative accommodation, AC/A-ratio (Gradient-method), fusional vergence (step vergence with prism bar), Binocular single vision, stereopsis, and funduscopy with cycloplegic refraction were done.

**Results:** There were a total of 187 subjects, males (34.2%) and females (65.8%). In accommodative anomalies were: accommodative insufficiency (10.6%), accommodative infacility (10.2%), and accommodative excess (3.2%). In non-strabismic binocular dysfunctions were: fusional vergence dysfunction 36.9% (n = 69), convergence insufficiency 21.4% (n = 40), convergence excess 2.1% (n = 4), divergence excess 11.2% (n = 21), divergence insufficiency 1.1% (n = 2), basic exophoria 2.7% (n = 5), and basic esophoria 0.5%. Prevalence refractive error estimates were: emmetropes 32.6% (n = 61), simple myopia 17.6% (n = 33), simple hyperopia 18.2% (n = 34), simple myopic astigmatism 14.4% (n = 27), simple hyperopic astigmatism 6.4% (n = 12), compound myopic astigmatism 4.3% (n = 8), compound hyperopic astigmatism 5.9% (n = 11), and mixed astigmatism 0.5% (n = 1).

**Conclusions:** Accommodative and non-strabismic binocular vision problems are highly prevalent in children. Accommodative and non-strabismic binocular dysfunctions also affect quality of life in children. Meticulous vision evaluation, appropriate diagnosis, and treatment may solve the problems in children.

children with buphthalmos.

**Methods:** Prospective study in eyes with buphthalmos. Small (4.5-5 mm) anterior capsulorhexis with/without primary posterior capsulotomy and primary IOL (hydrophobic acrylic 3 piece) implantation (rhesis/bag fixation) was performed.

**Results:** Out of 15 eyes, endocapsular implantation was performed in 8 eyes and rhesis fixation (optic in bag and haptic in sulcus) in 7. In 2 out of 4 eyes where primary posterior capsulotomy was done, IOL was decentered. In these 2 eyes IOL was implanted in the bag. IOL remained stable in the other 2 eyes with rhesis fixation.

**Conclusions:** Standard IOLs without the need for any customization can safely be implanted in buphthalmos. However, if posterior capsulotomy is attempted, IOLs should be rhesis fixated.

## Spontaneous Muscle Disinsertion During Strabismus Surgery

First Author: Blanche **LIM**

Co-Author(s): Cheryl **NGO**, Chen-Hsin **SUN**

**Purpose:** To describe our experience and evaluate the possible etiology of the snapped rectus muscle during strabismus surgery.

**Methods:** We described the case of a 29-year-old individual with juvenile idiopathic arthritis-associated uveitis who had previously been on oral and topical steroids and had esotropia. He was planned for a unilateral recession and resection when the medial rectus broke across its width (1 mm) behind its insertion during strabismus surgery. The proximal part of the medial rectus was not located. The remaining stump of distal muscle was excised and sent for pathological examination.

**Results:** Spontaneous disinsertion of the right medial rectus had occurred when held on a squint hook with minimal traction during strabismus surgery. Examination of the eye 2 weeks prior to operation was quiescent for any evidence of active inflammation. A sample of the remaining stump at insertion was sent for histology which showed atrophy. After the surgery, the patient was still esotropic in primary position.

**Conclusions:** Multiple causes of an intraoperative snapped muscle have been described inclusive of post manipulation with trauma and surgery as well as resulting from congenital infections. This case report described a first-known incidence of snapped intraoperative recti in a patient who had been on long-term anabolic steroids for the follow-up of juvenile idiopathic arthritis and associated recurrent uveitis. The patient had also previously been placed on adalimumab and sulphasalazine, of which case reports of resultant muscle weakness have been described in skeletal muscles.

## 04 Primary Intraocular Lens Implantation in Buphthalmic Eyes with Cataract

First Author: Jaspreet **SUKHIJA**

Co-Author(s): Savleen **KAUR**, Suhmita **KAUSHIK**, Surinder **PANDAV**, Srishti **RAJ**, Jagat **RAM**

**Purpose:** To study the outcome of cataract surgery with standard size intraocular lens (IOL) implantation in

## Successful Management of Large Exotropia Due to Lost Medial Rectus Muscle

First Author: Rani **SARI**

Co-Author(s): Gusti **SUARDANA**

**Purpose:** This report presented the successful surgical management of a difficult ocular motility problem following trauma.

**Methods:** A case report. A 9-year-old girl came with chief complaint of squint eye after she got her right eye scratched by a nail 1 year before admission. There was large exotropia, more than 90 prism diopter, with marked limitation in adduction on the right eye. Corrected visual acuity was 0.8 on right eye and 1.0 on left eye with no diplopia. Diagnosis of large exotropia due to suspicions of medial rectus muscle loss of right eye was established. Augmented nasal hummelsheim with rectus lateral recession procedure of the right eye was performed. One day after surgery, globe position was orthotropia.

**Results:** Three days after surgery, globe position was also orthotropia, though limitation of upgaze, right gaze, and left gaze still existed on right eye. The medial rectus muscle is the most frequently traumatized extraocular muscle. The surgical technique for repair and management of complete muscle loss was based upon the condition of the individual patient. When the posterior border could not be identified, in cases where the laceration was distal to the tendon or in the belly of the muscle, a partial tendon transfer from the neighboring rectus muscle to the ruptured muscle area of the globe was performed.

**Conclusions:** Augmented hummelsheim procedure, combined with horizontal rectus recession is a good option in treating large deviations due to horizontal rectus muscle loss. The surgeon's precision and experience also affect the success of management.

## Surgical Correction in Cyclic Esotropia: A Case Report

First Author: Mohammad **MOSTAFA HOSSAIN**

Co-Author(s): Quazi **IFTEKHAR**, Sidratul **MUNTAHA NAZNIN**, Shifat **TOUFIQE**

**Purpose:** To report outcome of surgical correction in cyclic esotropia.

**Methods:** A 7-year-old girl presented herself with a history of inward deviation of the left eye on each alternate day. Visual acuity was 6/6 in each eye and cycloplegic refraction revealed nothing significant. Patient was admitted in our hospital and orthoptic evaluation was done for 3 successive days which confirms that deviation was cyclic in nature. Examination on the first day (having deviation) elicited left marked esodeviation by Hirschberg test (HBT), Prism Cover Test (PCT) was about 45 Prism Diopter (PD) at near and 40 PD at distance, ocular motility was full, and revealed no latent nystagmus. She had no diplopia.

Examination on the next day (after 24 hours) revealed central corneal reflex by HBT, esophoria about 10 PD for both near and distant, ocular motility was full, and patient had 400 sec. of arc stereo acuity by Titmus Fly test. Examination on third day revealed that features were the same as on the first day having strabismus. Diagnosis of cyclic esotropia was made. Previously we reported some cases of cyclic esotropia from our hospital and only 1 case of surgical intervention which had good outcome. This case also underwent surgical intervention (7 mm bilateral medial rectus recession) after counseling of parents.

**Results:** In follow-up, no deviation was noted. In last postoperative review visit (after 1 year), patient was almost orthophoric and had no complaint of deviation. Parents were very happy.

**Conclusions:** Surgical correction may be considered as ultimate treatment of cyclic esotropia.

## The Effect of Refractive Error Degrees and Use of Corrective Glasses on Stereoacuity in Children

First Author: Dian **HIDAYATI**

**Purpose:** To acknowledge the effect of refractive error degrees and the use of corrective glasses for stereoacuity in children.

**Methods:** This study was a cross-sectional analytic study, conducted in elementary schools in Makassar for 3 months. There were 261 children who met the inclusion criteria consisting of 124 men (47.5%) and 137 women (52.5%). The degrees of refractive error were divided into mild, moderate, and severe degrees. Stereoacuity was measured using Titmus Stereotest before and after the use of corrective glasses.

**Results:** The results showed a significant correlation between the degree of refractive abnormality with stereoacuity before corrective glasses based on Kendall's tau  $b = 0.313$  ( $P < 0.001$ ), whereas the more severe the degrees of the refractive error, the worse the stereoacuity. There is a significant correlation between the degrees of refractive error and stereoacuity after corrective glasses based on Kendall's tau  $b = 0.235$  ( $P < 0.001$ ), whereas the more severe the degrees of the refractive error, the worse the stereoacuity. There were significant differences in stereoacuity to the degrees of refractive error before and after the use of corrective glasses based on the McNemar statistical test ( $P < 0.001$ ).

**Conclusions:** The more severe the degrees of the refractive error, the worse the stereoacuity. Stereoacuity after the use of corrective glasses is better than before the use of corrective glasses.

## The Ocular and Brain Presentation of Aicardi Syndrome: Case Report

First Author: Yan-Ting **CHEN**

**Purpose:** To report the clinical presentation and prognosis of an infant with rare Aicardi syndrome.

**Methods:** We reviewed the chart record, ophthalmic examinations, image studies, and lab data of this infant with rare Aicardi syndrome complicated with intraocular changes and brain abnormality.

**Results:** This 2-month-old female infant had infantile seizure and was suspected as metabolic disorders initially. Detailed ocular examination was performed by pediatric ophthalmologist and multiple changes were found. Her left eye had a small hypoplastic optic disc with suspected disc coloboma and multiple white-colored chorioretinal lacunae. Except that, there were diffused hyperpigmented and hypopigmented retinal patches and relative undergrowth lower eyelashes in both eyes. Brain MRI revealed unilateral enlargement of left lateral ventricle associated with subependymal nodules, cavum septum pellucidum, and the hypoplasia of the corpus callosum without associated pachygyria. The hippocampus and parahippocampal regions are normal. Visual evoked potential was also performed but showed some strange results.

**Conclusions:** We reported a rare infant case with Aicardi syndrome. Except for the typical triad (chorioretinal lacunae, abnormal corpus callosum, and infantile spasm), asymmetric eyelash growth was also noted in this case. Strange VEP result, which is not matchable with structural changes, was also noted. Further follow-up and repeat examination might be necessary to realize the visual impact of Aicardi syndrome.

## Toric Orthokeratology for Highly Astigmatic Children

First Author: Ya-Chi **HUANG**

**Purpose:** To evaluate the effectiveness of toric ortho-K lenses for the treatment of a child with combined myopia and astigmatism.

**Methods:** A case report.

**Results:** A 9-year-old child had a current spectacle correction of  $-1.75/-2.0 \times 170$  (OD) and  $-1.0/-2.50 \times 170$  (OS) and visual acuity of 1.0 in each eye. Her mother reported a history of myopic progression that had not been arrested by the use of atropine eye drops. She was interested in ortho-K lenses as a means of vision correction and myopic control. Corneal topographical data showed the presence of corneal astigmatism of 2.50 D (OD) and 2.75 D (OS). The patient was fitted with toric Ortho-K lenses (DreimLens) for overnight wear. After 3 months follow-up, the unaided visual acuity was 1.0 in both eyes. In addition, he had no undesirable corneal responses and was very happy for

unaided vision during the daytime. This report showed that toric ortho-K lenses can be used effectively for correcting high corneal astigmatism. When astigmatism is beyond the central 3 mm chord length or is limbus-to-limbus corneal astigmatism, toric ortho-K lenses should be considered.

**Conclusions:** This report presented a successful case of a child with high corneal astigmatism who was fitted with a pair of toric ortho-K lenses. Close to full correction of myopia and astigmatism were achieved with good unaided visual acuity of 1.0 in both eyes after 3 months of lens wear.

## Treatment of 3-Year Recurrent Myopic Strabismus Fixus with Loop Myopexy and Medial Rectus Muscle Re-Recess

First Author: Made **SURASMIATI**

**Purpose:** Myopic strabismus fixus (MSF) often presents with esotropia and hypotropic ocular motility, as well as restricted abduction and supraduction. Traditional recession and resection surgery are no longer popular due its limited effects and higher recurrence in severe cases. Loop myopexy of the superior rectus (SR) muscle and lateral rectus (LR) muscle is now the most preferred surgery for restoring the dislocated globe back to the muscle cone. The purpose of this report was to show combine of loop myopexy and medial rectus (MR) muscle re-recess technique after 3-years recurrence of MSF.

**Methods:** Female, 65 years old with VA NLP on RE and best corrected visual acuity 6/6 on LE, ET 45°. Krinsky was 80 prism dioptic (PD) with base-out (BO), also difficulty of abduction movement. Three years ago, she had already done MR muscle recess and LR muscle resect on RE. We planned this patient with a loop myopexy on SR and LR muscle combined with MR re-recess surgery on RE.

**Results:** Surgery in RE is chosen to avoid complications in eye with better VA. We found patient with slight esotropia in primary position 1 day postoperative. Restriction in abduction and supraduction markedly reduced. One year after the second surgery, we found residual ET 15 PD BO and the patient still happy.

**Conclusions:** Loop myopexy combined with MR muscle re-recess had better results cosmetically than recess of MR muscle and resect on LR muscle in myopic strabismus fixus.

## Treatment of Pediatric Vogt-Koyanagi-Harada Disease with Adalimumab

First Author: Emily **SU**

Co-Author(s): Chin-Te **HUANG**

**Purpose:** To describe a case of pediatric Vogt-Koyanagi-Harada disease (VKH) utilizing adalimumab as a systemic corticosteroid sparing agent.

**Methods:** A 12-year-old female diagnosed with complete VKH required high-dose systemic corticosteroids for ocular inflammation suppression. Attempts at steroid tapering were unsuccessful despite addition of mycophenolate mofetil with relapsing inflammation. Patient rapidly developed Cushingoid features, and adalimumab was utilized for further immunosuppression.

**Results:** Incorporation of adalimumab to the treatment regimen allowed for sustained inflammatory remission during tapering of oral corticosteroids and subsequent maintenance therapy. Her Cushingoid appearance resolved and she continued to follow her usual trajectory of growth chart. There were no major adverse effects observed with the addition of adalimumab.

**Conclusions:** Management of pediatric VKH is particularly challenging with balancing the need for adequate immunosuppression and complications of systemic corticosteroids administration. Incorporation of adalimumab in the treatment of our patient allowed for successful tapering of systemic steroids. Subsequent maintenance therapy with adalimumab yields stable and excellent visual acuity, and no recurrence episode. Further research is necessary to evaluate the efficacy and safety of adalimumab in the pediatric VKH population.

## Unilateral Enlargement of the Extraocular Muscles in a Child

*First Author: Bonifacio BUNO*

*Co-Author(s): Alvina SANTIAGO*

**Purpose:** To report a rare case of unilateral strabismus in a child secondary to congenitally enlarged extraocular muscles with surgical photographs and histopathologic correlation.

**Methods:** This is a case report.

**Results:** A healthy 1-month old male child was referred to our clinic for evaluation of right hypotropia. The hypotropia was noted since birth and was described as constant, non-alternating, and non-progressive. CT scan of the orbits revealed enlargement of the right medial, lateral, and inferior rectus muscles with sparing of the tendons. The superior rectus muscle appeared to be spared. Biopsy of all the rectus muscles revealed fibrosis, indistinct muscle fibers, and relatively scant cellularity of the superior and lateral rectus. The medial and lateral rectus muscles showed well-delineated fibers and normal cellularity. Whole genome sequencing of the patient's DNA revealed no pathogenic changes in the genes known to cause incomitant strabismus.

**Conclusions:** Unilateral enlargement of the extraocular muscles is extremely rare in the pediatric population. Efforts to identify the exact pathogenesis of this rare strabismus syndrome have a vital contribution to the

continuously increasing knowledge of this condition.

## Prevention of Blindness

### Ancient Medicine in the 21st Century

*First Author: Devanshi DESAI*

*Co-Author(s): Yoshita BHAWSINKA, Rajiv DESAI, Sanjiv DESAI, Ranjana DESAI, Rashmi SHARMA*

**Purpose:** To document traditional ophthalmic medical practices dating from ancient times which are still commonly practiced in the modern world.

**Methods:** Five retrospective case studies were presented of patients who underwent initial treatment by a traditional healer for their ocular complaints. After recording their history, a thorough examination was performed and positive findings were recorded. They were given appropriate treatment and were reported herein.

**Results:** A gamut of traditional ocular treatments is presented which is anathema to modern medicine. Case 1 was a 18-year-old male with allergic conjunctivitis who was forced to get branded. Case 2 was a 4-year-old boy with keratomalacia whose night blindness wasn't cured after circumambulation around the village deity. Case 3 was a 6-month-old girl with corneal ulcer who was treated for red eyes by the village shaman by licking the eye with his tongue and spitting out several seed grains that were supposedly causing the red eye. Case 4 was a 24-year-old man who was exorcised by a shaman by being beaten with an iron chain. During the exorcism, the chain impacted on the head and caused rupture of the globe. Case 5 was a 47-year-old man who suffered from aphakic iritis after couching.

**Conclusions:** Traditional healers abound in countries where health infrastructure and doctor-patient ratio are at a nadir. It's common to encounter cases in the clinic that have been treated previously by traditional healers and upon presentation the eyes are usually lost. When encountering severely morbid eyes it's important to elicit a history of traditional treatment.

### Awareness and Knowledge of Glaucoma in North India: A Hospital-Based Study

*First Author: Sonia PHULKE*

*Co-Author(s): Punita GARG*

**Purpose:** To assess the awareness and knowledge of glaucoma among people attending the ophthalmology outpatient department at a tertiary eye care hospital in north India.

**Methods:** A questionnaire-based prospective observational study was conducted, involving persons aged 18 and above attending the ophthalmology

outpatient department. Data on awareness and knowledge of glaucoma was collected through a face-to-face interview.

**Results:** A total of 300 people participated in the study. The average age of participants was 43.9 years (range of 18-75). The study participants included 166 men and 134 women. Only 33% (n = 100/300) of the participants were aware of glaucoma. Family history was seen in 9% (27/300) of total recruited participants. The most common source of awareness was close acquaintance with relatives, family members, and friends of glaucoma patients. Awareness level was greater in individuals with higher education levels (P < 0.006). Awareness level is also significantly high in those participants who had family history of glaucoma (P < 0.001).

**Conclusions:** The data suggest that there is a lack of awareness about glaucoma. The study findings stress the need to spread awareness about glaucoma for prevention of glaucoma-related blindness. The awareness programs should also be conducted frequently, especially in hospitals for patients attending outpatient departments.

### Complex Management of a Family with Low Vision Manifestation Due to Marfan Syndrome

*First Author: Lisanti ROMADONA*

*Co-Author(s): Nanda ANANDITA*

**Purpose:** To report a rare case of a family with all siblings (<50% theoretically) diagnosed as low vision (LV) manifestation of Marfan syndrome (MFS).

**Methods:** Patients examined in Pediatric Ophthalmology Subdivision of Ophthalmology Department by physical examination, slit lamp biomicroscopy, funduscopy, ultrasonography, and laboratory workup.

**Results:** A 14-year-old boy had complained of blurry vision on both eyes since 2 years ago, getting worse. Visual acuity (VA) of right eye (RE) was 1/300, left eye (LE) 1/60. Anterior segment found bilateral lens subluxation. Funduscopy and ultrasonography showed retinal detachment on LE. His physical characteristics were similar to MFS. We did RE ICCE and prescribing binoculars. From subsequent investigations, we found his mother (56 years old) and all the siblings (18-year-old female and 14-year-old male, respectively) have the same visual impairment and physical clinical features. His mother's VA was RE 1/∞, LE light perception (LP) – with tall stature and arachnodactyly. His sister's VA was RE 1/300, LE 1/300 with short stature and scoliosis. Anterior segment found phacodonesis. From funduscopy, we obtained atrophic optic nerve head. His brother's VA RE 5/30, LE 5/40 with similar condition to the patient. They were consulted to pediatric, cardiologist, and orthopedics departments for further examination.

**Conclusions:** Ocular manifestations of these patients consist of corneal, lens, and retinal abnormalities leading to visual impairment. In this case, we should do a proper and holistic approach to do visual rehabilitation of their low vision condition and improve their quality of life.

### Demographics and Clinical Characteristics of Open-Globe Ocular Trauma at a Tertiary Eye Center in the Philippines: A 5-Year Retrospective Review

*First Author: Cris Martin JACOBA*

*Co-Author(s): Jubaida AQUINO, Ma. Sheila JIMENEZ, Ronald Steven S. MEDALLE II, MD-MBA*

**Purpose:** To describe the demographics and clinical characteristics associated with visual acuity (VA) at last follow-up at a tertiary eye care center in the Philippines.

**Methods:** A retrospective cohort study of 445 patient records from January 2013 to November 2017 was done. All open-globe injuries, defined by Birmingham Eye Trauma Terminology classification system, were included. Baseline VA was compared to last follow-up VA, classified as excellent (>20/60), good (20/80 to 20/200), or poor (<20/200).

**Results:** The mean age of patients was  $28.0 \pm 16.9$  years. The most common objects causing injury were hammered nails at work (n = 57/232, 24.6%), while for children 8 years and younger they involved knives at home (n = 7/34, 20.6%). The most common complication was intraocular foreign body (IOFB) (n = 27/107, 25.2%). Subgroup analysis was done on patients with at least 1-month follow-up, with mean follow-up time of  $105.5 \pm 259$  days. At final consult 59.6% (n = 84/141) had excellent outcome, 12.8% (n = 18/141) had good outcome, and 27.7% (n = 39/141) had poor outcome. For complications, VA improved significantly between initial and last consult for eyes with vitreous hemorrhage (logMAR  $1.87 \pm 0.83$  vs  $1.40 \pm 1.00$ ; P = 0.022), IOFB (logMAR  $1.69 \pm 0.91$  vs  $1.10 \pm 0.98$ ; P = 0.011), and eyes needing penetrating keratoplasty (logMAR  $2.07 \pm 0.68$  vs  $1.22 \pm 0.94$ ; P = 0.007). However, there was no significant improvement in VA for eyes presenting with retinal detachment and endophthalmitis. Better initial VA correlated with excellent final VA (P < 0.006, OR = 1.131, 95% CI = 0.331, 1.930).

**Conclusions:** Implementing policies for prevention of ocular trauma should be a priority of eye care programs. Prognosis and management of patients should be based on initial VA, and other pertinent clinical characteristics.

## Evaluation of the Patient Safety Culture in Eye Hospital HCMC (Vietnam) in 2018

First Author: Tien **PHAM**

Co-Author(s): Hiep **DO**, Dai **NGUYEN**, Phuong **NGUYEN**

**Purpose:** To assess the culture of patient safety in Eye Hospital HCMC (South of Vietnam).

**Methods:** A cross-sectional descriptive study was conducted from May to June 2018. The Hospital Survey on Patient Safety Culture questionnaire (Vietnamese version) was used and the 42 questions from 12 dimensions of the culture were evaluated. The software SPSS 20.0 and Microsoft Excel 2010 were employed to conduct statistical analysis on the survey data.

**Results:** A total of 587 surveys were distributed, of which 584 were responded validity to analyze. The average rate of positive response for 12 composites was 64.7% (41.2-86.6). The high positive response rate on 3 composites were: "Teamwork within Units" (86.6%), "Organization Learning-Continuous Improvement" (84.4%), and "Supervisor/manager expectations and actions promoting safety" (81.3%). Conversely, 4 areas with the highest percentage of negative responses identified as critical were "Feedback & Communication About Error", "Frequency of events reported", "Communication Openness", and "Non-punitive response to errors". There was a statistical difference on the perception of patient safety culture in groups of different work units and positions. The average patient safety grade was 3.71.

**Conclusions:** Besides the positive composites, the results of the survey show many negative areas that the hospital needs to address to improve the culture of patient safety in the future.

## How Big a Problem Eye Disease Screening is in Rural Shanxi (CHEER): Case Study

First Author: Feng **CHEN**

**Purpose:** To find out the reason of estimated low detection and referral rate of eye disease children in 5 years CHEER (Children's Healthy Eyes bring Educational Rewards) program, we conducted this case study.

**Methods:** Mixed methods research (MMR) was used. The qualitative part of the MMR was a semi-structured in-depth interview and focus group. They were used in exploring participants' perspectives and expectations of the CHEER program from 2013 to 2018. The quantitative components of the MMR were questionnaires and survey data for sensitive topics like the economic level of families, and cost and quality of eye care service. We had recruited students, parents, teachers, village doctors, project managers, Health department and Disabled Federation officials to share their experience.

**Results:** We analyzed findings from 24 in-depth

interviews and 10 focus groups with project managers, teachers, village doctors, disabled federation staff of CHEER, school and community screening, linking them, if possible, to their individual experience records from the previous 5 years program. Affirm of school and community screening's contribution for finding eye disease children out of school is up to 100% in all the interviewees' perspectives.

**Conclusions:** School and community screening could be a feasible and economical way to find the severe eye disease children the first time, even in poor families living far from hospital. However, there is still a long way to go for more effective and accessible screening status by local eye care service abilities and optimistic competing market build.

## Impact of Self-Learning Nutrition Education on Improving Awareness and Knowledge of Age-Related Macular Degeneration and Lutein/Zeaxanthin

First Author: Wipada **SAE-LAO**

Co-Author(s): Prut **HANUTSAHA**

**Purpose:** To 1) develop a set of 2 self-learning nutrition education videos consisting of AMD video and lutein/zeaxanthin's role in eye health video, 2) study adult and elderly satisfaction toward the self-learning nutrition education videos, 3) compare awareness and knowledge of AMD and lutein/zeaxanthin's role in eye health before and after undergoing self-learning nutrition education videos.

**Methods:** Videos providing knowledge on AMD and Lutein/Zeaxanthin were developed. A voluntary sample of 103 participants of adults and elderly aged 50 to 70 years old was recruited. The developed self-learning nutrition education videos were shown. Participants completed the questionnaires for awareness and knowledge of AMD and lutein/zeaxanthin role in eye health before and after undergoing videos.

**Results:** The Cronbach's alpha coefficient reliability of the instrument was 0.879. The participants had an overall satisfaction toward the AMD video and the lutein/zeaxanthin role in eye health video and were extremely satisfied (4.60, SD = 0.427 and 4.68, SD = 0.429 respectively). After watching AMD video, the mean score for awareness and knowledge of AMD of participants (11.63, SD = 2.347) was significantly increased (3.78, SD = 2.642) at  $<0.05$  ( $t = 25.148$ ,  $P = 0.000$ ). After watching the lutein/zeaxanthin role in eye health video, the mean score for awareness and knowledge of lutein/zeaxanthin role in eye health of participants was increased (5.10, SD = 3.661) at  $<0.05$  ( $t = 8.190$ ,  $P = 0.000$ ).

**Conclusions:** This study concluded that these self-learning nutrition education videos may help to increase the level of awareness and knowledge of AMD and lutein/zeaxanthin role in eye health for adults and

the elderly.

## Increase of Cataract Surgical Rate After Rapid Assessment of Avoidable Blindness in Bali

*First Author: Ni Made Ari **SURYATHI***

*Co-Author(s): Gede **JAYANEGERA***

**Purpose:** The Rapid Assessment of Avoidable Blindness (RAAB) was carried out in 2015 in Bali. The number of those with blindness in Bali is 2%, with the largest cause being cataracts. The purpose of this paper was to show an increase of Cataract Surgical Service (CSR) in Bali after the RAAB implementation.

**Methods:** This research was a descriptive study with a cross-sectional approach. CSR figures were obtained from the number of cataract surgeries in Bali that were carried out both in the operating room of the hospital and also in community services.

**Results:** In 2015-2018, the CSR figure in Bali was 808, 1485, 1601, and 1746. The cataract eradication due to blindness in Bali had the effect of increasing CSR. Empowerment of health cadres at the village level to detect blindness, validation of cataracts as a cause of blindness at the primary level, improvement of referral systems, and high volume cataract surgery at the regional hospital level increase the number of cataract surgeries. Community services for cataract surgery using mobile car units also increased the coverage of cataract surgery for people who don't have insurance.

**Conclusions:** CSR in Bali increased from 2015 until 2018. Adequate human resources, well referral system, and government and stakeholders support increased CSR in Bali. Repeat RAAB after 8-10 years is needed to evaluate eradication of blindness program.

## Outcomes of High Volume Cataract Surgeries Using Both Phacoemulsification and Manual Small-Incision Cataract Surgery in a Developing Country

*First Author: Andi Akhmad **FAISAL***

*Co-Author(s): Ahmad **ASHRAF**, Habibah **MUHIDDIN**, Muhammad **ABRAR ISMAIL**, Muhammad **IRFAN***

**Purpose:** To analyze the outcomes of high-volume cataract surgeries using phacoemulsification technique in addition to manual small-incision cataract surgery (MSICS) in outreach program.

**Methods:** Number of surgeries along with preoperative and first postoperative day visual acuity data were collected from 1247 eyes that underwent cataract surgery. The preoperative visual impairment of subjects was categorized based on WHO classifications of visual impairment. Univariate analysis was made for each variable to describe outcomes of using phacoemulsification in addition to manual small-incision cataract surgery (MSICS) for high volume cataract surgeries.

**Results:** A total of 1247 eyes were undergoing cataract surgery in outreach program from January to December 2017 with 879 (70.5%) eyes using manual small-incision cataract surgery (MSICS) and 368 (29.5%) using phacoemulsification. Mean age at surgery was 62.8 years old with male predominance of 52.2%. A total of 933 eyes (74.8%) were categorized as blindness, 149 (11.9%) eyes had severe visual impairment, 159 (12.8%) eyes had moderate visual impairment, and 7 (0.6%) eyes had mild visual impairment. Both techniques have good initial visual recovery. 52.85% blindness was diminished by MSICS technique in first operative day, compared with 57.3% reduced by phacoemulsification. MSICS covered operations on the 80.9% of eyes with blindness, while phacoemulsification mostly covered moderate (64.15%) and mild (71.43%) visual impairment.

**Conclusions:** Phacoemulsification technique in high-volume cataract surgery could help increasing the number of surgeries with good initial visual outcomes. This technique seems to be a promising one to help reduce the backlog of cataract surgeries in developing countries.

## Prevention of Irreversible Visual Disability by Conducting Regular Eye Examination of Primary School Children

*First Author: Verma **MANJU***

**Purpose:** To identify and prompt management of amblyopia and refractive errors in young children to prevent irreversible low vision detection of color vision defects for opting appropriate career choices.

**Methods:** In the last 10 years, the School Health Eye Screening project has been targeting primary school children aged 5-10 to screen them on school premises. We selected the primary schools from rural, semi-urban and urban areas with different socioeconomic backgrounds. After involving the school management, a team of an ophthalmologist, optometrist, and ophthalmic assistants were involved in assessing the visual acuity in each eye, color vision, amblyopia, and observation of any other obvious ocular conditions.

**Results:** A total of 31,890 students were screened, out of which 24,053 came from urban and semi-urban areas while 7837 belonged to rural schools. The refractive error stands highest out of the total at 16.57%, amblyopia at 1.03%, and color vision at 0.56%. The rural schools revealed only 5.34% of refractive errors with amblyopia in only 0.11 and 0.2 with color vision defects.

**Conclusions:** The study found that refractive errors form the bulk of the aberrations that could well be managed with the appropriate use of the glasses at their age. Children with high errors were kept in special follow-up programs to check on the progress of their refraction and identify early complications. Though a small percentage of children have amblyopia, timely

management in special clinics helped to restore their vision well in time. Color vision-defected children were referred to appropriate counsellors, discussing their career options once they reached that age.

## Use of PPE in Small Scale Industries

*First Author: Sanjiv DESAI*

*Co-Author(s): Devanshi DESAI, Rashmi SHARMA*

**Purpose:** To assess the knowledge, attitude & practices about personal protection eyewear usage in the small scale industries of Jodhpur, India.

**Methods:** Twenty different factories were studied which represent a wide gamut of ocular hazards. A questionnaire was given to the manager of the factory and the responses were analyzed.

**Results:** Only 2 units had a specifically designated Safety Officer (10%). None of the factories had a safety policy, hazard drills, or safety signage in the premises, and a first aid protocol was available in only 2 (10%). Only 10 units had issued PPE and face masks to their workforce (50%). Only 1 unit had issued proprietary safety glasses, the rest had brought regular glasses from roadside vendors. The commonest reason for not providing PPE was that the tasks involved were not dangerous and did not present an ocular hazard. Workers who were issued PPE often chose not to wear them and the floor manager never insisted on their usage. The most common reason cited was “negligence of the workers” and “increase in time required to finish the job.” Workers from 8 industries (40%) had sustained penetrating injury or chemical burns in the past 6 months with loss of eyes in half of them. Yet in spite of irreversible sight loss in a co-worker, there was no increased acceptance of PPE.

**Conclusions:** Knowledge about the use of PPE in small scale industries remains poor. This study suggests that implementation of eye safety must be enforced rather than implied to curb work-related ocular trauma.

## Refractive Surgery

### Accommodative Changes After Laser Scleral Microporation in Presbyopic Asian Eyes

*First Author: David MA*

*Co-Author(s): Annmarie HIPSLEY, Eddie HSIAO, Chi-Chin SUN*

**Purpose:** To evaluate changes in visual outcomes in Asian eyes after Laser Scleral Microporation (LSM).

**Methods:** An Er:YAG laser was used in 4 quadrants on the sclera to improve pliability and biomechanical efficiency of the ciliary muscles in 5 critical zones. Ray-tracing aberrometer and double-pass wavefront were used to objectively measure visual acuity, higher-order

aberrations (HOA), depth of focus (DoF), the visual Strehl ratio based upon the optical transfer function (VSOTF), true accommodation, pseudoaccommodation, and the effective range of focus.

**Results:** Ray-tracing technology can objectively measure dynamic accommodation as well as specific lens behavior. LSM provided improvement in both accommodative ability and near visual acuity. Positive changes after the LSM procedure were also seen in both spherical aberration and DoF. Pseudoaccommodation from changes in spherical aberration and increased DoF may contribute to near vision functionality.

**Conclusions:** Early clinical trial results suggest LSM to be a safe and effective procedure for restoring range of visual performance in presbyopes. Early results also suggest that LSM can improve intermediate and near visual acuity without touching the visual axis. Data collection is ongoing.

### Alcohol-Assisted Debridement in PRK with Intraoperative Mitomycin C

*First Author: Kourosh SHEIBANI*

*Co-Author(s): Nader NASSIRI*

**Purpose:** To compare corneal stromal and endothelial cells after photorefractive keratectomy with intraoperative mitomycin C in alcohol-assisted versus mechanical epithelial debridement using confocal microscopy.

**Methods:** This prospective randomized comparative study was performed on 88 eyes (44 patients) with myopia up to -6.00 diopters. The right eye of each patient was randomly assigned to either mechanical or alcohol-assisted groups, and the left eye was assigned to the alternate group. Confocal microscopy was performed preoperatively and at 3 months postoperatively. The main outcome measures were epithelial thickness; number of keratocytes in the anterior, mid-, and posterior stroma; and characteristics of the central corneal endothelial cells in terms of density, mean cell area, and polymegathism and hexagonality.

**Results:** Three months after surgery, no statistically significant difference was noted between the study groups in terms of epithelial thickness. We also found no statistically significant difference in central corneal endothelial cells regarding cell density, mean cell area, hexagonality, or polymegathism. Compared with baseline values, the density of mid- and posterior stromal keratocytes showed no significant change in either group, whereas it decreased significantly in the anterior stroma in both groups 3 months after surgery.

**Conclusions:** We found that the adverse effects of photorefractive keratectomy with mitomycin C on central corneal endothelial cells were comparable between the mechanical and alcohol-assisted epithelial

debridement groups and the significant decrease in postoperative keratocyte density in anterior stroma was comparable between the 2 groups. The choice of their application could be left to the discretion of the ophthalmologist.

### Analysis of Different Approaches to Enhance Range of Vision: Functional Results–Patient Satisfaction–Disphotopic Phenomena

*First Author: Florian KRETZ*

*Co-Author(s): Detlev BREYER, Matthias GERL, Claudia HERBERS, Insa KAISER, Rafaela LUCCHESI*

**Purpose:** To evaluate the refractive & functional results, defocus curve, disphotopic phenomena, and patient satisfaction after binocular implantation of an extended depth of focus (EDOF) intraocular lens (IOL), compared to a Mix & Match approach with the same IOL in the distance dominant eye and a trifocal IOL in the near dominant eye.

**Methods:** In a prospective study, patients received either binocular EDOF IOL targeted emmetropia (EDOF group) or the same EDOF IOL in their distance dominant eye and a trifocal IOL in their near dominant eye (Mix & Match group). Pre- and postoperative, monocular and binocular functional results [CDVA, UDVA, DCIVA (90 cm, 80 cm, 60 cm), DCNVA, UNVA, Defocus curve; (logMAR)] refractive outcome, Halo and Glare Simulator, and patient satisfaction scores were evaluated.

**Results:** Mean binocular UDVA, CDVA, DCIVA (90 cm, 80 cm, and 60 cm) DCNVA in the EDOF and the Mix & Match group were -0.03, -0.05, -0.02, 0.03, 0.05, 0.33 (EDOF group) and -0.05, 0.00, -0.05, 0.13, -0.08, 0.02 (Mix & Match group), respectively. Halo and Glare analysis showed 85.8% of EDOF patients reported none to mild, and 100% of Mix & Match patients reported mild to moderate strength. The Mix & Match group questionnaire evaluation showed a higher degree of spectacle independence in near distance.

**Conclusions:** Both groups show a high degree of patient satisfaction. The Mix & Match approach clearly shows a higher degree of spectacle independence in near, while still resulting in a slightly higher perception of disphotopic phenomena.

### Clinical Outcomes and Comparison of Phakic IOLs Using Implantable Contact Lens and Implantable Collamer Lens

*First Author: Mariko MITA*

*Co-Author(s): Minoru TOMITA*

**Purpose:** IPCL (Implantable Contact Lens; EYEOL, UK) is a single piece posterior chamber Phakic intraocular lens (IOL) made of hybrid hydrophilic acrylic material. ICL (Implantable Collamer Lens; Star USA) is made by Collamer material. Both types of lenses were specialized for an improvement of myopia and astigmatism. To

evaluate the difference of clinical outcomes between IPCL and ICL, we analyzed the clinical outcomes about both lenses.

**Methods:** This study compared 46 patients with myopia and astigmatism using IPCL and 83 patients with myopia and astigmatism using ICL. The visual acuity of preoperative, 1, 3, and 6 months postoperative data was statically analyzed.

**Results:** Preoperative Uncorrected Distance Visual Acuity [UDVA (logMAR)] was  $1.22 \pm 0.43$ , Corrected Distance Visual Acuity [CDVA (logMAR)] was  $-0.14 \pm 0.06$ , and Manifest Refraction Spherical Equivalent (MRSE) was  $-6.84 \pm 4.25$  diopters (D) in IPCL patients. Preoperative UDVA was (logMAR)  $1.39 \pm 0.20$ , CDVA (logMAR) was  $-0.13 \pm 0.07$ , and MRSE was  $-8.12 \pm 2.75$  D in ICL patients. At 6 months results, UDVA (logMAR) was  $-0.13 \pm 0.09$ . CDVA (logMAR) was  $-0.18 \pm 8.32$ , and MRSE was  $0.03 \pm 0.31$  D. in IPCL patients. At 6 months results, UDVA (logMAR) was  $-0.16 \pm 0.04$ , CDVA (logMAR) was  $-0.17 \pm 0.01$ , and MRSE was  $0.32 \pm 0.36$  D in ICL patients. There were no significant differences between IPCL and ICL in 6 months results.

**Conclusions:** The clinical results of both Phakic IOL (IPCL and ICL) show significant improvement for UDVA. Both IPCL and ICL lens are effective for patients with myopia and astigmatism.

### Combined Small Incision Lenticule Extraction with Accelerated Cross-Linking Using 2 Different Low-Energy Irradiation Protocols: A Comparison Study

*First Author: Alex Lap Ki NG*

*Co-Author(s): Tommy CHAN, George CHENG*

**Purpose:** To compare the clinical results of combined small incision lenticule extraction with accelerated cross-linking (SMILE Xtra) using 2 different low-energy irradiation protocols.

**Methods:** We compared the spherical equivalence (SEQ), safety index (SI), and efficacy index (EI) at 1 day, 1 week, and 6 months after SMILE Xtra using 2 different irradiation protocols: group 1:  $18 \text{ mW/cm}^2 \times 30 \text{ seconds}$  (total energy  $0.54 \text{ J/cm}^2$ ); group 2:  $30 \text{ mW/cm}^2 \times 30 \text{ seconds}$  (total energy  $0.9 \text{ J/cm}^2$ ).

**Results:** There were a total of 19 patients in group 1 and 28 in group 2. Only the left eye was analyzed, and all aimed for plano refraction. There was no difference in age (both 31,  $P = 0.416$ ), baseline SEQ (group 1:  $-6.61 \pm 2.02$  D; group 2:  $-6.46 \pm 2.17$  D,  $P = 0.914$ ), and residual stromal bed thickness (group 1:  $286 \mu\text{m}$ ; group 2:  $290 \mu\text{m}$ ,  $P = 0.862$ ) between the 2 groups. The SEQ of group 1 and 2 were  $-0.11 \pm 0.48$  D and  $-0.24 \pm 0.37$  D ( $P = 0.139$ ) at day 1,  $-0.09 \pm 0.41$  D and  $-0.03 \pm 0.32$  D ( $P = 0.880$ ) at week 1,  $-0.19 \pm 0.46$  D and  $-0.08 \pm 0.25$  D ( $P = 0.640$ ) at month 6. The respective safety indices were  $0.86 \pm 0.14$  and  $0.87 \pm 0.12$  ( $P = 0.721$ ) at day 1,  $0.97 \pm 0.07$  and  $0.93 \pm 0.11$  ( $P = 0.212$ ) at week 1,  $1.01 \pm 0.03$

and  $1.00 \pm 0.00$  ( $P = 0.225$ ) at month 6. The respective efficacy indices were  $0.76 \pm 0.20$  and  $0.81 \pm 0.13$  ( $P = 0.420$ ) at day 1,  $0.87 \pm 0.19$  and  $0.88 \pm 0.12$  ( $P = 0.675$ ) at week 1,  $0.92 \pm 0.18$  and  $0.95 \pm 0.08$  ( $P = 0.969$ ) at month 6.

**Conclusions:** Both low-energy SMILE XTRA protocols demonstrated good refractive and safety outcomes at 6 months, with no difference in the parameters studies between the 2 groups.

### Corneal Stromal Augmentation Followed by Toric Phakic Intraocular Lens Implantation in Advanced Non-Scarred Keratoconic Eyes: A Conceptual Analysis

*First Author: Lionel DANIEL RAJ PONNIAH*

**Purpose:** To analyze the effectiveness of implantation of toric phakic IOL (PIOL) as an Add-on refractive measure to corneal stromal augmentation technique (CSA) in the management of advanced non-scarred keratoconic eyes.

**Methods:** In phase 1, non-scarred keratoconus contraindicated for cross-linking were included. Femto assisted donor lenticule (180-220 microns thick, 8-8.5 mm in diameter) was fashioned, and a mid-stromal bed was created with 2 incisions in recipient cornea, into which donor lenticule was transplanted for stromal augmentation. Vision in logMAR, pachymetry, anterior and posterior corneal elevation (mm), and reversal of irregular astigmatism were analyzed at 1 year. In phase 2, subjects with high residual refractory errors underwent an Add-on toric PIOL implantation and outcomes were measured at 3 months.

**Results:** In phase 1, 15 underwent CSA. Uncorrected visual acuity (UCVA) improved from  $1.2 \pm 0.2$  to  $0.8 \pm 0.2$  ( $P = 0.003$ ), best corrected visual acuity (BCVA) from  $0.9 \pm 0.2$  to  $0.4 \pm 0.1$  ( $P < 0.0001$ ). Central Pachymetry restored from  $359 \pm 49$  to  $583 \pm 53$  microns. Cornea flattened significantly (anterior improved from 0.067 to 0.044 and Posterior from 0.075 to 0.039). Astigmatism reduced from  $9.2 \pm 4.3$  diopters (D) to  $4.3 \pm 1.7$  mm. Post CSA inferior to superior asymmetry was  $3.2 \pm 1.4$  D. In phase 2 ( $n = 8$ ), residual spherical error was  $-3.87 \pm 2.21$  D and cylinder was  $-4.18 \pm 0.84$  D. UCVA improved from  $1.0 \pm 0.11$  to  $0.4 \pm 0.14$  ( $P < 0.0001$ ), BCVA from  $0.63 \pm 0.15$  to  $0.25 \pm 0.05$  ( $P < 0.0001$ ) at 1 month and  $0.22 \pm 0.04$  at 3 months.

**Conclusions:** Corneal Stromal Augmentation Technique is effective in improving vision, flattening cornea, reversing ectasias, and improving irregular astigmatism without the sacrifice of recipient tissue and suture-related events. Add-on Toric phakic IOL implantation is effective in overcoming residual high refractive errors post-stromal augmentation and provides a comprehensive refractive solution.

### Dynamic Accommodative Changes in Macaque Non-Human Primate Eyes Following Laser Scleral Microporation

*First Author: Jodhbir MEHTA*

*Co-Author(s): Brad HALL, Annmarie HIPSLEY, Yu-Chi LIU*

**Purpose:** To evaluate accommodative and biomechanical changes in macaque non-human primates after the Laser Scleral Microporation (LSM) procedure for presbyopia therapy.

**Methods:** An Er:YAG laser was used in 4 quadrants on the sclera to rejuvenate age-related ocular rigidity and improve pliability and biomechanical efficiency of the ciliary muscles in 5 critical zones of anatomical and functional significance. Twelve eyes of 6 monkeys were treated: Young (less than 10 years of age,  $n = 2$ ) and Old with loss of accommodation (greater than 10 years of age,  $n = 4$ ). Ranges of distance and near vision were created using pharmacological stimulation; cycloplegic drops for distance, and pilocarpine drops for near vision. Ray-tracing aberrometer and double-pass wavefront were used to objectively measure accommodation. Intraocular pressure (IOP) was assessed using a pneumatic tonometer.

**Results:** LSM provided improvement in true physiological accommodation, pseudoaccommodation, and effective range of focus. In the Old Group, true accommodation improved by 5 diopters (D) at 7 months postoperatively, while effective range of focus improved by 8 D. Positive changes after the LSM procedure were also seen in both spherical aberration and depth of focus, which contributed to improvements in pseudoaccommodation. Additionally, average IOP was  $13.0 \pm 0.8$  mm Hg preoperatively and significantly improved to  $10.2 \pm 0.8$  mm Hg 7 months postoperatively ( $P = 0.000076$ ).

**Conclusions:** Preliminary results show LSM to be a safe and effective procedure for improving accommodation in non-human primates without touching the visual axis. Positive changes in IOP and overall resting and dynamic spherical aberrations suggest that the posture of the lens may also be changed as a result of this treatment, improving biomechanical efficiency.

### Early Clinical Trial Results of Laser Scleral Microporation in Presbyopic Asian Eyes

*First Author: David MA*

*Co-Author(s): Annmarie HIPSLEY, Eddie HSIAO, Chi-Chin SUN*

**Purpose:** To evaluate changes in visual outcomes in Asian eyes after Laser Scleral Microporation (LSM).

**Methods:** An Er:YAG laser was used in 4 quadrants on the sclera to improve pliability and biomechanical efficiency of the ciliary muscles in 5 critical zones. Patients were over 40 years old and showed loss of accommodative ability. Visual outcomes were assessed

using the Early Diabetic Retinopathy Study (EDTRS) logMAR charts, randot stereopsis, and intraocular pressure (IOP) was also assessed using a pneumatic tonometer before and after the procedure.

**Results:** LSM provided improvement in both uncorrected and distance corrected intermediate (UIVA, DCIVA) and near visual acuity (UNVA, DCNVA), with no significant changes to patients' distance vision. Patients also showed improvement in stereopsis postoperatively. Data collection is ongoing.

**Conclusions:** Early clinical trial results suggest LSM to be a safe and effective procedure for restoring range of visual performance in presbyopes. Early results also suggest that LSM can improve intermediate and near visual acuity without touching the visual axis and without comprising distance vision or stereopsis.

### Evaluating the Changes of Biological Parameters of Rhesus Eye After Blue Light Scleral Cross-Linking In Vivo

*First Author:* Yu **LI**

*Co-Author(s):* Fengju **ZHANG**

**Purpose:** To evaluate the changes of biological parameters in the retina and choroid of rhesus eye after blue light scleral cross-linking (CXL), in order to investigate the safety of CXL on sclera in vivo.

**Methods:** Nine 3-year-old rhesus monkeys (18 eyes) were randomly divided into 3 groups. Cross-linking was performed by riboflavin (0.5%) and blue light (460 nm) on equatorial sclera. The right eyes served as the experimental eyes, and left eyes served as the control eyes. One quadrant of right eyes was irradiated in Group A, 2 quadrants of right eyes and one quadrant of left eyes were irradiated in Group B, and 2 quadrants of right eyes were irradiated in Group C. OCTA, f-ERG, and OCT examinations were performed at baseline and at 1 week, 1 month, 3 months, and 6 months after CXL.

**Results:** There were no significant differences between experimental eyes and control eyes in the vessel density of the superficial capillary plexus, the retina thickness, and the choroidal thickness at baseline, 1 week, 1 month, 3 months, and 6 months postoperatively in all groups ( $P > 0.05$ ). Among f-ERG parameters, significant reductions were detected after 1 week in the experimental eyes of Group A and Group C ( $P < 0.05$ ), but it gradually recovered from 1 month postoperatively without significant differences ( $P > 0.05$ ), while the amplitudes of Group B remained no difference between both eyes.

**Conclusions:** Blue light scleral CXL could cause a transient f-ERG parameters decline and recover to normal levels from 1 month, but the intraocular safety should be investigated further.

### Femto-Assisted Crosslinking in Dampening Progression of Keratoconus: A Longitudinal Study

*First Author:* Lional **DANIEL RAJ PONNIAH**

**Purpose:** To compare femto assisted CXL with conventional CXL, prove that the concept of deeper stromal crosslinking better dampens progression of ectasias, and to study the outcomes of Femto-CXL after 2 years.

**Methods:** In phase 1, Femto CXL (FCxL) (creation of stromal bed, 8.5 mm diameter, 140-160 mic. deep with 2 incisions, into which riboflavin is infused in addition to transepithelial application and subsequent UVA) was compared with epi-off conventional CXL (CCxL). Visual acuities in logMAR, CCT in microns, K max value, astigmatism, AS-OCT derived demarcation line (DL) in microns were analyzed. Follow-up at 1 year. In phase 2, subjects of Femto CXL (FCxL) group were followed after 2 years to study the long-term outcomes.

**Results:** Phase 1 (25 FCxL, 21 CCxL eyes). Uncorrected visual acuity (UCVA) improved by 1 additional line in FCxL ( $0.64 \pm 0.25$  logMAR,  $P = 0.005$ ), BCVA in FCxL ( $0.21 \pm 0.16$ ) was similar. CCT was maintained in FCxL ( $474 \pm 37.5$  mic), reduced by 25 mic. ( $P < 0.05$ ) in CCxL. Astigmatism reduced in FCxL by 0.25 diopters (D) ( $3.57 \pm 1.38$  D), increased by 0.27 D in CCxL. DL, deep in FCxL ( $393 \pm 34.1$  mic) versus ( $243 \pm 15.9$  mic) in CCxL Phase 2 (24 FCxL eyes), CCT was maintained ( $470 \pm 36.53$  mic), there was no statistical significance in UCVA ( $0.61 \pm 0.26$ ), BCVA ( $0.14 \pm 0.13$ ), Astigmatism  $2.84 \pm 1.23$  D) and KMax ( $47.6 \pm 2.28$  D).

**Conclusions:** Crosslinking of posterior stroma deeper than 250 microns could be achieved with femto assisted CXL than conventional procedures. Femto assisted cross-linked corneas clinically remained stable with no progression after 2 years.

### Five-Year Results of Refractive Lenticule Extraction ReLex SMILE Compared to Femto-LASIK

*First Author:* Detlev **BREYER**

*Co-Author(s):* Gerd **AUFFARTH**, Philipp **HAGEN**, Hakan **KAYMAK**, Karsten **KLABE**, Florian **KRETZ**

**Purpose:** There are very few peer-reviewed publications reporting long-term clinical outcome after ReLex SMILE. The aim of this retrospective analysis was to investigate whether 5 years after surgery the visual outcomes for ReLex SMILE were as safe, predictable, and stable as those after Femto-LASIK.

**Methods:** So far, the results of 1192 eyes in the ReLex SMILE group and 404 eyes operated on with Femto-LASIK in the control group were evaluated. Follow-up was performed between 6 months and 5 years after treatment. For clinical evaluation, visual acuity at far, subjective refraction, and retreatment rates were

compared. Additionally, patient questionnaires were evaluated for dry eye symptoms, comfort, and recovery time.

**Results:** Concerning safety, predictability, and stability, we could not detect significant differences between both methods. Mean values for spherical equivalent did not show any clinically relevant regression. Regarding the subgroups with target refraction emmetropia, 6 months after ReLEx SMILE and Femto-LASIK, the mean monocular UDVA was  $(0.01 \pm 0.12)$  logMAR and  $(0.04 \pm 0.12)$  logMAR, respectively. These values remained stable within the 5-year follow-up, with  $(0.03 \pm 0.10)$  logMAR and  $(0.03 \pm 0.10)$  logMAR being the 5-year values. Retreatment rates were comparable in both groups and of the order of 1%.

**Conclusions:** Five years after surgery, ReLEx SMILE and Femto-LASIK show equally good results in terms of safety, predictability, and stability. However, fewer dry eyes were observed in the ReLEx SMILE group compared to the Femto-LASIK group. Therefore, we clearly favor the ReLEx SMILE technique in patients who ask for a painless refractive correction.

### Long-Term Assessment of Visual and Refractive Outcome of Laser In Situ Keratomileusis for High Hyperopic Patients

First Author: Mehmet **SUCU**

Co-Author(s): Murat **ARICI**, Gökhan **DEMIR**, Yusuf **YILDIRIM**

**Purpose:** To evaluate the long-term efficacy and safety of high hyperopic patients who underwent laser in situ keratomileusis (LASIK).

**Methods:** The medical records of 23 high hyperopic [more than +4.00 diopters (D)] eyes of 20 patients who underwent LASIK for hyperopia using the AMARIS 750S excimer laser were reviewed retrospectively. Uncorrected and best corrected visual acuity (BCVA), long-term stability of refraction, and complications were evaluated.

**Results:** Of the patients, 34 (54.9%) were male and 28 (45.1%) were female. The mean age was  $37.4 \pm 11.2$  (20-59). The mean follow-up for all eyes was 51 months. The mean preoperative SE was  $+5.26 \text{ D} \pm 0.44 \text{ D}$ . At the last visit, the mean SE was  $+1.63 \text{ D} \pm 0.47 \text{ D}$ . Regression was found  $1.38 \text{ D} \pm 0.44 \text{ D}$  at 4 years postoperatively. Preoperative uncorrected visual acuity (UCVA) was 0.380.12 and increased to  $0.68 \pm 0.15$  at 4 years follow-up ( $P < 0.01$ ). There was no statistically significant difference between preoperative and postoperative BCVA. The UCVA was 20/20 or better in 69.9% of the patients.

**Conclusions:** LASIK is safe and effective for correcting high hyperopia in the short term; however, the efficacy of the procedure is limited in the patients with long follow-up.

### Modified Monovision for Presbyopia Treatment Using PresbyMAX Hybrid

First Author: Mariko **MITA**

Co-Author(s): Minoru **TOMITA**

**Purpose:** To evaluate the clinical outcomes of Presby LASIK, we analyzed clinical data after PresbyMax treatment by using Schwind Amaris 1050.

**Methods:** In this study, Schwind Amaris 1050 RS excimer laser was used for Presby LASIK surgery. The dominant eye was treated with normal LASIK and non-dominant eye was treated with PresbyMax treatment. The results of pre-operation and post-operation of 454 eyes of 227 presbyopia patients with an average of 52 years (range 42 to 69) were statistically analyzed. Pre-operation data of BUDVA (Binocular Uncorrected Distance Visual Acuity) was 20/28, BUNVA (Binocular Uncorrected Near Visual Acuity) was 20/43. The preoperative Manifest Refraction Spherical Equivalent (MRSE) was  $-1.23 \pm 2.9$  diopters (D) in dominant eyes and  $-1.11 \pm 3.02 \text{ D}$  in non-dominant eyes.

**Results:** The mean BUDVA was 20/15 and BUNVA was 20/21 at postoperative 6 months. The mean MRSE of the dominant eye was  $0.24 \pm 0.40$  and for the non-dominant eye was  $-1.29 \pm 0.68$  at postoperative 6 months. Patient satisfaction was high.

**Conclusions:** The clinical outcomes of patients with presbyopia treatment using PresbyMax hybrid showed the value of modified mono-vision and improvement of visual acuity.

### Visual Acuity, Endothelial Cell Density, and Polymegathism After Iris-Fixated Lens Implantation

First Author: Nader **NASSIRI**

Co-Author(s): Saeedeh **GHORBANHOSSEINI**, Kourosh **SHEIBANI**

**Purpose:** The purpose of this study was to evaluate the visual acuity as well as endothelial cell density (ECD) and polymegathism after iris-fixated lens (Artiflex AC 401) implantation for correction of moderate to high myopia.

**Methods:** In this retrospective cross-sectional study, 55 eyes from 29 patients undergoing iris-fixated lens implantation for correction of myopia ( $-5.00$  to  $-15.00 \text{ D}$ ) from 2007 to 2014 were evaluated. Uncorrected visual acuity, best spectacle-corrected visual acuity, refraction, ECD and polymegathism [coefficient of variation (CV) in the sizes of endothelial cells] were measured preoperatively and 6 months postoperatively.

**Results:** In the 6th month of follow-up, the uncorrected vision acuity was 20/25 or better in 81.5% of the eyes. The best-corrected visual acuity was 20/30 or better in 96.3% of the eyes, and more than 92% of the eyes had a refraction score of  $\pm 1 \text{ D}$  from the target refraction.

The mean corneal ECD of patients before surgery was  $2803 \pm 339$  cells/mm<sup>2</sup>, which changed to  $2744 \pm 369$  cells/mm<sup>2</sup> 6 months after surgery ( $P = 0.142$ ). CV in the sizes of endothelial cells before the surgery was  $25.7\% \pm 7.1\%$  and 6 months after surgery it was  $25.9\% \pm 5.4\%$  ( $P = 0.857$ ).

**Conclusions:** Artiflex iris-fixated lens implantation is a suitable and predictable method for correction of moderate to high myopia. There was no statistically significant change in ECD and polymegathism (CV in the sizes of endothelial cells) after 6 months of follow-up.

### Visual Outcome and Contrast Sensitivity After Photorefractive Keratectomy in Low to Moderate Myopia: Wavefront-Optimized Versus Conventional Methods

*First Author:* Kourosh **SHEIBANI**

*Co-Author(s):* Nader **NASSIRI**

**Purpose:** To compare visual outcomes and contrast sensitivity after wavefront-optimized or conventional photorefractive keratectomy (PRK) in myopic patients with or without astigmatism.

**Methods:** Patients with low to moderate myopia, with or without astigmatism, were allocated into 2 groups. The study group was treated with wavefront-optimized PRK (Allegretto Wave Eye-Q software version 2.020 default treatment) and the control group, with conventional PRK (Technolas 217z). In all cases, treatments were bilateral and performed with the same device. Baseline and 3-month postoperative measures were uncorrected and corrected distance visual acuities, manifest refraction, and contrast sensitivity.

**Results:** Each group comprised 66 eyes. The mean preoperative spherical equivalent refraction improved from  $-2.99$  diopters (D)  $\pm 1.02$  (SD) preoperatively to  $-0.08 \pm 0.26$  D 3 months postoperatively in the study group and from  $-2.66 \pm 0.95$  D to  $0.01 \pm 0.30$  D, respectively, in the control group. In both groups, the postoperative mesopic and photopic contrast sensitivity decreased significantly at most spatial frequencies. The postoperative decrease in contrast sensitivity in both groups was comparable except at spatial frequencies of 3 cycles per degree (cpd) under mesopic conditions and 12 cpd under photopic conditions, frequencies at which the control group had a greater reduction.

**Conclusions:** Visual acuity and refractive error outcomes were similar in both treatment groups. After 3 months, mesopic and photopic contrast sensitivity were significantly decreased in both groups; the reduction in the 2 groups was almost comparable.

## Retina (Medical)

### 1-Year Outcome of Polypoidal Choroidal Vasculopathy with Vision Better Than 20/40

*First Author:* **SUMIT**

*Co-Author(s):* Jay **CHHABLANI**, Abhilash **GOUD**, Raja **NARAYANAN**, Niroj **SAHOO**, Nallamasa **ROHIT**

**Purpose:** To report the 12-month outcomes of treatment naïve polypoidal choroidal vasculopathy (PCV) in patients with vision better than 20/40 Snellen's best corrected visual acuity (BCVA).

**Methods:** This was a retrospective study that included 18 eyes with treatment-naïve PCV treated with monotherapy of anti-vascular endothelial growth factors (VEGF) agents on a pro re nata (PRN) protocol. Photodynamic therapy using verteporfin (vPDT) was used as rescue therapy. The primary study objective was change in BCVA at 12 months. Secondary objectives included change in optical coherence tomography (OCT) parameters: central macular thickness (CMT), pigment epithelial detachment (PED) height, the mean number of injections, and treatment free interval at 12 months.

**Results:** The mean age was  $58.0 \pm 12.0$  years. BCVA at baseline and 12 months were  $0.16 \pm 0.08$  (Snellen equivalent 20/30) and  $0.15 \pm 0.15$  logMAR (approximately 20/30) respectively. A total of 12 (66.6%) eyes either improved or maintained BCVA. The (mean  $\pm$  SD) CMT at baseline and 12 months were  $188.2 \pm 61.1$   $\mu$  and  $161.7 \pm 47.4$   $\mu$  ( $P = 0.15$ ) respectively. PED height at baseline was  $393.2 \pm 217.6$   $\mu$  which improved to  $236.4 \pm 215.1$   $\mu$  at 12 months ( $P = 0.05$ ). The mean number of anti-VEGF injections at 12 months was  $3.28 \pm 1.96$  with a treatment free period interval of  $6.83 \pm 3.63$  months. A total of 3 eyes required vPDT (4 treatment sessions; mean: 1.33) as a rescue therapy through 12 months.

**Conclusions:** PRN anti-VEGF monotherapy in real-life situations for the treatment of naïve PCV eyes with good visual acuity (better than 20/40) achieves maintenance or improvement of visual acuity through 12 months follow-up.

### A Case of Retinal Circulation Disorder in a Young Woman with Iron Deficiency Anemia

*First Author:* Yuto **YOSHIDA**

*Co-Author(s):* Akira **MURAKAMI**, Koichi **ONO**, Ayako **OGIWARA**, Reiko **UMEYA**

**Purpose:** Retinal artery occlusion and retinal vein occlusion are diseases that often develop in elderly people with high blood pressure, arteriosclerosis, heart disease, etc. However, even young people are known to cause retinal circulation impairment if systemic vasculitis and abnormal blood components are present. We reported a case in which iron deficiency anemia is

thought to be involved in retinal circulation disorder in young women.

**Methods:** We administered iron to the retinal circulation disorder case of young people with iron deficiency anemia.

**Results:** A 24-year-old woman was aware of the upper visual field loss of the right eye from waking up and she visited our hospital. At the first visit, there was retinal vein dilation and tortuosity, dot hemorrhage, and retinal edema under the macula in the right eye fundus. Based on fundus fluorescein angiography, it was diagnosed as cilio-retinal arteriolar occlusion and retinal vein stasis, and vasodilator and antiplatelet agent were administered. After starting administration of vasodilator and antiplatelet agent, retinal edema improved but central retinal vein occlusion in the right eye occurred about 9 weeks after the start of treatment. There was no systemic disease requiring treatment, but in blood tests serum iron: 43 µg/dl, ferritin: 7.0 ng/mL was low. Oral administration of iron preparation started, and retinal circulation disorder dramatically improved after 3 months.

**Conclusions:** In the retinal circulation disorder cases of young people, iron deficiency anemia should be considered as one cause. Treatment for anemia may be effective for retinal circulation disorders in which iron deficiency anemia is based.

## A Classical Case of Retinal Cavernous Hemangioma

*First Author: Prem SAI*

*Co-Author(s): Sivaraja GOWTHAMAN, Hannah PRASANTH, Ishwarya SRIDHAR, Elfride SANJANA*

**Purpose:** To present a rare case of cavernous hemangioma of the retina in a child.

**Methods:** A 12-year-old girl presented with the complaint of gradual diminution of vision in the left eye for the past year. On examination, vision in the right eye was 6/6 and left eye was 6/36 not improving with pinhole. Anterior segment was normal in both eyes. Fundus examination of left eye showed a grapelike cluster of aneurysms on the macula along with numerous dilated vessels and dot shaped intraretinal hemorrhages extending up to inferotemporal ora serrata, where it ended as grey fibrotic tissue. A clinical diagnosis of cavernous hemangioma of retina of left eye was made.

**Results:** B-scan of left eye showed a hyperechoic elevated lesion. MRI brain was normal study. Pediatrician ruled out other systemic involvement.

**Conclusions:** Cavernous hemangioma of the retina is a rare, congenital, and benign unilateral vascular hamartoma. It is often asymptomatic unless it involves macula. The typical cavernous hemangioma appears as a cluster of saccules within the sensory retina. Periodic observation is advised in most cases as cavernous

hemangiomas rarely increase in size.

## A Comparative Study of Lipid Profile in Diabetes Mellitus Patients with and without Diabetic Retinopathy in a Rural Population of Eastern India

*First Author: Rudra GHOSH*

*Co-Author(s): Arpita NASKAR*

**Purpose:** 1. To study relationship between severity of diabetic retinopathy and serum lipid levels. 2. To evaluate relationship between serum lipid levels, diabetic retinopathy changes including CSME.

**Methods:** A total of 100 diabetic patients without retinopathy (group A), 100 diabetic patients with retinopathy (group B), and 100 non-diabetic patients with no retinopathy as control (group C) according to ETDRS chart were studied. Total cholesterol (TC), triglycerides (TG), high density lipoprotein (HDL), low-density lipoprotein (LDL), very low-density lipoprotein (VLDL), fasting plasma glucose (FPG), 2-hour plasma glucose (2-hr PG), and HbA1C (glycosylated hemoglobin) levels were compared among the groups.

**Results:** The groups were age and gender matched ( $P = 0.474$  and  $P = 0.84$  respectively, one-way ANNOVA test). The mean duration of diabetes was higher in Group A than Group B ( $P \leq 0.0001$ ;  $P \geq 0.0001$  respectively). The Body Mass Indexes were higher in both Group A and Group B than Group C ( $P \leq 0.0001$ ;  $P \leq 0.0001$ ;  $P \geq 0.0001$  respectively). The mean FBS, PPBS, and HbA1C were higher for Group A and B than the control group C ( $P \leq 0.0001$ ;  $P \leq 0.0001$ ;  $P \geq 0.0001$  respectively). The mean TG and VLDL was higher in Group A and B than Group C ( $P = 0.043$ ;  $P = 0.044$  respectively). The mean HDL was lower in Group A than the other 2 groups ( $P = 0.674$ ). Out of 56 cases of CSME among the diabetic patients, 44 (78.5%) had CSME in both eyes which was significantly higher ( $Z = 6.87$ ;  $P < 0.0001$ ). No CSME was found among Groups B and C.

**Conclusions:** Serum lipid levels were significantly associated with severity of DR and the existence of CSME in those patients.

## A Rare Case of Vaso-Occlusive Retinopathy in Systemic Lupus Erythematosus

*First Author: Weni PUSPITASARI*

*Co-Author(s): Made SUSIYANTI, Anggun YUDANTHA*

**Purpose:** To demonstrate a rare case of SLE retinopathy, how to make a proper diagnosis, and initiating appropriate therapy in order to prevent irreversible visual loss.

**Methods:** This is a case report with a 26-year-old male who came with painless bilateral blurred vision 2 weeks prior accompanied with fever, fatigue, photosensitivity, arthralgia, hair loss, and erythema over the cheeks, neck, hands, chest, and the back 2 months prior.

Ophthalmological examination showed visual acuity of the right eye was 1/60 and 1/300 on the left eye. The fundus found extensive cotton wool spots, papil hemorrhage and flame-shaped hemorrhages on both eyes. Macular optical coherence tomography (OCT) showed severe retinal atrophy on both eyes with macular thickness of 118 and 119  $\mu\text{m}$  for the right and left eye, respectively. FFA test revealed diffuse arteriolar, branch arterial occlusion, and capillary non-perfusion. Serological test revealed positive result an antinuclear antibody (ANA) and the anti-double-stranded DNA (anti-ds DNA). The Internal Medicine department diagnosed as systemic SLE disease with mucocutaneous and ocular involvement and gave oral methylprednisolone 3 x 16 mg.

**Results:** Six weeks after treatment showed marked improvement in visual acuity of the right eye and decrease changes of cotton wool spots on both eyes. However, papil atrophy was revealed in the left eye.

**Conclusions:** This case represents a rare case of vaso-occlusive SLE retinopathy that initially diagnosed as infectious posterior uveitis based on clinical features. After comprehensive evaluation from laboratory findings and multidiscipline department revealed the diagnosis of SLE retinopathy, appropriate therapy could control systemic inflammation and ocular symptoms.

### A Retrospective Analysis on the Risk Factors for Aggressive Posterior-Retinopathy of Prematurity

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**Purpose:** : To analyze the risk factors contributing in the pathogenesis of Aggressive Posterior ROP (AP-ROP).

**Methods:** Retrospective, observational case series. Parameters included birth weight, gestational age, post conceptual age, associated illness, duration of oxygen supplementation, treatment advised.

**Results:** Case record of 30 babies was analyzed. All these babies had received supplemental oxygen for 3 days or longer after birth and had several other systemic co-morbidities. The mean gestational age was 30.3 weeks and mean birth weight was 1.27 kgs. A total of 48 eyes of 30 babies showed AP-ROP on examination out of which 29 eyes (60.4%) had zone II posterior AP-ROP and 19 eyes (39.6%) had zone I APROP. A total of 22 babies received treatment in the form of laser and intravitreal anti-VEGF.

**Conclusions:** In our case series, APROP in premature infants occurs mostly in posterior zone 2 with flat neovascularization and atypical features like large vascular loops. Supplemental unmonitored oxygen for prolonged duration and multiple systemic co-morbidities could be a contributing factor.

### Alstrom Syndrome, A Rare Disease: 2 Cases in the Same Family

*First Author: Mamunur Rashid CHOWDHURY*

*Co-Author(s): Mejbah ALAM, Nazmun NAHAR*

**Purpose:** To describe 2 cases of Alstrom syndrome (AS).

**Methods:** We reported 2 cases of AS, in a brother and sister, with a positive history of consanguinity of marriage. Both of them presented with dimness of vision, photophobia, nystagmus since childhood, and developmental delay. The elder child also had obesity, diabetes mellitus (DM), hearing loss, and cone dystrophy, and the younger child additionally had high hyperopia.

**Results:** The diagnosis of AS was proven at any age when 2 ALMS1 genes, each coming from 1 parent, have been identified in the patient. Because mutation analysis is not always possible, a set of diagnostic criteria have been established consisting of 3 series of age groups. Namely, from birth-2 years, children of 3-14 years, and 15 years – adulthood. Each of these age groups consists of major and minor criteria. Our 2 cases fell into the 3-14 years age group and need either 2 major criteria or 1 major criterion with 3 minor criteria for establishment of AS. The younger child had 2 major criteria, such as positive family history of AS and vision-related findings (nystagmus, photophobia, diminished visual acuity). The elder one had 1 major criterion of vision-related findings (nystagmus, photophobia, diminished visual acuity, cone dystrophy) and 3 minor criteria, namely, obesity with DM, hearing loss, and hepatic dysfunction.

**Conclusions:** Although AS is a rare genetic disorder, all cases with early onset obesity having visual findings similar to AS should be evaluated for this disorder.

### Atypical Choroidal Neovascularization Presenting in Recurrent Central Serous Chorioretinopathy

*First Author: Vega CASALITA*

*Co-Author(s): Ari DJATIKUSUMO*

**Purpose:** In recurrent central serous chorioretinopathy (CSCR), choroidal neovascularization (CNV) can occur as a result of persistent or recurrent serous macular detachment. This case report aims at demonstrating management of CNV as a complication of chronic persistent CSCR.

**Methods:** Case report. A 53-year-old woman had a 6-month history of decreased object sharpness and color sensitivity in central field area of her left eye. Visual acuity (VA) was 20/40 and clinical examination showed well-circumscribed submacular fluid with multiple small yellow deposits as confirmed by optical coherence tomography (OCT). Fluorescein angiography (FA) revealed pinpoint hyperfluorescence outside fovea avascular zone followed by dye leakage throughout the

phase at superior macular region. Patient underwent focal laser photocoagulation treatment, and 3 months later the disease showed complete resolution.

**Results:** Six months follow-up after laser treatment, the VA decreased to 20/150, with the presence of subretinal fluid, accompanied by pigment epithelial detachment and irregular RPE appearance on OCT. FA showed late phase hyperfluorescence in inferior macula region, suggestive of CNV formation. She underwent 3 episodes of intravitreal bevacizumab injection monthly. The last follow-up showed VA improvement to 20/40 with fluid resolution at OCT examination.

**Conclusions:** Atypical CNV can develop as an unnatural course of chronic CSCR due to diffuse RPE loss and Bruch's membrane damage. Intravitreal bevacizumab has successfully obliterated the CNV and preserved visual function in this patient.

### Automated Detection of a Nonperfusion Area in Optical Coherence Tomography Angiography Images Using Deep Learning

*First Author: Tomoaki SONOBE*

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**Purpose:** The aim of this study was to assess the ability of deep learning (DL) to detect a non-perfusion area (NPA) using optical coherence tomography angiography (OCTA) images.

**Methods:** The study included 322 OCTA images [normal: 148; NPA owing to retinal vein occlusion (RVO): 174 (128 branch RVO images and 46 central RVO images)]. We conducted training with deep convolutional neural network (DNN) models using OCTA images. The area under the curve (AUC), sensitivity, and specificity for detecting a NPA were examined. We compared the diagnostic ability (sensitivity, specificity, and average required time) between the DNN and 7 ophthalmologists. Heat maps were generated.

**Results:** With regard to the DNN, the mean AUC, sensitivity, specificity, and average required time for distinguishing RVO OCTA images with an NPA from normal OCTA images were 0.988, 96.6%, 98.6%, and 176.9 s, respectively. The DNN focused on the foveal avascular zone and NPA in heat maps. With regard to the 7 ophthalmologists, the sensitivity, specificity, and average required time for distinguishing OCTA images with an NPA from normal OCTA images were 88.8%, 86.3%, and 700.6 s, respectively. The performance of the DNN was significantly better than that of the ophthalmologists in all parameters ( $P < 0.01$ ).

**Conclusions:** The combination of DL and OCTA images could detect an NPA owing to RVO with high accuracy, and it might be useful in clinical practice and retinal screening.

### Branch Retinal Arterial Occlusion Presenting with Papilledema

*First Author: Cheng-Chao CHING*

*Co-Author(s): Michael CHOU*

**Purpose:** To report a case of branch retinal arterial occlusion presenting with papilledema.

**Methods:** Case report.

**Results:** A 66-year-old woman with a history of hypertension complained of central scotoma of left eye about 2 weeks ago. She described intermittent episodes of headache accompanied with blurred vision during this time. On examination, visual acuity was 20/20 in the right eye and 2/20 in the left eye. Fundus examination revealed tortuosity and obscured cilioretinal vessels with flame-shaped hemorrhage over temporal disc area and blurry disc margin with mild disc pallor at temporal side was noted. Visual field examination showed inferonasal scotoma of left eye, and OCT of disc demonstrated swelling of superotemporal disc area. Under impression of optic neuritis suspect anterior ischemic optic neuropathy, steroid pulse therapy was administered. Fluorescein angiography showed delayed filling of left cilioretinal artery circulation. After pulse therapy treatment, the patient noted slight improvement of scotoma; however, her visual acuity remained static at discharge.

**Conclusions:** Cilioretinal arteries are anatomical variants originating from the short posterior ciliary arteries. Anterior ischemic optic neuropathy is known to be caused by occlusion of the short posterior ciliary arteries, resulting in partial or total infarction of the optic nerve head. Thus, occlusion of the short posterior ciliary arteries may cause concomitant occlusion of the cilioretinal artery. The presence of both anterior ischemic optic neuropathy and a cilioretinal artery occlusion was shown to be pathognomonic for giant cell arteritis. Our case reported a patient with only a history of hypertension, but presented with both these conditions.

### Central Scotoma in a Patient with Non-Ocular Trauma

*First Author: Shih-Hao TZENG*

*Co-Author(s): Michael CHOU*

**Purpose:** To report a case of acute traumatic maculopathy in non-ocular trauma resulting in central scotoma.

**Methods:** Case report.

**Results:** A 32-year-old man suffered reduction of vision in his left eye after motorcycle accident. He suffered multiple abrasions and trauma to the back and chest, but denied direct head or eye trauma. Computed tomography (CT) scan did not reveal any brain lesions. The patient described the appearance of a central scotoma in the left eye. On presentation, visual acuity

were 0.9 right eye (OD) and 0.04 left eye (OS). Fundus examination revealed an abnormal yellowish spots at the macula with small parafoveal hemorrhages. Visual field examination showed an absolute central scotoma in the left eye. OCT findings presented with thickened outer retina with increased reflectivity of the inner and outer segment junction. The inner retinal layers did not reveal significant abnormalities compared with the fellow eye, and architecture of the foveal pit was preserved. The central foveal thickness was 235  $\mu\text{m}$  in the left eye.

**Conclusions:** Macular commotio retinae causes loss of vision, with variable recovery over several months and incidences of persistent scotoma. OCT findings in acute traumatic maculopathy may show swelling of the outer retina with preservation of inner retinal structures, or the presence of neurosensory retinal detachment at the fovea. Although most cases of ATM show some degrees of long-term visual recovery, loss of vision may be permanent.

### Changes in Systemic Oxidative Stress in Response to Intravitreal Anti-VEGF Therapy for Patients with Retinal Vein Occlusion

*First Author:* De-Kuang **HWANG**

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**Purpose:** The objective of this study was to evaluate the effects of intravitreal anti-vascular endothelium growth factor (VEGF) treatment on Sirtuin 1 (SIRT1) and related biomarkers of the oxidative stress cascade in patients with retinal vein occlusion.

**Methods:** In this study, 34 health controls with senile cataract and 32 retinal vein occlusion patients were enrolled. Serum levels of SIRT1 and expression of downstream genes including peroxisome proliferator-activated receptor gamma (PPAR-r), Peroxisome proliferator-activated receptor gamma coactivator 1-alpha (PGC-1 $\alpha$ ), orkhead box protein O1 (FOXO1), and orkhead box protein O3 (FOXO3) were measured and compared. Factors before and after intravitreal anti-VEGF treatment were measured repeatedly in this study.

**Results:** The mean SIRT1, PPAR-r, PGC-1 $\alpha$ , FOXO1, and FOXO3 levels were significantly lower in patients with retinal vein occlusion compared with the control group. After serial intravitreal anti-VEGF treatment for 16.7 months, the mean of SIRT1, PPAR-r, PGC-1 $\alpha$ , FOXO1, and FOXO3 levels were significantly increased (SIRT1,  $0.005 \pm 0.005$  vs  $0.014 \pm 0.004$ ,  $P < 0.05$ ; PPAR-r,  $0.02 \pm 0.007$  vs  $0.025 \pm 0.008$ ,  $P < 0.05$ ; PGC-1 $\alpha$ ,  $0.002 \pm 0.001$  vs  $0.003 \pm 0.002$ ,  $P < 0.05$ ; FOXO1,  $0.024 \pm 0.008$  vs  $0.029 \pm 0.009$ ,  $P < 0.05$ ; FOXO3,  $0.02 \pm 0.005$  vs  $0.025 \pm 0.01$ ,  $P < 0.05$ ).

**Conclusions:** In the present study, we demonstrated that intravitreal anti-VEGF treatment was associated with an increase in the expression of SIRT1 and up-regulation of downstream genes, which includes

PPAR-r, PGC-1 $\alpha$ , FOXO1, and FOXO3.

### Clinical Efficacy of the Treat and Extend Method Combining Intravitreal Aflibercept and Retinal Photocoagulation for the Treatment of Diabetic Macular Edema

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**Purpose:** We investigated the clinical efficacy of the Treat & Extend (T&E) method, combining intravitreal aflibercept (IVA) and retinal photocoagulation for treating diabetic macular edema.

**Methods:** As induction treatment, IVA was administered 3 times at 4-week intervals. Focal/grid laser treatment was performed 1 week after the first IVA injection. Subsequently, if central macular thickness (CMT) was  $\geq 350 \mu\text{m}$  or CMT had not increased above the minimum by  $\geq 100 \mu\text{m}$ , the frequency of examinations was extended to every 4 weeks (T&E). The primary endpoints were CMT at 52 weeks after the start of treatment and visual acuity, and secondary endpoints were the number of IVA treatments and safety. This was an investigator-initiated, multicenter, single-arm, non-blinded clinical study.

**Results:** CMT decreased from  $501.9 \mu\text{m}$  at baseline to  $328.9 \mu\text{m}$ . ETDRS visual acuity improved from 59.8 characters at baseline to 64.0 characters. The interval between the 52-week examination and the preceding examination was 8 weeks in 38.7% of cases, 12 weeks in 16.1%, and 16 weeks in 45.2%. There were no reported serious adverse events during follow-up, and blood pressure did not change significantly from baseline.

**Conclusions:** The T&E method combining IVA with focal/grid laser treatment used fewer IVA treatments at 52 weeks than the conventional method, while providing morphological and functional therapeutic efficacy that may be an effective regimen for diabetic macular edema.

### Clinical Outcome of Anti-Vascular Endothelial Growth Factor in Diabetic Macular Edema: A Comparative Study Between Ranibizumab and Bevacizumab

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**Purpose:** The aim of the study was to compare the effects of Bevacizumab and Ranibizumab on anatomical and clinical outcomes in patients with diabetic macular edema (DME).

**Methods:** A total number of 58 patients from both sexes, ages older than 18 years with DME [Center

involved DME >300  $\mu$ m on Optical Coherence Tomography (OCT)] and Best Corrected Visual Acuity (BCVA) in logMAR chart (0.17-3.0) were selected for this study. They were randomly divided into 2 groups, 29 eyes in each group: Group A patients received inj. Ranibizumab and Group B patients received inj. Bevacizumab. Patients were scheduled for follow-up examinations immediately the day after giving the 1st injection and the final follow-up was 4 months later. Statistical analysis was performed by unpaired t-test, paired t-test and Chi-square test to assess the difference between the clinical outcome of Groups A and B.

**Results:** The mean percentage of OCT improvement was found  $24.61 \pm 16.11 \mu$ m in Group A and  $20.86 \pm 11.86 \mu$ m in Group B. The mean percentage of BCVA improvement was found  $38.26 \pm 26.7 \mu$ m in Group A and  $31.40 \pm 20.60 \mu$ m in Group B. The differences were not statistically significant ( $P > 0.05$ ) between the 2 groups. But the improvement by decreasing macular thickness and BCVA were highly significant in both groups before and after giving bevacizumab and ranibizumab.

**Conclusions:** The 3 doses of intravitreal bevacizumab or ranibizumab given at one-month intervals showed substantial improvement in visual outcome and decreasing central macular thickness by 4 months and the results were statistically similar in both the groups.

### Clinical Outcomes of Central Retinal Vein Occlusion with Poor Baseline Visual Acuity

*First Author:* SUMIT

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**Purpose:** To describe the clinical outcomes of treatment naïve eyes with macular edema secondary to central retinal vein occlusion (CRVO) with poor baseline visual acuity ( $\leq 20/320$  Snellen's equivalent) through 12 months.

**Methods:** The clinical records of 26 eyes of 26 patients diagnosed with macular edema secondary to CRVO during the period from January 2012 to June 2017 were retrospectively analyzed. Demographic details were obtained and best corrected visual acuity (BCVA), central macular thickness (CMT), and number of intravitreal injections were evaluated at baseline, 3, 6, and 12 months. Baseline parameters were evaluated using analysis of variance (ANOVA) and regression analysis as predictors for treatment outcome at month 12.

**Results:** The mean age of the study population was  $58.65 \pm 11.07$  years. The mean disease duration was  $27.31 \pm 23.95$  days (range 4-90 days). Mean BCVA at presentation was  $1.85 \pm 0.46$  logMAR (Snellen's equivalent 20/1400) with no significant improvement in BCVA at 12 months ( $P = 0.98$ ). Thirteen (50%) and 3 (11.54%) eyes had improvement or maintained BCVA

through 12 months respectively. Significant reduction in CMT was noted at 12 months ( $429.0 \pm 313.13 \mu$ ) compared to baseline ( $P = 0.001$ ), with a mean of  $2.38 \pm 1.42$  intravitreal injections. Univariate analysis identified baseline and 3 months BCVA as predictors of final BCVA at 12 months, whereas multivariate analysis revealed BCVA at 3 months as the only predictor of final visual acuity.

**Conclusions:** Up to 50% of eyes with poor baseline visual acuity showed improved visual acuity at month 12. Short-term visual acuity at 3 months can predict the final visual outcomes.

### Combined Central Retinal Artery and Vein Occlusion as the Presenting Manifestation of Systemic Lupus Erythematosus

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**Purpose:** To report a rare case of combined central retinal artery (CRAO) and vein occlusion (CRVO), presenting as the first manifestation of systemic lupus erythematosus (SLE) in a 14-year-old girl.

**Methods:** A retrospective case report.

**Results:** A 14-year-old girl presented with sudden loss of vision in her left eye (LE) for 1 day. Best corrected visual acuity in the right eye (RE) was 20/20 and no light perception in the left eye. LE had a relative afferent pupillary defect. Fundus examination of LE revealed a mild swollen optic disc, pale and edematous retina, engorged and tortuous retinal veins, scattered intraretinal hemorrhages in all quadrants, and a cherry-red macular spot, establishing the diagnosis of a combined CRAO and CRVO. Anterior and posterior segment findings were unremarkable in RE. Despite ocular paracentesis and supplementation with anticoagulants, there was no improvement in the visual acuity of LE and amaurosis eventually developed. She had raised anti-nuclear antibody, double-stranded DNA, and slightly decreased complement-3. Lupus anticoagulant, anticardiolipin antibodies were negative. She developed all characteristic manifestations of SLE including macula-papular rashes, polyarthritides, lupus nephritis, and broncho-alveolar hemorrhages, and ultimately died of terminal cardiorespiratory arrest due to bilateral aspiration pneumonitis on 9th day of presentation.

**Conclusions:** The combined occlusion presented as a catastrophic form of disease flare in the absence of raised anti-phospholipid antibodies, suggesting inflammatory etiology; leading to severe visual loss, despite aggressive treatment. This case reminds us that SLE must be considered in the rare instance in which the patient presents with combined CRAO and CRVO.

## Concurrent Chronic Central Serous Chorioretinopathy and Pachychoroid Pigment Epitheliopathy in Fellow Eyes

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**Purpose:** To report on a patient with concurrent chronic CSC and pachychoroid pigment epitheliopathy (PPE) that occurred in the different eyes.

**Methods:** Case report and review of the literature.

**Results:** A 63-year-old Taiwanese male was in his usual health and presented with bilateral metamorphopsia for 1 year with the right eye showing more severe symptoms. On examination, the best-corrected visual acuity (BCVA) showed 0.8 in the right eye and 1.0 in the left eye while no external eye abnormality was found by slit-lamp biomicroscopy. However, fundus examination revealed bilateral orange-redish macular elevation with right predominant. The optical coherence tomography (OCT) illustrated right large PED and left large choroid vessel with drusen under the retinal pigment epithelium. Thus, right eye chronic CSC and left eye PPE were diagnosed. The oral ibuprofen was prescribed 3 times per day for the bilateral pachychoroid lesions then the metamorphopsia was only observed in the right eye. Then intravitreal injection of aflibercept was performed for the right eye symptoms, which improved 1 week after the injection. The final BCVA was 0.9 in the right eye.

**Conclusions:** The concurrent existence of CSC and PPE is rare but possible. A follow-up period of up to 1 year could be suggested to monitor the disease course.

## Disc Edema and Bull's Eye Maculopathy in Systemic Lupus Erythematosus

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**Purpose:** To study the ocular effects of Hydroxychloroquine (HCQ) and its progression in a young lady with SLE.

**Methods:** A 32-year-old lady came with complaints of diminution of vision in the left eye for 3 years. She had undergone cataract surgery for both eyes. She is a known SLE patient (Rowell Syndrome) with class IV Lupus Nephritis for past 18 years. She has taken 12 cycles of Cyclophosphamide, presently on steroid Azathioprine and Eltroxine. Patient was started on HCQ tablets (100 mg daily), and dose was doubled after a year.

**Results:** She complained of blurring of vision after 7 months. Her best corrected visual acuity (BCVA) in right eye was 6/6; N6 and left eye was 6/12; N6. She had bilateral papilloedema with tortuous vessels. After 5 months, her left eye vision dropped to a BCVA of HM; <N36. Papilloedema was persistent. Provisional

diagnosis of Pseudotumour cerebri was made and treated conservatively. After 1 month, right eye had resolving papilloedema and left eye secondary optic atrophy. After 3 months, bull's eye maculopathy seen in both eyes. Patient was asked to stop HCQ. After 2 years, both fundus showed perimacular flecks with distinctive features of bull's eye maculopathy. FFA showed extreme venous tortuosity with pigment atrophy at the macula.

**Conclusions:** This was to report multiple ocular manifestations in optic neuropathy with macular involvement, and also to depict toxicity that developed as a consequence of Hydroxychloroquine. A combination of factors accounts for visual loss in SLE and Rowell syndrome causing visual loss that has not been reported till now.

## Efficacy and Safety of Oral Spironolactone for Treatment of Central Serous Chorioretinopathy

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**Purpose:** To compare the efficacy of oral spironolactone treatment versus observation in patients with chronic and/or recurrent central serous chorioretinopathy (CSCR).

**Methods:** An age-matched retrospective cohort study, medical records, and optical coherence tomography images of 69 patients with a minimum of 3 months' follow-up were reviewed. 23 subjects received oral spironolactone (50 mg/day), while 46 subjects were observed. Primary outcome measures included the complete resolution of subretinal fluid (SRF). Changes in SRF height, central macular thickness (CMT), ellipsoid layer disruption, and best corrected visual acuity (BCVA) were assessed.

**Results:** A total of 69 patients, 44 men and 25 women, were recruited. Mean age was  $44.71 \pm 8.94$  years and mean follow-up time was  $5.18 \pm 1.34$  months. In demographic data, duration of symptoms was significantly longer ( $P = 0.0001$ ) and baseline BCVA was significantly worse in treatment group ( $P = 0.038$ ). Mean duration of spironolactone treatment was  $4.95 \pm 1.40$  months. Complete resolution of SRF and considerable reduction of SRF ( $>50\%$ ) were significantly higher in treatment group at 1 month ( $P = 0.001$ ,  $P = 0.013$ ), but not statistically significant at 3 and 6 months. Although visual gain, CMT reduction, and ellipsoid layer proliferation were observed in both groups, there were no statistically significant differences between groups. Nevertheless, the patients with improvement of 2 lines or more of visual acuity was significantly higher in treatment group ( $P = 0.05$ ). No side effects of spironolactone were detected.

**Conclusions:** There was no significant difference

between oral spironolactone and observation in terms of treatment outcomes for CSCR. For visual outcome, spironolactone may help to restore visual function. Further prospective study is needed.

### Elevation of Vitreous Body Concentrations of Oxidative Stress-Responsive Apoptosis Inducing Protein in Diabetic Retinopathy

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**Purpose:** Oxidative Stress-Responsive Apoptosis Inducing Protein (ORAIP) is a newly discovered pro-apoptotic ligand secreted from cells in response to oxidative stress and induces apoptosis in the cells in an autocrine fashion. To investigate the role of ORAIP in diabetic retinopathy (DR), we analyzed the concentrations and expression of ORAIP in the vitreous body and their relationship with the extent of proliferative diabetic retinopathy (PDR).

**Methods:** We studied 40 eyes from 11 patients with Non-PDR (NPDR) and 28 patients with PDR for vitreous body concentrations of ORAIP, vascular endothelial growth factor (VEGF), monocyte chemotactic protein-1 (MCP-1), interleukin-6 (IL-6), and interleukin-8 (IL-8) by enzyme-linked immunosorbent assay (ELISA). We also analyzed the expression of ORAIP in the vitreous body residues from these patients by immunofluorescent staining. Also, proliferative tissue residues were immunostained for ORAIP.

**Results:** Vitreous body concentrations of ORAIP were significantly ( $P = 0.0433$ ) higher [ $52.26 \pm 46.74$  (mean  $\pm$  SD) ng/mL,  $n = 29$ ] in the PDR group than those [ $28.21 \pm 24.21$  ng/mL,  $n = 11$ ] in the NPDR group. However, there were no significant correlations between those of ORAIP and VEGF, IL-6, MCP-1, IL-8. There was a clear expression of ORAIP in the vitreous body residues from most patients in the PDR group, whereas only weak or almost no expression of ORAIP was seen in the NPDR group.

**Conclusions:** These findings strongly suggest that ORAIP plays at least in part a role in oxidative stress-induced retinal injury and may be a sensitive diagnostic marker as well as a potential therapeutic target for oxidative stress-induced cytotoxicity.

### Evaluation of Choroidal Neovascularization Before and After Anti-VEGF Therapy Using OCT Angiography

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**Purpose:** To analyze choroidal neovascularization (CNV) using optical coherence tomography (OCT) angiography, and to study structural features of CNV sequentially after anti-vascular endothelial growth factor (VEGF) therapy.

**Methods:** Macular OCT angiography images were acquired using the RTVue XR Avanti with AngioVue. Distinct morphologic patterns and quantifiable features of neovascular membranes were studied at baseline and follow-up.

**Results:** A total of 21 eyes of 21 patients were included. 15 eyes (71%) were identified as type 1 CNV, 5 eyes as Type 2 CNV, and 1 eye as Type 3 CNV. In 17 eyes, a highly organized vascular complex could be identified. A large main central vessel trunk/feeder vessel could be seen in 76% (13 eyes) of these eyes, with vessels radiating in a branching pattern either in all directions from the center of the lesion ("medusa" pattern), or from one side of the lesion ("seafan" pattern). 19% (4 eyes) had an "indistinct" vascular pattern. Of the 15 eyes with follow-up OCT angiography, the lesion area changed marginally, but vessel density decreased after anti-VEGF therapy, indicating a more mature longstanding neovascular complex resistant to anti-VEGF therapy.

**Conclusions:** OCT angiography is a noninvasive imaging modality which provides a unique opportunity to study the morphology of neovascular membranes and allows precise structural and vascular assessment. We identified a large mature neovascular complex in approximately 81% of eyes. OCT angiography may help to define a correlation between a particular vascular pattern and response to treatment and may contribute to the development of improved therapies.

### Functional and Anatomical Effect of Intravitreal Dexamethasone Implant in Treatment of Refractory Cystoid Macular Edema Secondary to Retinal Vein Occlusion

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**Purpose:** To determine functional and anatomical efficacy of intravitreal (IV) dexamethasone implant (Ozurdex) in patients with refractory CMO secondary to RVO.

**Methods:** The prospective interventional case series included 10 eyes with patients suffering from diabetes and hypertension for more than 10 years, and all were diagnosed cases of RVO. All the patients underwent treatment of a minimum of 5 doses of IV bevacizumab injection due to CMO secondary to RVO. As the CMO was refractory, a single dose of 0.7 mg IV Ozurdex implant was administered. Preoperative, 1 month postoperative, and 6 months postoperative best corrected visual acuity (BCVA) and optical coherence tomography (OCT) macula were measured.

**Results:** The mean age was  $64 \pm 2$  years. The average preoperative BCVA in affected eyes and normal eyes in logMAR chart were  $1 \pm 0.2$  (6/60) and 0 (6/9) respectively. The postoperative BCVA in affected

eyes after 1 month were  $0.48 \pm 0.2$  (6 /18), and after 6 months were  $0.30 \pm 0.2$  (6/12). The average preoperative central macular thickness (CMT) at baseline was  $515.5 \pm 160.05 \mu\text{m}$ . The 1 month postoperative CMT were  $460.77 \pm 144.28$ , and after 6 months were  $322.16 \pm 107.78 \mu\text{m}$ . The efficacy of dexamethasone implant in refractory CMO is significant ( $P < 0.05$ ) and CMT is significantly decreased ( $P < 0.05$ ).

**Conclusions:** The functional and anatomical efficacy of single dose dexamethasone implant is significant in patients with refractory CMO secondary to RVO as the final BCVA in improved and CMT is reduced significantly.

### Incidence of Endophthalmitis Following Intravitreal Injections

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**Purpose:** To study the incidence of endophthalmitis following intravitreal anti-VEGF injections given under aseptic conditions.

**Methods:** Retrospective analysis of 228 eyes treated with intravitreal anti-VEGF injections under aseptic conditions from January 2017 to January 2018 at Lions Club of Hyderabad, Sadhuram Eye Hospital. These eyes were treated for different causes (diabetic macular edema, CNVM, and retinal vein occlusion). Patients were evaluated prior to injection for blood sugar, anterior segment for any evidence of infection, and the lacrimal sac for regurgitation. Injection is given under strict aseptic conditions. Patients were followed for at least 6 months. At each visit patient data included BCVA, IOP, anterior segment for cells and flare, and the posterior segment for vitreous cells and exudates. Endophthalmitis was defined as the presence of severe inflammation in both anterior and posterior segments associated with pain and loss of vision.

**Results:** Total of 228 eyes received intravitreal injections. Of these, 149 DME, 42 RVO, 37 CNVM cases. Post injection, topical antibiotics were prescribed. No signs of endophthalmitis were observed in any case following intravitreal injections. Overall endophthalmitis rate was 0%.

**Conclusions:** Intravitreal injection when given under aseptic conditions, with proper evaluation prior to injection and antibiotic prophylaxis after injection, will reduce the incidence of endophthalmitis to almost zero.

### Intravitreal Triamcinolone Acetonide Efficacy After Failed Bevacizumab Injection to Treat Macular Edema in Ischemic Central Retinal Vein Occlusion: A Case Report

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**Purpose:** To report the effectiveness of Intravitreal Triamcinolone Acetonide (IVTA) to treat unimproved macular edema after Bevacizumab injection in ischemic Central Retinal Vein Occlusion (CRVO).

**Methods:** A 48-year-old man complained of sudden blurry vision on his left eye 7 days prior to hospital admittance. Best corrected visual acuity on right eye was 6/6 and 1/60 on the left eye. There was thickening on left eye macula found on optical coherence tomography examination ( $639 \mu\text{m}$ ), with loss of optic nerve border and vast sub-retinal bleeding. The patient was then treated with panretinal photocoagulation laser and planned to be injected with series of Bevacizumab. After 2nd injection in 2-month interval of Bevacizumab, there was no significant improvement in patient's visual acuity and macular thickness ( $466 \mu\text{m}$ ). Thus, the patient planned to take IVTA treatment to treat the condition.

**Results:** Reassessment after IVTA administration was performed with significant improvement on patient's visual acuity and reduced macular thickness. On 1-month follow-up period, the patient's left eye visual acuity was improved to 6/45 with 6/24 on pinhole and macular thickness was reduced ( $346 \mu\text{m}$ ) with controlled intraocular pressure. No sign of visual problem recurrence.

**Conclusions:** With the current widespread use of anti-vascular endothelial growth factor (anti-VEGF) and diminishing role of corticosteroid in the treatment of CRVO, it is important to consider the usage of corticosteroid as it still proves to be effective. As in some cases, corticosteroid usage, as a single therapy or in combination with anti-VEGF, can improve the patient's condition in terms of visual acuity and reducing macular edema.

### Long-Term Results of Anti-VEGF Therapy for Retinal Angiomatous Proliferation in Japanese Patients

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**Purpose:** To evaluate the results of anti-vascular endothelial growth factor (VEGF) therapy for Japanese patients with retinal angiomatous proliferation (RAP) over 2 years.

**Methods:** To evaluate the results of anti-vascular endothelial growth factor (VEGF) therapy for Japanese patients with retinal angiomatous proliferation (RAP).

**Results:** The mean follow-up was 46.9 months. The initial treatment was performed with combination therapy of intravitreal anti-VEGF drug injections and photodynamic therapy (PDT) in 17 eyes (mean of 1.7 PDTs and 6.2 injections) and anti-VEGF monotherapy in 8 eyes (mean of 6.2 injections). The mean logarithm of the minimum angle of resolution best corrected visual acuity (BCVA) levels declined from 0.65 at baseline to 0.81 at month 24 ( $P = 0.052$ ), 0.93 at month 36 ( $P < 0.01$ ), and 0.93 at final visit ( $P < 0.01$ ), respectively. The mean change of BCVA at final visit was a decline of 3.20 lines, which was related on the presence of retinal pigment epithelium (RPE) atrophy ( $P = 0.023$ ). There was no correlation to the number of PDTs ( $P = 0.80$ ) or injections ( $P = 0.38$ ) and the presence of PEDs ( $P = 0.76$ ). The presence of RPE atrophy was significantly related on follow-up periods ( $P < 0.05$ ), and showing less tendency using ranibizumab ( $P = 0.073$ ). No severe general adverse events were seen.

**Conclusions:** Anti-VEGF therapy for RAP showed decline of VA due to the presence of RPE atrophy for long-term follow up. It is important to comprehend predictive factors for incidence of RPE atrophy. We should need individual treatment for patients with RAP.

### Multimodal Imaging Findings in a Patient with Venous Stasis Retinopathy Caused by Carotid Artery Occlusion: A Case Report

*First Author: Shu-Chun KUO*

*Co-Author(s): Heng-Chiao HUANG*

**Purpose:** To present the clinical ophthalmic and multimodal image findings of a carotid artery occlusion case who presented with CRVO-like retinal dot-and-blot hemorrhage and iritis initially.

**Methods:** A case report.

**Results:** A 73-year-old man complained of blurred vision in his right eye after an uneventful cataract surgery. On examination, best corrected visual acuity (BCVA) was 20/40 in his right eye and 20/20 in the left. Anterior chamber (AC) reaction was cells 3+ with dot-and-blot hemorrhage in fundus OD. Fluorescein angiography showed flower petal-like staining at macula, delayed A, A-V phase and peripheral vessels late leakage but no obvious capillary non-perfusion. Oral and topical steroid was given. 3 months later, BCVA decreased to 20/200 in his right eye. Rubeosis iridis, neovessels and blood clot in angle and persistent AC cells (3+) were found. The dot-and-blot hemorrhage increased but no typical retinal vein or artery occlusion was noted. The neovascularization regressed after intravitreal injection of bevacizumab. Carotid doppler revealed atheromatous plaque at right carotid bulb with over 50% lumen stenosis and reverse flow in ophthalmic artery. Carotid occlusive disease combined with venous stasis retinopathy was diagnosed.

**Conclusions:** Carotid artery disease may produce ocular ischemic syndrome or venous stasis retinopathy.

The patient may have transient or persistent blurred vision. Dot-and-blot retinal hemorrhages characterize early ocular ischemia. Anterior segment changes may be easily confused with intraocular inflammation. We reported a patient with carotid occlusion disease that presented with signs of uveitis and mild CRVO-like fundus appearance initially. Multimodal image provides more information to diagnose and to initiate the remedy.

### Ocular Ischemia and Beyond: Ocular Ischemic Syndrome

*First Author: Juhy CHERIAN*

*Co-Author(s): Hannah PRASANTH, Elfride SANJANA*

**Purpose:** To present a case of ocular ischemic syndrome.

**Methods:** A 57-year-old male presented with gradual painless vision loss in the right eye for 3 years. There was no history of ocular trauma, ocular surgery, or systemic diseases, including hypertension or diabetes mellitus. Ocular examination of right eye revealed best corrected visual acuity (BCVA) of 1/60 and intraocular pressure of 14 mm Hg. Slit lamp examination of anterior segment showed 5 noncontiguous clock hours of iris neovascularization near the collarette. RE pupil was 6 mm dilated, and direct and consensual light reflexes were absent. No lens changes were noted. Anterior chamber appeared shallow with Van Herricks grade 1. On gonioscopy, 360 degree peripheral anterior synechiae with no angle neovascularization. Fundus examination showed cup-disc ratio of 0.5 with optociliary shunt in the nasal quadrant. Few dot and blot hemorrhages were present around the disc. Macula was featureless with no foveal reflex. BCVA in the left eye was 6/9. Anterior segment and fundus examination of the left eye was unremarkable.

**Results:** OCT macula of right eye showed loss of normal foveal contour with thinning of macula (272  $\mu$ m) in the right eye compared to the left eye (326  $\mu$ m). Fundus fluorescein angiography showed delayed choroidal filling time and prolonged arteriovenous transit time. Patient was referred to cardiology for cardiac evaluation and carotid doppler.

**Conclusions:** While there are different causes of rubeosis iridis, it has an incidence of 66% in ocular ischemic syndrome. Prompt diagnosis of this condition and timely referral to the concerned specialties may be life-saving for the patient.

### Preoperative Timing of Intravitreal Bevacizumab Injection for Proliferative Diabetic Retinopathy Patients

*First Author: Jing FENG*

*Co-Author(s): Yanrong JIANG*

**Purpose:** To evaluate the changes in aqueous concentrations of inflammatory cytokines and fibrosis-

related factors, and to detect the expression of vascular endothelial growth factor (VEGF) and proliferating cells in fibrovascular membranes (FVMs) of patients with proliferative diabetic retinopathy (PDR) after intravitreal injection of bevacizumab (IVB).

**Methods:** Forty-two eyes of 42 patients with PDR, including 28 eyes that received an IVB (1.25 mg) 2 days, 5 days, and 14 days before pars plana vitrectomy (PPV), and 14 eyes without IVB were enrolled, in addition to 10 eyes of 10 patients with nondiabetic ocular diseases. Aqueous concentrations of inflammatory cytokines and fibrosis-related factors were analyzed by a multiplex bead assay. Fluorescence immunostaining was performed to examine the expressions of VEGF and proliferating cells in the excised epiretinal membranes.

**Results:** PDR eyes without IVB had the highest vitreous VEGF levels, and the level was statistically significant as compared with that of PDR eyes that received IVB 2 days before surgery, PDR eyes that received IVB 5 days before surgery, and nondiabetic eyes ( $P = 0.011$ ,  $P = 0.012$ , and  $P < 0.001$ , respectively). The expression of fibroblastic cells and connective tissue growth factor (CTGF) increased in epiretinal FVMs of the IVB group 21 days after treatment.

**Conclusions:** IVB injection may lead to a decrease in the intraocular concentrations of VEGF after 2-5 days and induce the formation of proliferation after 21 days, which suggests that the PPV in PDR patients should take place within 1 week of the administration of preoperative IVB.

### Retinal Vein Occlusions Treated with Biosimilar (Razumab)

*First Author: Umesh BHAMMARKAR*

*Co-Author(s): M ATTEQURRAHMAN, Archana JANGA, Sarika PANDYA*

**Purpose:** To study the clinical safety and efficacy of Razumab for the treatment of macular edema secondary to retinal vein occlusions (RVOs).

**Methods:** Retrospective analysis of 18 eyes with Retinal vein occlusions (RVOs) treated with Razumab with at least 6 months follow-up time. Macular edema was diagnosed by clinical examination, Fundus photo and cirrus optical coherence tomography. Patients' data were collected and included details best corrected visual acuity (BCVA) by Snellen chart and OCT at baseline and on each visit during follow-up. Number of injections and potential complications were recorded. Outcome measures were safety parameters that included signs of clinical ocular toxicity and changes in best-corrected visual acuity (BCVA) and central macular thickness (CMT) on OCT, respectively.

**Results:** All patients received biosimilar Razumab for macular edema secondary to RVO between January 2018 and August 2018. Mean pre-treatment BCVA was 5/60 to 6/24, and post-injection BCVA at day 30 was

6/24 to 6/9 with reducing central macular thickness on OCT. No serious drug-related ocular or systemic adverse events were identified.

**Conclusions:** The biosimilar ranibizumab macular edema secondary to RVO was well tolerated with improvements in BCVA and CMT without any detectable ocular and systemic toxicity. These short-term results suggest that biosimilar ranibizumab could become a safe, low-cost therapy for macular edema. Further studies are needed to determine safety, efficacy, and side effects.

### Role of Oral Rifampicin in Chronic Central Serous Chorioretinopathy

*First Author: Pir Salim MAHAR*

**Purpose:** To determine the improvement in visual acuity and central macular thickness in patients with chronic central serous chorioretinopathy (CSCR) with oral Rifampicin.

**Methods:** Ten eyes of 10 patients having chronic CSCR of more than 6 months duration were prospectively treated with oral Rifampicin 450 mg in single oral dose for 3 months duration. All patients were followed up for 12 months.

**Results:** Ten eyes of 10 patients were included in the study. The gender distribution showed 8 male (80%) and 2 female (20%) patients. There were 5 right and 5 left eyes. Mean age of our patients was  $40.10 \pm 5.1$  years (range 34-46 years). Mean duration of patient's ocular symptoms was  $9.4 \pm 2.9$  months with a range of 6-14 months. Patient's visual acuity improved at 3 months follow-up. Mean preoperative central macular thickness was  $350 \pm 82.3 \mu\text{m}$  improving to  $232 \pm 54.3 \mu\text{m}$  at 3 months treatment.

**Conclusions:** All patients with chronic CSCR of more than 6 months duration showed improvement in their vision and central macular thickness with oral Rifampicin taken for 3 months.

### SD-OCT in Vogt-Koyanagi-Harada Syndrome

*First Author: Yoshita BHAWSINKA*

*Co-Author(s): Devanshi DESAI, Manmath DAS*

**Purpose:** To report SD-OCT findings in a case of Acute Vogt-Koyanagi-Harada (VKH) syndrome.

**Methods:** SD-OCT was performed on a case of Acute Vogt-Koyanagi-Harada (VKH) syndrome. Both 5-line HD raster scan and single macular scan were done in both eyes. The following parameters were studied: retinal pigment epithelium (RPE) integrity and regularity, thickness of outer retina as well as inner retina, and vitreomacular interface. RPE undulation index and the choroidal thickness was measured using enhanced depth imaging (EDI) method in SD-OCT.

**Results:** SD-OCT findings in the case of Acute Vogt-

Koyanagi-Harada (VKH) syndrome – RPE was found to be intact with no pigment epithelial detachment. Multiple pockets of subretinal fluid with multiple subretinal septa were seen. Internal limiting membrane shows irregularities giving it a bumpy pattern which is characteristic of VKH. Subretinal deposits of fibrin were seen. Inner retina appears thickened, and vitreomacular interface was found to be normal. RPE undulation index was found to be raised, as well as mean choroidal thickness was found to be increased.

**Conclusions:** SD-OCT is a very good diagnostic tool to differentiate Vogt-Koyanagi-Harada (VKH) syndrome from other causes of exudative retinal detachment. Hence, knowing differentiating features of VKH on SD-OCT is important in decision-making and arriving at a specific diagnosis.

### Spontaneous Reabsorption of Macular Subhyaloid Hemorrhage

*First Author: Andi VICTOR*

**Purpose:** To demonstrate the spontaneous reabsorption of macular subhyaloid hemorrhage occurring in patient without any pre-existing risk factors.

**Methods:** A case report of macular subhyaloid hemorrhage patient who came to Vitreo-retina Clinic in Cipto Mangunkusumo Hospital on March 2018. A 34-year-old man with chief complaint of sudden visual loss of the left eye since 10 days prior to hospital admission. History of hypertension and diabetes were denied. Eye examination revealed a best corrected visual acuity (BCVA) of 6/6 for the right eye and 2/60 for the left eye. Anterior segment examination of the eye was unremarkable. On funduscopy examination, the left posterior segment showed a “dome shape” hemorrhage in the macular area.

**Results:** Conservative treatment with head positioned 30 degree during sleep was chosen and observation was done in regular monthly visit. Patient’s posterior segment was observed using color fundus photography and optical coherence tomography (OCT). There was gradual resolution of the hemorrhage within 2 months of observation. Patient’s BCVA was also improved into 6/6 on both eyes. Patient’s funduscopy and OCT also showed a complete resolution of the blood.

**Conclusions:** Macular subhyaloid hemorrhage could be self-absorbing, but the time needed depends on the amount of blood. Various treatment options for macular subhyaloid hemorrhage allow comprehensive management. The benefit of macular subhyaloid hemorrhage therapy should outweigh the complications caused by the invasive procedure.

### Spontaneous Subhyaloid Hemorrhage in Pregnancy: Report of a Rare Case

*First Author: Werlinson TOBING*

*Co-Author(s): Vela AMALTHEA, Ernes SURYAWIJAYA*

**Purpose:** To present a rare unilateral subhyaloid hemorrhage in pregnancy.

**Methods:** A 33-year-old pregnant woman in 27 weeks of gestation came with a sudden scotoma on her left eye in the last 6 hours. No history of forcible exhalation, trauma, or coitus within 48 hours. Blood pressure was 120/80 mm Hg. The visual acuity of the right eye 20/20 and the left eye 20/200. Fundus revealed subhyaloid hemorrhage in the left eye that covered the macula. Other eye examination and hematology examination were within normal limit. The patient then underwent Nd:YAG hyaloidotomy and the visual acuity became 20/25 on the left eye.

**Results:** There were 9 case reports of subhyaloid hemorrhages in pregnancy since 2000, and some cases were caused by pregnancy-induced hypertension (11,11%), vasalva retinopathy (77,77%), and Terson’s syndrome (11,11%). In this case, the possible cause is probable valsalva maneuver due to normal hematology result. With Nd:YAG laser hyaloidotomy, the patient visual acuity increased from 20/200 and became 20/25. The other study in 2014 with the Nd:YAG laser showed the visual acuity was significantly increased from 1/300-1/60 to 6/6-6/60. In this case, there were no complications. The patient was decided to have caesarian surgery to prevent valsalva maneuver.

**Conclusions:** Subhyaloid hemorrhage in pregnancy is a rare case but could cause visual acuity deterioration. Valsalva maneuver is the leading cause, although sometimes the history is not clear such as in this case. The treatment with Nd:YAG hyaloidotomy gave significant improvement in visual acuity, especially if performed as early as possible.

### Streptococcus pyogenes-Related Endogenous Endophthalmitis: A Case Report

*First Author: Krystine Colette JAMORA*

**Purpose:** To describe an atypical presentation of endophthalmitis.

**Methods:** Descriptive case report.

**Results:** A healthy adult female with sudden blurring of vision, a left eye with redness and pain, without extraocular limitation, and no history of trauma. The right eye was essentially normal. The left eye’s visual acuity (VA) is 20/200 with swollen lids, no eyelash matting, ciliary injection, grade 3 corneal edema, Descemet’s folds, and no view for gonioscopy and fundus. Intraocular pressure (IOP) is 42 mm Hg. She was given anti-glaucoma medications. Repeat IOP is 38 mm Hg. On follow-up, left eye VA is counting fingers at 3 feet. Diffuse anterior chamber infiltrates

were noted peripherally. Blood culture and corneal scraping were done. B-scan was normal. Topical antibiotics were started. On follow-up, VA was hand movement, increased periorbital swelling, chemosis, and limited extraocular movement. Repeat B-scan showed vitreous opacities and choroidal thickening suggestive of endophthalmitis. She was admitted for intravenous administration of antibiotics. Topical fortified vancomycin and amikacin were added. Beginning corneal thinning was noted inferiorly with a negative Seidel's test. After 4 hours, spontaneous corneal perforation noted from 3 to 9 o'clock. She had coughing episode resulting in lens expulsion with vitreous material. Left eye had no light perception, hence an enucleation was performed. Blood culture revealed *Streptococcus pyogenes*, no growth for corneal scrapings, and whole abdomen ultrasound revealed cholelithiasis. A furuncle was noted at the scalp. The patient responded well with intravenous antibiotics. Histopathology of the left eye revealed a retinal detachment with no microorganism seen microscopically.

**Conclusions:** Prompt diagnosis is necessary to prevent devastating complications.

### Subconjunctival Dexamethasone Implant Accidental Migration: Case Report

*First Author: Umesh BHAMMARKAR*

**Purpose:** To report a case of subconjunctival dexamethasone implant accidental migration given for macular edema.

**Methods:** A 46-year-old male, a known case of diabetic for 8 years, with moderate NPDR with DME in left eye received ozurdex implant in other hospital. He presented with redness and swelling over conjunctiva. On examination in anterior segment, there was ozudex implant which might not be gone inside due to incorrect method of giving implant without sufficient training. Intraocular pressure (IOP) was normal. Post segment suggestive of DME.

**Results:** After 7 days, 1 month, and 2 months, the implant seemed to fragment, reducing progressively its dimensions and was no longer detectable after 2 months. After 2 months, IOP was quite normal without any glaucoma medication.

**Conclusions:** Subconjunctival dexamethasone implant accidental migration can occur as wired complication if not given with sufficient training. Disintegration of implant takes 2 to 3 months without creating much complication. Meticulous follow-up is important to monitor the progress and IOP.

### Tachyphylaxis After Intravitreal Bevacizumab Treatment

*First Author: Jiyeon KIM*

**Purpose:** To report the outcomes of 2 patients who

developed tachyphylaxis to intravitreal bevacizumab treatment in 1 eye and required another agent to treat the exudative age-related macular degeneration while the fellow eye continued to respond well to bevacizumab treatment.

**Methods:** Four eyes of 2 patients were recruited for this case series. Retrospective data collection was performed, mainly through clinical notes, macular OCT and fundal photos. Two patients were given multiple intravitreal bevacizumab injection therapy to 1 eye each to treat for exudative age-related macular degeneration. They initially responded well but later developed tachyphylaxis and thus required another agent (aflibercept in one, ranibizumab in another). Both patients later developed exudative age-related macular degeneration in the fellow eye and therefore have been treated with intravitreal bevacizumab injections.

**Results:** The Fellow eyes showed excellent response with resolution of macular edema and improved best corrected vision (BCVA).

**Conclusions:** Despite developing tachyphylaxis to intravitreal bevacizumab treatment in 1 eye, this does not preclude the responsiveness of the fellow eye. A possible hypothesis for this finding is ocular immune privilege phenomenon.

### The Association of Body Mass Index with Age-Related Macular Degeneration in Yogyakarta, Indonesia

*First Author: Supanji SUPANJI*

*Co-Author(s): Angela AGNI, Muhammad SASONGKO, Dian Caturini SULISTYONINGRUM, Firman WARDHANA, Tri Wahyu WIDAYANTI*

**Purpose:** The objective of the study was to investigate and to quantify the relationship between Body Mass Index (BMI) and Age-Related Macular Degeneration (AMD) risk in Yogyakarta, Indonesia.

**Methods:** This study was a case-control study. 52 AMD patients and 51 non-AMD patients were recruited for nutrition status assessment using dietary intake assessment. The assessment used food recall and semi-quantitative food frequency questionnaires (SQ-FFQ). The study was conducted from January to December 2017 in Yogyakarta, Indonesia. This study used Stata software to determine the relationship between BMI and AMD.

**Results:** There were 103 participants; 52 participants of which were AMD patients and the rest were in the control group. There was no significant difference in body mass index (BMI) between AMD patients and controls (23.65 vs 22.28 kg/m<sup>2</sup>, P = 0.108), but the average body weight among AMD patients was significantly heavier than the control group (58.62 vs 53.66 kg, P = 0.036). There was also no significant difference between systolic blood pressure (SBP)

between AMD patients and control group (136 vs 140 mm Hg,  $P = 0.298$ ), but there was a significant difference in diastolic blood pressure (DBP) between AMD patients and control group (78 vs 86 mm Hg,  $P = 0.004$ ).

**Conclusions:** Among the patients, there was no significant difference in BMI between AMD patients and control group. However, body weight is a probable risk factor for AMD cases in Indonesia. Based on recent study, higher body weight shows more AMD cases; however, it needs further investigation with other risk factors. In this research, SBP was not significant but DBP was significantly associated to AMD.

### Unusual Retinal Presentation in a Young Adult with Progeria

*First Author: Krishnima RAGHU*

*Co-Author(s): Debolina DEB, Mary Santhosh JOSEPH, Ansu JOHN, Meera MOHANAKUMAR, Priyadharshini PALANIYAPPAN*

**Purpose:** To report a case of Empty Sella syndrome with long-standing papilledema and superadded grade IV hypertensive retinopathy in a young male adult with progeria.

**Methods:** A case report. A 22-year-old male, suspected case of progeria was referred to us in view of elevated blood pressure 190/120 mm Hg, with complaints of headache, vomiting, and blurring of vision for 2 weeks. Patient was previously diagnosed as a case of Empty Sella Syndrome with bilateral papilledema at the age of 4 years. Systemic examination revealed short stature, craniosynostosis, beaked nose, crowded teeth, high arched palate, and micrognathia. Visual acuity was counting fingers at 1 meter with no pinhole improvement, <N36 in the right eye and 6/60 with pinhole 6/36, N24 in the left eye. Refraction showed high hypermetropic status of +9D in the right and +7D in the left eye. Ocular examination revealed pseudoproptosis, with sluggish pupillary reaction bilaterally. Fundus examination showed Grade IV hypertensive retinopathy. Lab investigations showed elevated renal function tests and suggested acute over chronic kidney disease.

**Results:** Defective vision was attributed to macular edema as a part of Grade IV hypertensive retinopathy. Also, there was no evidence of optic atrophy in spite of long-standing papilledema.

**Conclusions:** Grade 4 Hypertensive retinopathy and long-standing papilledema, not culminating in optic atrophy, is a rare fundus feature in patients with progeria. This case is being reported to highlight the rare fundus presentation that can occur in young adults with progeria syndrome.

### Usual Presentation of Unusual Scenario: Angiod Streaks: A Case Report

*First Author: Irum RAZA*

**Purpose:** To establish the importance of systemic workup in patients of angiod streaks.

**Methods:** A 20-year-old female presented with dimness of vision in left eye for 1.5 years. She had 3 intravitreal injections of anti-vascular endothelial growth factors. A thorough ocular and systemic history was taken, along with a detailed examination. Previous ocular investigations were studied. A fresh optical coherence tomography (OCT) and fundus fluorescein angiography (FFA) were done. She was also referred to a general physician, dermatologist, and plastic surgeon.

**Results:** Patient's fundus showed angiod streaks in both eyes along with choroidal neovascularization (CNV) in left eye. Retinal pigment epithelial mottling and caveat signs were clearly visible. FFA showed late phase hyperfluorescence due to staining. OCT showed quiescent CNV. She had plucked chicken appearance of neck skin and hyperelasticity, giving strong suspicion of pseudoxanthoma elasticum (PXE), the most common association of angiod streaks. Skin biopsy showed calcium deposition and fragmented, clumped elastic fibers, confirming diagnosis of PXE. General physician also labelled her as a case of Gronblad-Strandberg syndrome, involving skin, eye, and gastrointestinal systems.

**Conclusions:** This case report strongly stresses upon the systemic evaluation of ocular presentations where a clear-cut systemic cause has been found in literature.

### Visual Acuity and Central Macular Thickness Outcome in Intravitreal Bevacizumab Treated Neovascular Age-Related Macular Degeneration Patients with Subretinal Fluid Compared to Those with Intraretinal Fluid

*First Author: Novia RAHAYU*

*Co-Author(s): Elvioza ELVIOZA, Aria KEKALIH*

**Purpose:** To compare visual acuity (VA) and central macular thickness (CMT) outcome of loading dose intravitreal bevacizumab treatment between neovascular AMD patients with character of predominant subretinal and intraretinal fluid.

**Methods:** Prospective study of loading dose intravitreal bevacizumab treated age-related macular degeneration, which has a baseline macular morphology of subretinal or intraretinal fluid. VA, CMT, and their changes were evaluated during and after loading dose was completed.

**Results:** Thirty-eight eyes (38 patients, mean age 66,95 years) were enrolled. Twenty eyes were in subretinal fluid group (SRF group) and 18 were in the intraretinal fluid (IRF) group. Mean VA at baseline eventually was significantly different, where SRF group (56,41

letters) were better than IRF group (43,72 letters). No statistically significant difference of mean VA gain or CMT reduction between groups, however. VA in SRF group remained higher, and CMT in SRF group was lower than IRF group. Subanalysis of other macular morphology showed that presence of subretinal hyperreflectivity material (SRHM) significantly related to lower VA outcomes in both groups.

**Conclusions:** Neovascular AMD, with both SRF and IRF at baseline, benefits from loading dose intravitreal bevacizumab treatment, although mean visual acuity and mean central retinal thickness are better in those with SRF.

### Whole-Exome Sequencing Analysis Identifies the Causative Genes in Retinitis Pigmentosa: Case Series in the Thai Population

*First Author:* Juthaporn **ASSAWACHANANON**

*Co-Author(s):* Pear **PONGSACHAREONNONT**, Vorasak **SHOTELERSUK**, Chalurmporn **SRICHOMTHONG**, Kanya **SUPHAPEETIPORN**

**Purpose:** To report phenotype and genotype and to identify novel loci or variant mutation of Retinitis Pigmentosa (RP) among Thai population.

**Methods:** We included 16 RP families at King Chulalongkorn Memorial Hospital. We collected patients' clinical data and examinations. DNA samples from patients' blood were analyzed for causative genes by Whole Exome Sequencing (WES). A total of 295 of identified RP and RP-related genes were used for screening to identify causative genes.

**Results:** We report a case series of clinical data and disease causative genes in 16 Thai RP families. 16 RP families included 4 Familial RP and 12 sporadic RP. We identified 1 known homozygous missense mutation in EYS gene in 1 familial RP. We identified 8 new variants of compound heterozygous mutation in 4 sporadic families including 4 missense substitutions, 2 nonsense mutations, 1 frameshift, and 1 splice site change in PLPNA6, CNGB1, RLBP1, and USH2A. Two families were reported syndromic RP of Boucher-Neuhauser and Usher syndrome.

**Conclusions:** In our series, it is challenging to identify causative genes in sporadic cases, which is most of the RP patient cases. Here we reported 1 known mutation in EYS genes in 1 familial RP family and 8 novel variants in PLPNA6, CNGB1, RLBP1, and USH2A in sporadic RP families.

## Retina (Surgical)

### 23-Gauge Buffered Saline Solution Flow of Dual-Pneumatic 10,000 cpm Vitrectomy Probes

*First Author:* Ishaq **MOHAMEDY**

*Co-Author(s):* Dina Joy **ABULON**, Helaine **GARIEPY**

**Purpose:** To characterize buffered saline solution (BSS) aspiration flow of 23-gauge dual-pneumatic 10,000 cut-per-minute (cpm) vitrectomy probes at various vitrectomy system settings, and to compare flow performance at maximum cut rate (10,000 cpm) with the flow of previous dual-pneumatic vitrectomy probes at maximum cut rate of 7500 cpm.

**Methods:** BSS aspiration flow rates from an open beaker through 23-gauge Advanced UltraVit and UltraVit vitrectomy probes were determined by measuring change in weight with a precision balance. Cut rates of 500, 2500, 5000, 7500, and 10,000 cpm and all 3 duty cycle modes (ie, Core, 50/50, and Shave) were tested, with each combination tested at least 3 times and averaged. BSS flow was compared at maximum cut rates for the Advanced UltraVit (10,000 cpm) and UltraVit (7500 cpm) vitrectomy probes.

**Results:** At these cut rates, the Core duty cycle generated the highest ( $9.65 \pm 0.15 - 17.77 \pm 0.34$  cc/min) and the Shave duty cycle generated the lowest ( $5.54 \pm 0.36 - 9.24 \pm 0.22$  cc/min) BSS flow, with the 50% duty cycle being intermediate ( $9.69 \pm 0.25 - 11.77 \pm 0.23$  cc/min). At maximum cut rates, the 10,000 cpm probes generated 77 – 80% higher BSS flow than the 7500 cpm probes in all 3 duty cycle modes ( $4.01 - 4.23$  cc/min,  $P < 0.05$  each).

**Conclusions:** The 23-gauge dual-pneumatic probes, operating at a maximum cut rate of 10,000 cpm, generated significantly greater BSS aspiration than previous generation probes operating at 7500 cpm. BSS aspiration of dual-pneumatic probes is optimized at maximum cut rate, suggesting that these probes may provide greater surgical efficiency than previous generation probes.

### 27-Gauge Vitrectomy and Adjunctive Intravitreal Conbercept in the Management of Proliferative Diabetic Retinopathy

*First Author:* Dong **FANG**

*Co-Author(s):* Yantao **WEI**, Shaochong **ZHANG**

**Purpose:** To compare the efficiency and safety of 27-gauge (G) pars plana vitrectomy (PPV) with 25G PPV and evaluate the efficacy of preoperative intravitreal injection of Conbercept for the treatment of proliferative diabetic retinopathy (PDR).

**Methods:** Retrospective, interventional, and comparative case series. Forty-eight eyes of 48 patients

were included in this study. All eyes underwent PPV with preoperative intravitreal Conbercept injection for PDR. Eyes that underwent 27G PPV (Group A, n = 23) were compared with eyes that underwent 25G PPV (Group B, n = 25). The main outcomes included operating time, suturing rate, the rate of endodiathermy use, postoperative best-corrected visual acuity (BCVA), central foveal thickness (CFT), intraocular pressure (IOP), and intraoperative and postoperative complications.

**Results:** The mean postoperative BCVA at final follow-up was significantly improved from baseline in both groups ( $P < 0.001$ ,  $P < 0.001$ ). The difference of mean visual acuity changes were not significant between 2 groups ( $P = 0.73$ ), nor do the difference of final CFT ( $P = 0.51$ ). The final IOP remained stable compared with baseline in both groups ( $P = 0.34$ ,  $P = 0.15$ ). The suturing rate significantly decreased in Group A compared with Group B ( $P = 0.036$ ). There were no significant differences between the 2 groups in the operating time, the rate of endodiathermy use, iatrogenic retinal breaks, postoperative recurrent vitreous hemorrhage ( $P = 0.18$ ,  $P = 0.54$ ,  $P = 0.21$ ,  $P = 0.53$ ).

**Conclusions:** 27-G vitrectomy was as efficient and safe as 25-G vitrectomy in the management of PDR. Preoperative intravitreal Conbercept injection helps to reduce the incidence of intraoperative and postoperative complications, which may be used as an effective pretreatment of vitrectomy for PDR.

## 27-Gauge Vitreous Traction Comparison: Dual-Cutting vs Single-Cutting Vitrectomy Probes

First Author: Dina Joy **ABULON**

Co-Author(s): Helaine **GARIEPY**

**Purpose:** To compare the vitreous traction forces of dual-cutting vitrectomy probes operating at a maximum of 20,000 cuts per minute (cpm) and of previous generation, single-cutting vitrectomy probes operating at a maximum of 10,000 cpm.

**Methods:** Traction forces were quantified during probe application to vitreous harvested from fresh porcine eyes using a cantilever beam measurement system. HyperVit 27+ and Advanced UltraVit 27+ vitrectomy probes were each tested in 30 porcine eyes at all 3 duty cycle modes (Core, 50/50, Shave). Vitreous flow tests were performed to determine vacuum settings that matched the vitreous flow rates of 20,000 cpm dual-cutting and previous generation 10,000 cpm single-cutting probes.

**Results:** When vacuum settings of 27-Gauge dual-cutting probes operating at maximum cut rate (20,000 cpm) were adjusted to 450 mm Hg vacuum to achieve vitreous flow rates similar to previous generation, 27 gauge single-cutting probes operating at 650 mm Hg vacuum and maximum cut rate (10,000 cpm), the

dual-cutting probes generated significantly less peak traction in the Core (-0.1178 mN, 50/50 (-0.0945 mN), and Shave (-0.2035 mN) duty cycle modes ( $P < 0.05$  each). At these settings for similar vitreous flow rates, the peak traction forces of dual-cutting 20,000 cpm probes were 25-41% lower than previous generation single-cutting 10,000 cpm probes.

**Conclusions:** Adjustments of vitreous flow rates of 27-gauge dual-cutting probes at maximum cut rates of 20,000 cpm to match previous generation single-cutting probes at a maximum of 10,000 cpm generates less vitreous traction and may improve surgery.

## Clinical Features and Surgical Outcomes of Pseudophakic Retinal Detachment

First Author: Ho **HAI**

**Purpose:** To describe the clinical features of pseudophakic retinal detachment (PRD) and the outcomes of surgical procedures for PRD eyes.

**Methods:** Prospective study on 91 eyes of 89 primary RD patients who had been done surgery at Vietnam National Institute of Ophthalmology from January 2011 to December 2015.

**Results:** The mean time from cataract surgery to onset of RD was  $31.0 \pm 0.6$  months. RD was usually large (total detachment was 41.7% and at 3 quadrants and more was 61.5%). Macular detachment was common: 87.9%. Most cases had one tear (75.8%). RD was usually accompanied by proliferative vitreoretinopathy (96.3%). The rate of postoperative RD was 85.7% and the rate of recurrence RD was 5.5%. The final rate of RD was 84.6%. From the mean preoperative visual acuity (VA) of  $2.1 \pm 0.64$ , the mean VA of the study group was improved to  $1.3 \pm 0.74$  at 12 months postoperatively. VA was improved in 85.7% of eyes (after 12 months, was improved from 2 or more lines in 79.6%). The most common preoperative complication was vitreous hemorrhage (8.8%). The most common of early complications was a transient rise of IOP (12.1%). The most common late postoperative complication was an epiretinal membrane (8.8%).

**Conclusions:** PRD usually with large detachment area, macular off, proliferative vitreoretinopathy. In our study, the rate of postoperative RD was 85.7%. From the mean preoperative visual acuity of  $2.1 \pm 0.64$ , the mean visual acuity of the study group was improved to  $1.3 \pm 0.74$  at 12 months postoperatively.

## Comparative Vitreous Traction of 27-Gauge High-Speed Dual-Pneumatic Vitrectomy Probes

First Author: Dina Joy **ABULON**

Co-Author(s): Helaine **GARIEPY**, Brian **MCDONELL**

**Purpose:** To compare vitreous traction forces at maximum cut rates of current high-speed dual-

pneumatic vitrectomy probes [10,000 cuts per minute (cpm)] and of previous generation vitrectomy probes (7500 cpm) using an ex-situ porcine eye model.

**Methods:** A mechanical force measurement system was developed to quantify traction forces applied to the vitreous by a vitrectomy cutter. Traction in vitreous harvested from fresh porcine eyes was measured using an ex-situ test set-up. Advanced UltraVit 27-Gauge and UltraVit vitrectomy probes were each tested in 35 porcine eyes. Peak traction forces were averaged from each test for all 3 duty cycle modes (Core, 50/50, Shave) on the CONSTELLATION Vision System. Significant differences in traction forces at maximum cut rate for each duty cycle modes were determined using unpaired t-tests with Welch's correction, with statistical significance defined as  $P < 0.05$ .

**Results:** Peak traction forces at their respective maximum cut rates were significantly lower for the current (10,000 cpm) than for the previous (7500 cpm) generation of vitrectomy probes in the Core (-0.11 mN), 50/50 (-0.17 mN), and Shave (-0.05 mN) duty cycle modes ( $P < 0.0001$  each). The peak force for all 3 duty cycle modes was 9-17% lower for the current (10,000 cpm) than the previous (7500 cpm) generation of probes.

**Conclusions:** When operating at maximum cut rate, the new 27-gauge high-speed 10,000 cpm dual-pneumatic probes may improve surgery by generating less vitreous traction than previous generation 7500 cpm probes.

### Conventional ILM Peeling vs Inverted ILM Flap for Macular Hole Surgery

*First Author: Manabjyoti BARMAN*

**Purpose:** To compare anatomical and functional outcomes after single surgery for large macular holes with 2 different surgical techniques viz Conventional ILM peeling vs Inverted ILM flap.

**Methods:** Retrospective analysis of macular hole surgery done by single surgeon on treatment-naïve patients with stage IV macular hole (diameter of  $>400 \mu\text{m}$ ) was done. Patients were randomized into 2 groups: group A: conventional internal limiting membrane peeling and group B: inverted-ILM flap technique. Study measurements included pre-and postoperative best corrected visual acuity and morphology of the hole by ED-OCT.

**Results:** Forty-one (41 no.) patients were enrolled (group A: 23, group B: 18). Mean follow-up was 8.3 months. The closure rate in group A was 91.3% and in group B was 94.4%. Visual acuity improvement was comparable in both the groups, though the inverted-flap technique induced a faster recovery. The morphology of hole closure was documented in detail in both the groups. No vision-threatening complication noted.

**Conclusions:** Large macular holes are surgical

challenges with guarded success rates. The inverted-flap technique is an alternative to conventional technique in such cases that may improve the chances of a better outcome. Though both techniques displayed a trend toward anatomical and functional success, inverted-flap technique may have an edge over the conventional technique in terms of slightly higher closure rate and faster visual recovery.

### Delayed-Onset Diplopia After Scleral Buckling Surgery with a Hydrogel Implant

*First Author: Wen-Hsin CHENG*

*Co-Author(s): Cheng-Hsien CHANG, Yu-Hung LAI*

**Purpose:** To report a case of hydrogel scleral buckle implant decades ago presented with refractory esotropia.

**Methods:** Case report.

**Results:** A 32-year-old female patient was referred for refractory esotropia OS. She received hydrogel implant (Miragel) for her scleral buckling surgery in 1994 elsewhere. She gradually developed esotropia and received multiple strabismus operations in 2008 and in 2013 by 2 ophthalmologists from other hospitals respectively. Orbital MRI showed a huge mass lesion displacing the eyeballs. The buckle implant was encapsulated, and the fibrotic capsule was incorporated with sclera and extraocular muscles. The hydrogel implant was fragile and could not be removed in a band form. We could only scoop them out fragment by fragment. We performed a repeated surgery to completely remove the implant. After the second surgery, her esotropia improved.

**Conclusions:** Long-term complications related to the hydrogel implant have been reported, and they were eventually taken off the market. However, its removal presented a technical difficulty due to its fragmentation. Any remaining pieces will continue swelling in size. Thus, complete clear-out is essential for this implant removal. Esotropia associated with these implants should not be treated with strabismus surgery until surgical removal of the implant is completed.

### Duty Cycle of 23-Gauge Dual-Pneumatic 10,000 cpm Vitrectomy Probes

*First Author: Ishaq MOHAMEDY*

*Co-Author(s): Dina Joy ABULON, Helaine GARIEPY*

**Purpose:** To examine the duty cycles of 23-Gauge dual-pneumatic 10,000 cuts per minute (cpm) vitrectomy probes as a function of cut rate and various duty cycle modes and to compare the duty cycles of 2 dual-pneumatic probe designs at their maximum cut rates of 10,000 (Advanced UltraVit) and 7500 (UltraVit) cpm.

**Methods:** The 23-Gauge vitrectomy probes were evaluated at cut rates of 500, 2500, 5000, 7500, and 10,000 cpm and in 3 duty cycle modes (Core, 50/50,

and Shave) using the CONSTELLATION Vision System. Video of the probe tip was recorded during stabilized operation. The video files were analyzed, and duty cycle was calculated as the ratio of open cycle time (OCT) to whole cycle time (WCT). OCT was defined as the time during which the cutter was >50% open, and the WCT as the duration of pme cut cycle.

**Results:** As cut rate increased from 500 to 10,000 cpm, Core duty cycle increased from 56.95 to 82.22%, Shave duty cycle from 20.27 to 56.47%, and 50% duty cycle from 51.51 to 56.76%. Comparisons of current generation 10,000 cpm probes with previous generation 7500 cpm probes at maximum cut rates showed that the former resulted in 9 to 12% increases in the Core (4.87%), 50% (5.72%), and Shave (5.95%) duty cycle modes ( $P < 0.05$  each).

**Conclusions:** The 23-Gauge dual-pneumatic probes operating at a maximum cut rate of 10,000 cpm generated significantly higher duty cycles than previous generation of probes operating at 7500 cpm. The performance of 23-Gauge vitrectomy probes appears to be optimal at 10,000 cpm.

### Efficacy of Perfluoropropane Gas (C3F8) in Proliferative Vitreoretinopathy with Inferior Breaks

*First Author: Nishant Vijay RADKE*

*Co-Author(s): Lizhen CHEN, Vivian JIANG, Zhaoxia KUANG, Snehal RADKE*

**Purpose:** To study the efficacy and outcome of endotamponade with C3F8 in inferior break retinal detachments (RD) with PVR grade B and selected grade C cases without additional encroachment or scleral buckle.

**Methods:** This is a retrospective case series of 11 eyes with inferior break RD who underwent pars plana vitrectomy (PPV) without additional buckle or encroachment. Exclusion criteria: Traumatic RD, retinal dialysis or giant retinal tears, uveitic or combined RD, retinoschisis with RD, coloboma RD, recurrent RD presenting for the first time to us, and PVR-C (Posterior) with diffuse star folds or narrow/closed funnel configurations were excluded as well. Minimum 6 months follow-up after the last successful surgery was considered necessary. 23 or 25 G PPV were done in all cases. 12-14% C3F8 gas was used as endotamponade.

**Results:** Mean age was 48.9 years. Average extent of clock hours of RD was 4.909. Average duration of RD based on history or records was 46.09 days. All cases had more than 1 break. Nine (81.81%) cases had a successful outcome in the primary surgery. Final success with rescue use of silicone oil in the 2 cases and subsequent SOR was 100%. P value for difference between BCVA pre and postoperative was statistically significant. 4 cases had 6 clock hours or more extent of RD, out of which 2 had recurrence. Cataract developed in 4 out of 5 lens sparing vitrectomies.

**Conclusions:** Gas endotamponade showed promising outcomes in inferior break RD with advanced PVR and can be used with proper case selection.

### Endoscope-Assisted 23-Gauge Vitrectomy for Repair of Retinal Detachment with Grade C Proliferative Vitreoretinopathy

*First Author: Tatsushi KAGA*

*Co-Author(s): Kazuo ICHIKAWA, Taisuke MATUDA, Hiroyuki SATO, Sho YOKOYAMA, Norihiko YOSHIDA*

**Purpose:** To present characteristics of endoscope-assisted 23G vitrectomy with subretinal endoscopic technique and atmospheric endoscopic techniques for repair of retinal detachment (RD) with grade C proliferative vitreoretinopathy (PVR).

**Methods:** The subjects were 16 cases. After removing the vitrectomy, peeling internal limiting membrane (ILM) visualized with Brilliant Blue G on the posterior retina with or without perfluoro-n-octane (PFO) were done. Subretinal membranes were peeled through subretinal cannulas (subretinal endoscopic technique). Fluid/air exchange and subretinal fluid drainage was completely done with PFO removal by changing patient's head and eye. Membranes and vitreous on the retina were peeled off or resected. Rolled and slipped retina was flattened (atmospheric endoscopic techniques). After retinal photocoagulation, silicon oil (SO) or SF6 gas was injected.

**Results:** Subretinal endoscopic technique was done in 2 cases. Atmospheric endoscopic techniques were done in all cases. Iatrogenic retinal breaks were made in all cases. The surgeries were performed without intentional retinotomy or buckling in 15 of 16 cases. Final anatomical attachment without SO was achieved in 15 of 16 cases. There was no subretinal or retained PFO in all cases. There was no recurrence more than 6 months in 15 of 16 cases. After surgery, the mean best corrected visual acuity improved from 1.63 to 0.81 logMAR ( $P = 0.0005$ ).

**Conclusions:** Endoscope assisted 23G vitrectomy, with subretinal endoscopic technique without retinotomy and atmospheric endoscopic techniques while utilized gravity, air surface tension, may reduce usage of retinotomy and buckle and complication of subretinal or retained PFO for repair of RD with grade C PVR.

### Higher Male Ratio in Rhegmatogenous Retinal Detachment: 17-Year Surgical Data in Yamanashi, Japan

*First Author: Mizuki MATSUMOTO*

*Co-Author(s): Hiroyuki IJIMA*

**Purpose:** To verify the previously reported male-dominant occurrence of rhegmatogenous retinal detachment (RRD) by statistical analysis of surgical data in Yamanashi, Japan.

**Methods:** We retrospectively studied the number of male and female patients undergoing first surgery for RRD between 2000 and 2016 in University of Yamanashi Hospital, where most patients with RRD in Yamanashi undergo surgery.

**Results:** The total number of male and female patients having undergone RRD surgery was 1,122 and 612 respectively and their male female ratio was 0.647 with 95% confidence interval (95% CI) of 0.625–0.670, which was significantly higher ( $P < 0.0001$ ) by binomial test compared with 0.490 for all residents in Yamanashi prefecture according to the 2012 national population census. In each of the 13 years except for 4 years before 2009, 95% CI of male ratio was higher than 0.490. Male ratio in each decade between 11 and 80 years of age for patients undergoing RRD surgery was significantly higher compared with that of corresponding data of residents in Yamanashi.

**Conclusions:** Based on the surgical data, RRD is more prevalent in males than in females in Yamanashi.

### Hyperacute Spontaneous Closure of a Traumatic Macular Hole in a Colobomatous Eye

*First Author: Diva MISRA*

*Co-Author(s): Manabjyoti BARMAN, Nilutparna DEORI*

**Purpose:** To report a case of hyperacute spontaneous closure of a traumatic macular hole in a colobomatous eye.

**Methods:** Case report.

**Results:** A 12-year-old boy presented to us with complaints of diminution of vision following blunt injury to his left eye (OS) for 1 day with a visual acuity (VA) of 20/20 in right eye (OD) and 20/200 in OS. Examination revealed traumatic mydriasis in OS with a clear lens. On gonioscopic examination, there was angle recession superiorly and inferiorly with hemorrhage in the schelm's canal. Fundus examination showed a grade 5 retina-choroidal coloboma in OS with hemorrhage at its inferior border. A macular hole was seen clinically which was confirmed on ocular coherence tomography (OCT). Repeat fundus examination and OCT after 10 days revealed spontaneous closure of the macular hole with improvement in the VA to 20/80. The hole remained closed on successive follow-ups.

**Conclusions:** Various studies have documented spontaneous closure of traumatic macular holes at a follow-up of 2–54 weeks. Accelerated spontaneous closure of traumatic holes, especially in young patients, should be kept in mind while advising follow-up visits. Documentation of early closure will help in allaying fears associated with such injuries.

### Internal Limiting Membrane Free Flap Transposition with Tuck Technique for Previously Failed Vitrectomy in Chronic Full Thickness Macular Hole

*First Author: Nicholas FUNG*

*Co-Author(s): Wai-Ching LAM*

**Purpose:** To assess an alternate treatment for chronic FTMH where primary surgery has failed.

**Methods:** A retrospective, interventional study conducted in a single center by a single surgeon in Hong Kong included consecutive patients with FTMH for at least 1 year and at least 1 previously failed vitrectomy with ILM peeling. A 25 Gauge vitrectomy with ILM free flap transposition was done without secondary assistance of PFCL, viscoelastic, or autologous blood. The free flap was manually tucked into the FTMH space and gas fluid exchange (20% SF6) was performed with prone posturing for 2 weeks postoperatively. Preoperative visual acuity (VA), macula hole duration, previous surgeries, Optical Coherence Tomography (OCT), appearance, and hole size were recorded. Postoperative 3 months VA, hole closure rate, and OCT appearance were also documented.

**Results:** 6 consecutive patients qualified from May 2016 to Feb 2018. 66% right eye, 66% female, with an average age of 65 years old. Transposition surgery was performed an average of 953 days (228 to 2349) after diagnosis of macula hole. Macula hole average size was 0.838 mm ( $\pm 0.5$ ), preoperative VA was logMAR 1.09 ( $\pm 0.15$ ), postoperative VA was logMAR 0.76 ( $\pm 0.29$ ) with 1.4 lines gained and a significant improvement of logMAR 0.33 ( $P = 0.0138$ ). Hole closure was seen in 5 out of 6 eyes (83.3%). The OCT with failed closure showed ILM flap within a flat hole, however no overlying neurosensory layers seen. The duration from diagnosis to surgery was 2349 days in this case.

**Conclusions:** Free flap ILM transposition tuck is an effective technique in treating chronic FTMH with previously failed surgeries.

### Intraocular Pressure Changes Following Dropped Nucleus: Our Experience at Hospital Selayang

*First Author: Seng Hong YEOH*

*Co-Author(s): Norlelawati ZAINOL*

**Purpose:** To evaluate the intraocular pressure (IOP) and visual outcomes of Pars Plana Vitrectomy (PPV) for dropped nucleus post phacoemulsification.

**Methods:** This was a retrospective case series of patients who underwent PPV for dropped nucleus from January 2015 to August 2017. All patients underwent PPV with phacofragmentation/lens removal and secondary intraocular lens implantation. Patients (excluding known glaucoma or glaucoma suspects) were selected from hospital electronic medical

records with follow-up till postoperative third and sixth month. Major outcome parameters were: pre-phacoemulsification versus post-PPV best corrected visual acuity (BCVA), and pre-PPV versus post-PPV IOP.

**Results:** Total of 30 patients were included in the study with mean age of  $67.4 \pm 10.3$  SD years. Average pre-PPV highest IOP are  $28.6 \pm 15.3$  SD mm Hg and the majority (19) (63.3%) of patients with pre-PPV IOP higher than 22 mm Hg. 13 (43.3%) patients required 2 or more anti-glaucoma medications (acetazolamide and anti-glaucoma eye drops) prior to PPV. All patients had significant reduction in IOP post-PPV with average of  $14.3 \pm 2.8$  SD mm Hg ( $P = 0.000013$ ) and no reported cases of persistent high IOP at postoperatively third and sixth months. Patients also experienced significant visual improvement from mean pre-phacoemulsification BCVA logMAR  $1.58 \pm 1.24$  SD to post-PPV BCVA logMAR  $0.42 \pm 0.26$  SD ( $P = 0.00003$ ) at third or sixth month follow-up. The majority of (17) (56.7%) patients achieved good post-PPV BCVA equal or better than logMAR 0.3 (Snellen = 6/12).

**Conclusions:** Majority of patients with dropped nucleus post-PPV achieved significant improvement in the final visual acuity. Preoperative high IOP also significantly reduced in the most cases post-PPV.

### **Klebsiella Endogenous Endophthalmitis: A Changing Spectrum?**

*First Author: Adrian FUNG*

*Co-Author(s): Jay CHANDRA, Jane FOO, Jessica TONG*

**Purpose:** To describe cases of *Klebsiella* endogenous endophthalmitis from a large tertiary referral hospital in western Sydney, Australia.

**Methods:** Retrospective chart review. Cases of endophthalmitis with systemic *Klebsiella pneumoniae* infection were identified by at Westmead Hospital, Sydney, Australia between 2000 and 2017.

**Results:** Three cases of presumed *Klebsiella* endogenous endophthalmitis were identified, ranging in age from 58 years to 81 years. All had *Klebsiella pneumoniae* liver abscesses requiring drainage. In 2 cases, the pathogen was resistant to ampicillin. Presenting vision ranged from hand movements to light perception, and symptoms included ocular pain, redness, fever, rigors, syncope, and abdominal pain. Two patients had diabetes mellitus, and none described recent travel. All patients underwent vitreous tap and intravitreal antibiotics with vancomycin 1 mg/0.1 mL and ceftazidime 2.25 mg/0.1 mL. All cases had negative vitreous biopsies. Two patients underwent early small gauge pars plana vitrectomy, but despite this 1 progressed to inoperable total retinal detachment after 1 month and the other to no light perception within 4 days. The third patient had extramacular retinitis and vitritis. After 3 intravitreal injections of vancomycin and ceftazidime, the infection was controlled without the need for vitrectomy, and vision recovered to 6/18 after

3 months.

**Conclusions:** *Klebsiella* endogenous endophthalmitis is becoming increasingly prevalent in Australia. Diabetes is a significant risk factor and predicts poor visual outcome. Early recognition and treatment with intravitreal antibiotics are the mainstays of treatment, but despite this patient outcomes are often poor. Early vitrectomy is usually associated with better visual outcomes, but some patients can do well without surgery.

### **Late-Onset Retinal Detachment from a Retinal Tear Associated with Laser Indirect Ophthalmoscopy for Retinopathy of Prematurity**

*First Author: Ronnie MANAYSAY*

*Co-Author(s): Jocelyn SY*

**Purpose:** To describe a case of late-onset retinal detachment from a retinal tear associated with laser indirect ophthalmoscopy in a patient born with retinopathy of prematurity and was subsequently managed by scleral buckling with pars plana vitrectomy.

**Methods:** Descriptive clinical case report.

**Results:** The case is that of a 12-year-old child who was born premature at 24 weeks age-of-gestation with a birth weight of 1200 grams and was diagnosed to have retinopathy of prematurity on both eyes and subsequently underwent laser indirect ophthalmoscopy which regressed the retinopathy. He presented 12 years after with sudden onset blurring of vision on his left eye. Fundus examination showed retinal tears on the superior border of the normal retina and lasered periphery on both eyes. The right eye has an attached retina, however, the left eye had total retinal detachment. The right eye underwent focal laser therapy immediately, which prevented detachment of the retina. The left eye then underwent scleral buckling with a 240 encircling band, pars plana vitrectomy, endolaser, and injection of 1,000 centistoke silicon oil. Retina was attached postoperatively, and visual acuity was 20/32 from counting fingers.

**Conclusions:** Late-onset retinal detachment is a sight-threatening sequela in children who had retinopathy of prematurity and treated with laser indirect ophthalmoscopy. Scleral buckling with pars plana vitrectomy, endolaser, and light silicon oil is a viable option to attach these retinas. Long-term follow-up, possibly life-long, is warranted to prevent visual impairment from retinal complications and initiate treatment as early as possible.

### **Macular Hole Closure After Surgery with Minimal or No Posturing: OCT-Based Study**

*First Author: Muhammad Amer AWAN*

*Co-Author(s): Javeria MUID*

**Purpose:** To identify early closure of macular hole

(MH) on the basis of postoperative optical coherence tomography (OCT) with minimal or no posturing.

**Methods:** Nonrandomized, prospective, consecutive series that included the patients who had MH surgery. The patients had either 27 gauge vitrectomy or phacovitrectomy depending on their lens status, ILM peel, and 18% C2F6 gas tamponade. Both idiopathic and traumatic MH were included in the study. MH were measured preoperatively to divide the MH in small, moderate, and large. Patients with MH size less than 400  $\mu\text{m}$  were not advised face down posturing and those with MH size between 400 and 700  $\mu\text{m}$  or greater than 700  $\mu\text{m}$  were postured face down overnight. OCT was performed on postoperative day (POD) 1, 8, and 30. From POD1, the patients were advised not to lie supine for 2 weeks with no further posturing.

**Results:** Total number of patients was 12, with mean age of 60 years (range 19-77 years). Eight patients were male and 4 were female. Nine patients had idiopathic MH and 3 had traumatic MH. All MH irrespective of size were closed on POD1 on the basis of OCT. Even later OCT images confirmed the closure of MH on POD 8 and POD 30. There was also significant improvement in vision with mean preoperative VA improved from 0.8 to 0.4 postoperatively.

**Conclusions:** MH closes irrespective of its size within 24 hours after the surgery on the basis of OCT. Smaller MH does not require any posturing; medium and large size MH also do not require prolonged posturing.

## Management of Posterior Segment Retained Intraocular Foreign Body by Pars Plana Vitrectomy

*First Author:* Pankaj **ROY**

*Co-Author(s):* Ava **HOSSAIN**, Banita **MISTRY**, Dipak **NAG**, Rinku **PAUL**

**Purpose:** The objective of the study was to evaluate the structural and functional outcome of retained intraocular foreign body located in the posterior segment removal by Pars plana vitrectomy.

**Methods:** This was a prospective, purposive study conducted from January 2014 to June 2018. A total of 64 consecutive eyes of 64 patients were included in the study. The mean age  $26.34 \pm 9.40$  years, age range 16-41 years. A total of 60 males and 4 females underwent Pars plana vitrectomy. Visual acuity, slit lamp biomicroscopy, intraocular pressure, posterior segment examination, B-scan, and CT scan of eye and orbit routinely done.

**Results:** Size of removed metallic foreign bodies were 2-16 mm. Preoperative visual acuity: no perception of light (2 eyes), only perception of light (4 eyes), perception of light and projection of rays (16 eyes), counting finger half meter (20 eyes), counting finger half meter to 1/60 (16 eyes), 2/60 to 5/60 (4 cases),

6/60 (2 eyes) ( $P = 0.003$ ). Anatomic success was obtained in 96.77% (62) of eyes. The postoperative visual acuity improvement was  $5.24 \pm 3.4$  letters in the Snellen visual acuity chart. Severe inflammation noticed in 24 (37.5%) eyes in early postoperative period, IOP elevated in 26 (40.63%) eyes, 1 silicon oil-filled eye developed band keratopathy, and 1 eye became phthisical.

**Conclusions:** Pars plana vitrectomy is an important, effective, and essential surgical approach for maintaining ocular integrity and better functional outcome for managing retained posterior segment intraocular foreign body.

## Microincision Vitrectomy Surgery Results in Metastatic Endophthalmitis

*First Author:* Akiko **TAJIMA**

**Purpose:** To investigate microincision vitrectomy surgery (MIVS) results in metastatic endophthalmitis.

**Methods:** Between April 2013 and August 2019, 9 patients (11 eyes), 5 males (6 eyes), and 4 females (5 eyes), with visual acuity more than light perception, underwent vitrectomy. The average age was 64.2 years (range of 57 to 80 years). All cases underwent lensectomy with a 25G system, followed by evaluation of visual prognosis.

**Results:** In 8 out of 9 cases, bacteria were isolated from blood or urine culture [4 cases of *Staphylococcus* and one case each of *Klebsiella pneumoniae*, *Listeria monocytogenes*, Group B *Streptococcus* (GBS), and *Streptococcus mitis*. In one case that was culture negative, GBS was detected in the vitreous body. The underlying primary disorders were endocarditis in 3 cases, iliopsoas abscess in 2 cases, and 1 case each of liver abscess, kidney abscess, purulent arthritis, and chronic myeloid leukemia. The average period from onset of ocular symptoms to MIVS was 7.5 days. Gas tamponade was performed in 1 eye, whereas silicone oil was used to treat 5 eyes. The postoperative average visual acuity significantly improved from logMAR Best Corrected Visual Acuity  $1.9 \pm 0.7$  to  $1.2 \pm 1.1$  ( $P < 0.0001$ ). Visual acuity in 2 eyes deteriorated postoperatively to no light perception whereas 1 of the cases required eye evisceration.

**Conclusions:** If patient's visual acuity shows light perception or more, MIVS is an effective treatment for metastatic endophthalmitis, and may be considered after checking the general condition.

## New OCT Era for Early Stage Macular Hole Follow-Up

*First Author:* Yuanfei **ZHU**

*Co-Author(s):* Lizhen **CHEN**, Tie Ying **ZHAO**

**Purpose:** To analyze the changes of early stage macular hole (MH). To surgically intervene as early as possible

when detecting enlargement.

**Methods:** Nine eyes of 9 patients diagnosed MH requested to observe when they admitted to hospital. Optical coherence tomography (OCT) and best visual acuity (BCVA) were carried out every month for the first 3 months, then every 3 months for follow-up. All patients were informed to return when there were BCVA changes.

**Results:** During the follow-up, 6 eyes (6/9, 66.7%) with average MH diameter  $101.4 \pm 11.3 \mu\text{m}$  achieved spontaneous closure. They demonstrated 2 characteristics: (1) Posterior vitreous cortex detachment (PVD) from macular; (2) Diameter of MH was smaller than  $150 \mu\text{m}$ . One eye was also detected epiretinal membrane and received intravitreal anti-VEGF for retinal pigment epithelitis previously. It started as bridging at the level of inner retina and defect in the outer retina. However, BCVA was improved to 0.7. Three eyes (3/9, 33.3%) were repaired surgically and achieved full closure. One eye with micro MH and persistent posterior vitreous cortex attachment had dramatic close-reopen change twice before vitrectomy. The other 2 eyes were with MH larger than  $200 \mu\text{m}$ .

**Conclusions:** Micro MH with PVD has a relatively higher spontaneous closure rate. PVD is essential for spontaneous closure.

### Operative Time and Outcome of Idiopathic Epiretinal Membrane Using Sutureless Microincision Vitrectomy with Noncontact Viewing Systems

*First Author: Chun-Ju LIN*

*Co-Author(s): Wei-Hsun KUNG, Chun-Ting LAI, Jane-Ming LIN, Yi-Yu TSAI*

**Purpose:** To evaluate the efficacy of sutureless microincision pars plana vitrectomy (PPV) using Lumera and Resight non-contact wide-angle viewing systems for idiopathic epiretinal membrane, and to report the anatomical and visual outcomes.

**Methods:** The retrospective, non-comparative, interventional case series reported here was conducted from October 2016 to June 2017. Enrolled patients presented with idiopathic ERM and received sutureless micro-incision PPV by 1 surgeon using the Lumera and Resight non-contact wide-angle viewing system. Pseudohole type ERM was excluded. All patients were followed-up for a minimum of 12 months. Variables collected included patient demographics, refraction, and best corrected visual acuity. Outcome measures included operative time, recurrent rate, postoperative best corrected visual acuity, and surgical complications. The end points were operative time, anatomical outcome, and functional outcome.

**Results:** A total of 51 eyes from 51 patients (19 men and 21 women) were treated. Mean age was 68.7

(61.2-76.1) years. The mean operative time was 26.9 (19.8-34.1) minutes. The mean operative time did not impact the change of vision and central foveal thickness. The mean change of VA (logMAR) was  $-0.3$  ( $-0.66$ - $0.07$ ,  $P < 0.001$ ). The mean change of CRT was  $-138.0 \mu\text{m}$  ( $-213.9$ - $-62.2$ ,  $P < 0.001$ ). There were 7 group 1A, 16 group 1B, and 28 group 1C cases respectively. Protruded epiretinal proliferation was observed in some cases, which was not affecting visual outcomes after vitrectomy.

**Conclusions:** The outcome of idiopathic epiretinal membrane repaired by sutureless PPV using the Lumera and Resight wide-angle viewing system was not inferior to any other published method. This instrument combination resulted in a relatively rapid and comfortable procedure without serious postoperative complications.

### Optic Disc Pit-Related Maculopathy: Simple Approach is Better

*First Author: Muhammad Amer AWAN*

**Purpose:** To assess resolution of optic disc pit (ODP)-related maculopathy after 25 and 27 gauge (G) 3 ports pars plana vitrectomy (3PPV).

**Methods:** Nonrandomized, prospective, consecutive series that included the patients with ODP-related maculopathy. The patients had 25 or 27 G 3PPV, wide ILM peel, and 18% C2F6 gas tamponade. All patients were postured face down for 8 hours immediately after the surgery.

**Results:** Total number of patients was 6, with mean age of 26 years (range 10-38 years). Three patients were male and 3 were female. All the patients were symptomatic with significant macular detachment (MD). The MD was completely resolved in all patients, except 1 developed macular hole (MH) postoperatively. None of the patients require drainage of subretinal fluid, ILM plugging, autologous blood or laser. Optical coherence tomography images also confirmed complete resolution of MD. MH was closed with fluid air exchange and 18% C2F6 gas tamponade. There was a significant improvement in vision, with mean preoperative visual acuity improved from 0.8 to 0.3 logMAR postoperatively. There was no recurrence of fluid on long-term follow-up.

**Conclusions:** This study confirms that ODP-related maculopathy gets resolved with 25 or 27 G 3PPV, wide ILM peel, and 18% C2F6 gas tamponade. In most cases, it does not require additional preoperative measures and leads to significant improvement in vision.

## Outcome of Idiopathic Full Thickness Macular Hole Surgery: Our Experience at Hospital Selayang

First Author: Seng Hong **YEOH**

Co-Author(s): Jane **FOO**

**Purpose:** To evaluate the anatomical and visual outcomes of Pars Plana Vitrectomy (PPV) for idiopathic full thickness macula hole (FTMH).

**Methods:** This was a retrospective case series done in Hospital Selayang of patients who underwent PPV for FTMH from January 1, 2016 to December 31, 2017. All patients underwent PPV with internal limiting membrane (ILM) peeling and perfluoropropane (C3F8) tamponade. Major outcome parameters were: pre and postoperative best corrected visual acuity (BCVA), macula hole index (MHI), and anatomical closure at 3 months.

**Results:** Total of 48 patients were included in the study, of which 13 (27%) were male. 38 (79%) patients achieved anatomical closure at postoperative 3 months. Younger patients age group (mean =  $65.2 \pm 8.4$  SD years) reported higher closure rate compared to older patient age group (mean =  $69.5 \pm 4.2$  SD years) [ $P = 0.03$ ]. Larger MHI (mean =  $0.54 \pm 0.2$  SD) also had better closure rate than smaller MHI (mean =  $0.33 \pm 0.08$  SD) [ $P = 0.015$ ]. A total of 26 (54%) patients experienced improvement in BCVA (average Snellen visual acuity of 6/21 at 3 months versus average Snellen visual acuity of 6/36 preoperatively). Seventeen (35%) patients maintained their preoperative BCVA, while 5 (10.4%) patients had worse postoperative BCVA due to cataract. There were no significant differences between gender and duration of symptoms to closure rate.

**Conclusions:** Our study was similar to worldwide studies with a closure rate of approximately 80%. Larger MHI and younger patients have a better closure rate. More than 80% of patients retained at least similar vision postoperatively, with more than 50% achieving significant vision improvement.

## Outcome of Primary Rhegmatogenous Retinal Detachment Surgery in a Tertiary Eye Referral Center in the Philippines from 2016 to 2017

First Author: Aimee **NG TSAI-CHUA**

**Purpose:** This study was designed to report the outcome of primary rhegmatogenous retinal detachment (RRD) surgery in a tertiary eye referral center in the Philippines. This paper describes the clinical profile of patients operated on for RRD and determines the anatomical and functional outcomes of primary RRD surgery.

**Methods:** This is a retrospective audit involving patients seen and managed for primary RRD in a single

center from 2016 to 2017. Patients' demographics, anatomical and functional outcomes with subgroup analysis were performed.

**Results:** A total of 58 cases were included with mean age of  $48.36 \pm 15.64$  years. Primary and final anatomical success rates were 89.65% and 93.1%, respectively. Mean visual acuity improved from 1.76 to 0.92 logMAR at least 3 months after the surgery. Presence of complications significantly affected the anatomical and functional success. There was also significant difference in the final visual acuity in relation to baseline macular status, duration of retinal detachment, and the type of procedure performed.

**Conclusions:** Overall, the anatomical and functional success rates of this audit were comparable to the results of the international studies. Early consult and timely repair of RRD might yield better outcomes.

## Peripapillary Retinoschisis in Patients from Neuropediatric Ophthalmology: a Case Collection

First Author: Li-Chung **CHI**

**Purpose:** To investigate peripapillary retinoschisis and its effect on visual field and progression of schisis area in patients from neuro-pediatric ophthalmology outpatient department. Correlation of peripapillary retinoschisis and its association with intraocular pressure (IOP) and other ophthalmologic conditions were also analyzed.

**Methods:** Images of 20 patients visiting our neuro-pediatric ophthalmology department who were noted to have peripapillary retinoschisis on optical coherence tomography (OCT) were reviewed. Serial peripapillary and macula OCT images, visual acuity, visual fields, and retinoschisis appearance were also reviewed.

**Results:** Twenty patients were detected to have peripapillary retinoschisis. Out of these 20 patients, 20 eyes had refractive error exceeding 1,000; 4 patients had strabismus. The most frequent visual field finding on automated perimetry was enlarged blind-spots. One eye of a patient had retinal detachment history. Two eyes of 2 other patients eventually developed retinal detachment. No peripapillary retinoschisis developed into foveal schisis. None of the eyes had elevated IOP. During follow-up period, spontaneous disappearance of peripapillary retinoschisis was observed in 1 eye. This patient was the only one in our case collection with glaucoma.

**Conclusions:** The prevalence and the factors associated with peripapillary retinoschisis are not well known yet. Recently, several studies have described peripapillary retinoschisis in patients with different types of glaucoma. Our series of 20 cases collected from neuro-pediatric ophthalmology clinic provide a different perspective to eyes with peripapillary retinoschisis and their associated eye diseases.

## Potential Risk Factors of Blindness from Globe Injury from Intraocular or Intraorbital Foreign Body

First Author: Pornthip **WATTANASIRI**

**Purpose:** To identify the potential risk factors of blindness from intraocular (IOC) or intraorbital (IOR) foreign bodies in patients with globe injury.

**Methods:** A total of 113 patients with globe injury from IOC/IOR between January 2013 and December 2017 were reviewed. Blindness was defined as a VA less than 10/200.

**Results:** Patients with mean age 35.4 years; 98% were male. Overall blindness incidence was 53%. Most patients had open globe injury (92.92%), of which the most common cause was job-related (87.39%). The metallic foreign body was the most common (63.7%), followed by organic (6.2%) and inorganic particles (30.1%). Initially poor VA ( $P = 0.012$ ), retinal detachment ( $P = 0.016$ ), and vitreous hemorrhage ( $P < 0.001$ ) were the most significant risk factors.

**Conclusions:** Potential risk factors of blindness from intraocular or intraorbital foreign bodies were initial poor vision, retinal detachment, and vitreous hemorrhage.

## Predictive Factors for Penetrating Eye Injuries Caused by Intraocular Foreign Bodies

First Author: Adrian **FUNG**

Co-Author(s): Jay **CHANDRA**, Jane **FOO**

**Purpose:** To describe the factors predicting the outcome of patients with intraocular foreign bodies from a tertiary referral center in Australia from 2007 to 2017.

**Methods:** Retrospective case series.

**Results:** A total of 18 patients presented with intraocular foreign bodies (IOFB). Most patients were male (16/18, 89%). Mean age was 46 years (range 20-61 years). Thirteen (72%) cases were work-related injuries, of which only 2 used protective eyewear. The mechanism of injuries was related to hammering, grinding, and wiring. The majority (10/18, 56%) of IOFBs were metallic, while the rest varied from rocks to eyelashes. All had entrance sites via the cornea except 1 that was transcleral entry. Lens capsule was breached in 8 (44%) patients, and 1 developed endophthalmitis. There were 4 (22%) cases of IOFB in the posterior segment. Mean duration from trauma to IOFB removal was 2.7 days (range 1-18 days). Mean best corrected visual acuity (BCVA) on presentation was logMAR +1.5 (range 0-4), while mean BCVA on final follow-up was logMAR +0.9 (range 0-4). Out of the 4 cases which required vitrectomy for IOFB removal, 2 cases had retinal complications which required further surgery. The patient with endophthalmitis had a foreign body in the lens, which was removed 4 days after injury.

**Conclusions:** In our study, poor visual outcome (BCVA worse than 6/60) was associated with delayed IOFB removal (>24 hours), poor presenting visual acuity, lens injury, and posterior segment IOFBs.

## Primary Inverted Internal Limiting Membrane Surgery for Large Pediatric Full Thickness Macular Holes

First Author: Nishant Vijay **RADKE**

Co-Author(s): Zhaoxia **KUANG**, Amrita **MUKHERJEE**, Snehal **RADKE**, Charudutt **KALAMKAR**

**Purpose:** To report the outcomes of Inverted ILM peeling as a primary modality of treatment in large pediatric FTMH.

**Methods:** Non-randomized case series. Four eyes of 4 children with large FTMH were included. Large FTMH was defined as size greater than 400 microns. All cases underwent 23 or 25 G vitrectomy, ILM peeling followed by inversion and gas endotamponade. Pre- and postoperative best corrected visual acuity (BCVA), optical coherence tomography (OCT), and fundus photo were taken. A total of 10 or 12% C3F8 was used as endotamponade and prone position advised for 1 or 2 weeks respectively. Minimum 6 months follow-up was deemed necessary. Students t test was used to compare mean BCVA pre- and postoperative. Fishers test was used to compare efficacy of 10% C3F8 with 2 weeks prone versus 12% C3F8 for 1 week prone.

**Results:** All 4 eyes achieved type 1 closure in OCT. Mean preoperative BCVA was 0.91325 and mean postoperative BCVA was 0.714. The difference was statistically significant. Mean hole size was 942.25 microns. Gas endotamponade with 10 and 12% C3F8 with 1 or 2 weeks prone was useful. Fishers test to compare outcome of 10% C3F8 with 2 weeks prone or 12% with 1 week prone showed no difference in outcome. In the short-term there was no development of cataract.

**Conclusions:** ILM inversion with gas endotamponade is useful in large pediatric holes and can be used as a primary modality.

## Retinal Detachment Due to Paravascular Abnormality-Associated Breaks in Highly Myopic Eyes

First Author: Yi-Ting **HSIEH**

Co-Author(s): Chung-May **YANG**

**Purpose:** To describe the characteristics of a novel type of retinal detachment (RD) due to paravascular abnormalities (PVAs) associated breaks in highly myopic eyes.

**Methods:** We retrospectively recruited 8 eyes with RD due to PVA-associated breaks. The clinical features and surgical results were evaluated.

**Results:** All eyes were highly myopic with a mean

axial length of  $31.31 \pm 2.86$  mm (27.51 to 36.52 mm). A total of 2 of the 8 eyes had multiple paravascular retinal breaks associated with PVAs, 4 had a single paravascular break with PVAs nearby, and 2 had multiple paravascular breaks along the same vessels. All breaks were round or oval-shaped, and only 3 eyes (37.5%) had their breaks located over patchy chorioretinal atrophy. A total of 2 of the 8 eyes had the breaks outside the arcades, 5 had their breaks within the arcades, and 1 had a break within the arcade as well as breaks outside the arcade. Vitrectomy and epiretinal and internal limiting membrane peeling were performed in all cases, with inverted or free internal limiting membrane flap insertions for the perifoveal breaks and endolaser for the more peripheral breaks. All eyes had retinal reattachment after 1 single operation.

**Conclusions:** RD due to PVA-associated breaks represented a distinct entity. PVAs and the associated breaks should be searched in RD without macular hole or obvious breaks in highly myopic eyes. It may be treated as RD caused by peripheral breaks or as a macular hole associated RD depending on the location of the breaks.

### Retropulsion and Mass Flow of 27-Gauge Vitrectomy Probes: Comparison of Dual-Blade/Flat-Tipped Probes and Single-Blade/Beveled Probes

*First Author:* Abolfazl **IRANNEJAD**

*Co-Author(s):* Dina Joy **ABULON**, Sonalee **TAMBAT**

**Purpose:** To use computational fluid dynamics to evaluate the intraoperative flow performance of dual-cutting 20,000 cpm probes and single-cutting 10,000 cpm probes.

**Methods:** The 27+ HyperVit dual-cutting 20,000 cpm probe with flat and beveled tips were modelled and compared to the computational model of a 27+ Advanced UltraVit single-cutting 10,000 cpm probe with a beveled tip. With the CONSTELLATION Vision System, the following system parameters were incorporated into the simulation: applied vacuum settings of 650 mm Hg, 30 mm Hg intraocular pressure, and 50/50 duty cycle for one complete cut cycle. Simulations were generated for a liquid water environment and also a viscous fluid environment to represent vitreous.

**Results:** The dual-cutting/flat-tipped 20,000 cpm probe generated higher mass flow rates than the single-cutting/beveled-tip 10,000 cpm probes. A dead fluid zone was identified and contributed in back flow or retropulsion. The beveled shape of the probes contributed to reduced back flow. Less back flow or retropulsion was associated with the 20,000 cpm dual-cutting probes compared to single-cutting 10,000 cpm beveled-tip probe. Pressure on the retina fluctuated during the cut cycle. At equivalent vacuum settings,

dual-cutting probes generated higher applied pressure to the retina than single-cutting probes.

**Conclusions:** Simulated results showed the expected improvement of mass flow rate for dual-cutting 20,000 cpm probes compared to single-cutting 10,000 cpm probes. Dual-cutting 20,000 cpm probes resulted in less back flow/less retropulsion and improved intraoperative flow stability. Simulations may help surgeons better understand differences in probe performance and help identify necessary adjustments to surgical settings.

### Rhegmatogenous Retinal Detachment in an Adult with Osteogenesis Imperfecta

*First Author:* Chong **HUAN**

**Purpose:** Osteogenesis Imperfecta (OI) is a rare hereditary connective tissue disorder caused by mutations in the genes, COL1A1 or COL1A2, encoding for Type I collagen. Patients with OI typically present with ocular problems such as blue sclera, scleral thinning, high myopia, and retinal detachment. The treatment of retinal detachment in patients with OI is challenging, owing to the abnormal morphologic characteristics of sclera. We reported a gentleman with underlying OI and high myopia that presented with right eye rhegmatogenous retinal detachment, followed by surgical management and postoperative outcomes.

**Methods:** Case report.

**Results:** A 26-year-old man with underlying OI and high myopia complained of painless sudden onset blurring of left vision for 3 days, associated with floaters. His vision acuity with glasses was 6/9 OD and 6/18 OS. No blue sclera was observed. There was a rhegmatogenous retinal detachment in the left eye from 1 to 7 o'clock with detached macula. A retinal break was located at 2 o'clock with a retinal hole at 1 o'clock within the lattice degeneration. Fundus examination of right eye revealed barricade laser mark at 10 o'clock. He underwent left eye scleral buckling surgery, cryotherapy, and intravitreal injection of sulfur hexafluoride (SF6). His best corrected vision acuity at 3 months postoperatively was 6/9. Retina was flat with no subretinal fluid collection.

**Conclusions:** In patients with OI who presented with rhegmatogenous retinal detachment, because of variations in sclera abnormalities, it is crucial for the surgeon to choose the best surgical option to yield excellent postoperative outcomes and minimize the operative complications.

## Secondary Paracentral Retinal Hole Following Internal Limiting Membrane Peeling for a Large Macular Hole

First Author: Diva **MISRA**

Co-Author(s): Pritam **BAWANKAR**, Pushkar **DHIR**, Ronel **SOIBAM**, Awaneesh **UPADHYAY**

**Purpose:** To report a case of secondary paracentral retinal hole following internal limiting membrane peeling for a large macular hole.

**Methods:** Case report.

**Results:** A 75-year-old female with a diagnosis of large (basal diameter 1685  $\mu\text{m}$ ) Stage 3 macular hole and coexisting epiretinal membrane [best corrected visual acuity (BCVA) 6/60] underwent uneventful and atraumatic 25 G vitrectomy, along with brilliant blue assisted internal limiting membrane peeling. Postoperative evaluation after 1 month revealed a secondary paracentral retinal hole formation along with reduction in the size of the macular hole (BCVA 6/36).

**Conclusions:** Pars plana vitrectomy with internal limiting membrane peeling is the standard technique for the management of large macular holes. Surgeons performing macular hole surgery should be aware of this relatively rare complication while performing the procedure. Secondary holes closer to the fovea may require re-surgery with gas tamponade.

## Silicone Oil Tamponade Might Assist Macular Hole Closure in Patients with Persistent Macular Hole After Primary Internal Limiting Membrane Peeling and Gas Tamponade

First Author: I Chia **LIANG**

Co-Author(s): Shuting **KAO**, Yi-Ru **LIN**, Kwan-Rong **LIU**

**Purpose:** To report successful macular hole (MH) closure using silicone oil (SO) as intraocular tamponade for persistent MHs after primary intervention with pars plana vitrectomy (PPV), internal limiting membrane (ILM) peeling and C3F8 tamponade in 3 cases.

**Methods:** Retrospective review. A total of 3 eyes of 3 patients were included. Persistent MHs after 23-gauge or 25-gauge PPV combined with indocyanine green-assisted ILM peeling and C3F8 gas tamponade were noted in these 3 eyes. All 3 eyes received secondary PPV and SO tamponade. Best corrected visual acuity (BCVA), slit lamp examination, fundus examination and the size of MH measured by optical coherence tomography (OCT) were gathered pre-and postoperatively. The main outcome measurements were anatomic closure of MHs and BCVA.

**Results:** All of the MHs sealed after secondary intervention with SO tamponade. The SO was removed after hole closure in 2 eyes (Eye 1 and 2). 2 eyes (Eye 1 and 3) also received cataract surgery. Closure of MH was confirmed by OCT and maintained during long-

term follow-up (range: 28-180 weeks). The BCVA of all eyes improved for at least 3 lines.

**Conclusions:** In our series, retreatment with SO tamponade was revealed to be effective for patients with failure of MH closure after gas tamponade.

## Sphere of Influence and Fluid Velocity Analysis of 27-Gauge Cutters: 20,000 cpm Dual-Cutting Probes vs 10,000 cpm Single-Cutting Probes

First Author: Abolfazl **IRANNEJAD**

Co-Author(s): Dina Joy **ABULON**, Sonalee **TAMBAT**

**Purpose:** The use of modeling and simulation to analyze fluid during vitrectomy may help improve the design of current cutters and help surgeons better understand performance of new vitrectomy probes. This study evaluated the fluid dynamics of balanced salt solution during vitrectomy of 27 gauge dual-cutting 20,000 cpm probes and single-cutting 10,000 cpm probes.

**Methods:** Vitrectomy aspiration of 3 different probes were modelled: 1) 27+ HyperVit dual-cutting 20,000 cpm probes with a flat tip; 2) 27+ HyperVit dual-cutting 20,000 cpm probes with a beveled tip; and 3) 27+ Advanced UltraVit single-cutting 10,000 cpm probes with a beveled tip. Vitrectomy system parameters such as applied vacuum settings of 650 mm Hg, an intraocular pressure setting of 30 mm Hg, and 50/50 duty cycle setting on the CONSTELLATION Vision System were simulated in balanced salt solution. For each probe, evaluations included comparisons of velocity streamlines, vector fields, and sphere of influence.

**Results:** When comparing probes, the velocity streamlines revealed behavioral differences inside the cutter: Dual-cutting 20,000 cpm probes demonstrated less internal transience than single-cutting 10,000 cpm probes. External velocity streamlines showed differences in fluid behavior outside of the cutter at different time points during the cut cycle.

**Conclusions:** Computer simulations of velocity streamlines and vector fields revealed differences in both internal and external fluid behavior. Additional velocity analysis showed how probe parameters affect the sphere of influence for a particular probe design. Simulations may help surgeons better understand the performance of new cutters and, ultimately, optimize system settings and intraoperative surgical techniques.

## Vitrectomy with Long-Term Silicone Oil Tamponade Without ILM Peeling in the Treatment of Myopic Foveoschisis

First Author: Yi-Ru **LIN**

Co-Author(s): Hsiang-Wen **CHIEN**, I Chia **LIANG**, Kwan-Rong **LIU**

**Purpose:** To report cases with symptomatic myopic

foveoschisis treated with vitrectomy with long-term silicon oil tamponade without ILM peeling.

**Methods:** All patients with visual symptoms and OCT sign of myopic foveoschisis were treated with 25 G pars plana vitrectomy and silicone oil injection without internal limiting membrane removal. All cases were followed for at least 6 months.

**Results:** All foveoschisis reapproximated over time under silicon oil tamponade after surgery.

**Conclusions:** 25G PPV with silicone oil tamponade is a relatively simple and safe procedure. Long-term silicone oil tamponade in our studies achieved gentle and progressive reapproximation of retinal layers in myopic foveoschisis. The mechanisms of foveoschisis may be the result of relative unstretchability of ILM compared to the more rapidly expanding myopic sclera. However, ILM removal may result in the loss of tectonic support of the inner retina and macula hole formation. Our study demonstrated that ILM may be stretchable through long-term silicone oil tamponade. Pars plana vitrectomy with silicone oil tamponade should be considered in the treatment of symptomatic myopic foveoschisis.

## Translational Research in Ophthalmology

### Artificial Identification of Surgical Processes in Cataract Surgery

*First Author:* Hitoshi **TABUCHI**

*Co-Author(s):* Naotake **KAMIURA**, Hiroki **MASUMOTO**, Shoji **MORITA**, Kosuke **TAKASE**, Tomofusa **YAMAUCHI**

**Purpose:** To identify each process of cataract surgery using artificial intelligence.

**Methods:** A total of 398 cases of cataract surgery videos were analyzed. We allocated 245 cases for learning, 10 cases for verification, and 48 cases for testing. A total of 3 processes, which consist of 2 core processes of cataract surgery, continuous curvilinear capsulorhexis (CCC) and nuclear removal, and 1 other process (other than the 2 core processes) were prepared. The start times and the end times of each process were recorded by a trained certified orthoptist, and we trained the Inception V3 network to learn the processes. The resolution was resized from 1920 × 1080 pixels to 299 × 168 pixels, and the frame rate was downsized from 30 frames per second (FPS) to 1 FPS. Ten types of image conversion techniques including Random Erasing were implemented. The learning parameters included batch size 32, loss function of multi-class logarithmic loss, optimization function of momentum Stochastic Gradient Descent (learning rate = 0.0001, momentum = 0.9), and maximum number of learning times of 300 epochs.

**Results:** The correct response rate of CCC was 90.7%, nuclear removal 94.5%, and the others 97.9%. The identification error rate, in which the network could not distinguish between CCC and nuclear removal, was less than 0.00001%.

**Conclusions:** Identification of a cataract surgical process using artificial intelligence is highly possible.

### Intravitreal Injection of Hydrogen Peroxide Induces Acute Retinal Degeneration, Apoptosis, and Oxidative Stress in Mice

*First Author:* Haoyu **CHEN**

*Co-Author(s):* Bing **HUANG**, Jiajian **LIANG**, Tsz-Kin **NG**, Xin **ZHONG**

**Purpose:** Here we reported the in vivo effect of H<sub>2</sub>O<sub>2</sub> exposure to the mouse retina and the underlying mechanism.

**Methods:** H<sub>2</sub>O<sub>2</sub> or saline solution was intravitreally injected into C57BL/6J mice. The retinal structure was evaluated by optical coherence tomography (OCT) and validated by histology and retinal marker expression. Cell apoptosis was examined by TUNEL staining and apoptotic gene expression. In addition, antioxidant enzyme expression was also determined.

**Results:** Photoreceptor disruption beginning at Day 1 and decreasing in the retinal and outer nuclear layer thickness at Day 7 and 14 were observed by OCT imaging with the treatment of 10 µg H<sub>2</sub>O<sub>2</sub>, which were confirmed by the histopathological analysis. The expressions of photoreceptors (Rho, Rora, Rorb and Rcvrn), bipolar cells (Chat and Calb2), and retinal pigment epithelial (Rpe65) markers were reduced in the H<sub>2</sub>O<sub>2</sub>-treated group, whereas the expression of retinal ganglion cell marker (Tubb3) was increased. TUNEL-positive cells were obviously found in outer nuclear layer and inner nuclear layer of H<sub>2</sub>O<sub>2</sub>-treated mice, but sparsely found in ganglion cell layer. Coherently, apoptotic gene expressions (Casp3, Casp9, Bax and Parp8) were significantly increased in the retina with increasing dosages of H<sub>2</sub>O<sub>2</sub>, while Bcl<sub>2</sub> expression was mildly decreased. In addition, the expressions of antioxidant enzyme genes (Txn2, Sod2 and Gpx4) were significantly upregulated in the retina after the H<sub>2</sub>O<sub>2</sub> treatment, compared to the vehicle control group.

**Conclusions:** Intravitreal injection of H<sub>2</sub>O<sub>2</sub> induces acute retinal damage by increasing oxidative stress and cell apoptosis in the retina.

### Laser Spectroscopic Study on Getting Best Results with Trypan Blue Dye Staining of Anterior Lens Capsule

*First Author:* Minu **MATHEN**

**Purpose:** To elucidate the molecular changes in anterior lens capsule after staining with different concentrations of trypan blue dye at various time

intervals.

**Methods:** Anterior lens capsules collected after capsulorhexis from 20 patients. Capsules exposed to various time intervals and dilutions of dye. Raman laser spectrometry used to get spectra from unstained and stained capsules. Computerized data plotting done.

**Results:** Dye stained capsules showed broadening of the secondary structure marker amide I band and appearance of higher wavenumber at  $1690\text{ cm}^{-1}$ , showing that capsule proteins undergo uncoiling from tightly packed triple helix to randomly coiled state. The 1 in 5 dilution (0.012%) stained capsule showed these changes after 15 seconds of exposure time.

**Conclusions:** Trypan blue staining of anterior lens capsule makes it less elastic and stiffer. If dye is used as 1 in 5 (0.012%) dilution of the 0.06% solution with exposure time of 10 seconds or less, capsule shows no structural changes.

### PEDF Protects Human Retinal Pigment Epithelial Cells Against Oxidative Stress by Upregulating Expression of UCP2

First Author: Xia **WANG**

**Purpose:** To investigate the protective function of pigment epithelium-derived factor (PEDF) against oxidative stress in ARPE-19 cells.

**Methods:** ARPE-19 cells were divided into oxidative stress groups with different concentrations of  $\text{H}_2\text{O}_2$  (0, 75, 150, and  $200\text{ }\mu\text{mol/L}$ ) for 24 h. For the protective group,  $200\text{ ng/mL}$  of PEDF was applied to these cells. LDH assay, PI staining, CCK-8 and cell growth curve experiments were conducted for cell viability assay. The apoptotic genes and the level of UCP2 gene expression were detected by RT-PCR. We also induced an oxidative stress injury animal model in both C57BL/6 mice and BALB/c mice. HE staining and UCP2 immunofluorescent labeling were conducted. ANOVA test was used to analyze the data statistically.

**Results:** The results showed that the numbers of apoptotic cells were increased with higher concentrations of  $\text{H}_2\text{O}_2$ , while this effect was reversed by PEDF ( $P < 0.05$ ). The expression of caspase3 and Bax were inhibited, whereas anti-apoptotic gene Bcl2 was improved by PEDF ( $P < 0.05$ ). PEDF increased the level of UCP2 gene expression ( $P < 0.05$ ). The confocal images confirmed a decreased UCP2 protein staining both RPE cells and RPE layers under  $\text{H}_2\text{O}_2$  injury, while we found an inhibition of this effect by PEDF. According to HE staining, the thickness of the RPE layer was significantly increased with PEDF under oxidative stress, in accordance with the increased number of RPE cells.

**Conclusions:** PEDF increased UCP2 gene expression in both ARPE-19 cells and animal RPE layers under oxidative stress, indicating that PEDF may protect RPE cells and tissues under oxidative injury.

## Visual Sciences

### Antimicrobial Effect of Silicone Oil on Bacterial and Fungal Pathogens: A Prospective In Vitro Study

First Author: Vivek **DAVE**

Co-Author(s): Joveeta **JOSEPH**

**Purpose:** To test the antimicrobial properties of silicon oil (Aurosil 1000 cSt, Aurosil Plus 5000 cSt) on in vitro growth of different microorganisms related to endophthalmitis.

**Methods:** *S. aureus*, *S. epidermidis*, *P. aeruginosa*, multi-drug resistant (MDR) strain of *K. pneumoniae*, *C. albicans*, and *A. flavus* were prepared to 0.5 Mc Farland turbidity. The bacteria and fungi were inoculated into the silicone oils, BHI broth for bacteria, and Sabouraud broth for fungi respectively and cultured aerobically for 30 days. From each sample,  $10\text{ }\mu\text{L}$  was plated onto nutrient agar and Potato dextrose agar for testing growth of bacteria and fungi respectively. After overnight incubation, colony-forming units (CFUs) were enumerated. Cultures from specimens, overnight incubation and CFU counting were repeated periodically at given intervals (0, 1, 3, 5, 7, 14, 21, 24 and 30).

**Results:** All bacteria showed a decrease in CFUs, with elimination between 21 and 30 days in silicone oil. Both the silicon oils however did not have cidal effect on fungal growth even up to 30 days. Colony-forming units of microorganisms remained stable in physiologic saline during the study. In BHI and Sabouraud broth, both bacteria and fungi showed a growth pattern that was compatible with the growth curve of microorganisms.

**Conclusions:** Silicone oil seems to have a significant bactericidal activity against bacteria in vitro after 30 days, but only had a fungistatic action. Silicone oil tamponade during vitrectomy may contribute to the elimination of microorganisms from the intraocular space in patient with especially multi-drug resistant ones.

### Carbon Emission in Eye Care Delivery

First Author: Bulbul **ISLAM**

Co-Author(s): Rajibul **ISLAM**

**Purpose:** To assess the extent of carbon emission in eye care delivery and create awareness.

**Methods:** Review of literature.

**Results:** Climate change is considered to be the single most important global health threat in the 21st century. Health care facilities are a rapidly growing industrial sector contributing to emission of almost 1% of total greenhouse gases. The National Health Services in England calculated its carbon footprint at more than 18 million tons of  $\text{CO}_2$  each year, equivalent

to 25% public sector emissions. In the US, healthcare sector emissions amount to 8% of the total. One study conducted to assess carbon emission in a first eye cataract surgery revealed carbon emissions amounting 181.8 KG CO<sub>2</sub> equivalent and that of 2230 patients to be 405 tons.

**Conclusions:** Eye care delivery has witnessed tremendous development in respect of technology and service volume. This has led to concerns of emission effects. Though detrimental, it is unintentional and leading to eye care delivery - climate change - health effect complex. The issue needs to be addressed immediately. A Kyoto type of global eye care protocol leading to less to zero carbon emission be commissioned under WHO umbrella and NGOs together may be effective in this regard.

### Effects of Blue Light Filtration on Light-Induced Retinal Damage in Rats

*First Author: Fumihito HIKAGE*

*Co-Author(s): Haruka IDA, Yosuke IDA, Yayoi MARUMO, Hiroshi OHGURO*

**Purpose:** To study retinal morphology and photoreceptor functions in rats subjected to photostress in the presence or absence of a yellow filter, which can effectively cut blue light.

**Methods:** Rats were exposed to 2500 or 5000 lux photostress for 24 hours in a photostress box with or without a yellow filter. After the photostress, retinal morphology and functions by an electroretinogram (ERG) were examined. To assess photoreceptor functions, during dark adaptation following the photostress, we employed a spectrometric assay to quantify rhodopsin (Rho) regeneration, and immunohistochemistry to evaluate in vivo Rho phosphorylation and dephosphorylation using specific antibodies toward 334Ser or 338Ser, which is major phosphorylation sites.

**Results:** Retinal morphology and ERG responses were significantly preserved by the presence of the yellow filter in both 2500 lux and 5000 lux photostresses. However, levels of Rho bleaching upon photostress, and rates of Rho regeneration and Rho dephosphorylation during dark adaptation following the photostress were almost comparable with or without the yellow filter.

**Conclusions:** Our study revealed that although there was little impact on photostress-induced changes in photoreceptor function, cutting blue light effectively reduced photostress-induced retinal damage in rats.

### Evaluation of the Psychometric Properties Between the Thai Version of the Low Vision Quality of Life Questionnaire and the World Health Organization Quality of Life Questionnaire

*First Author: Penpimol YINGYONG*

**Purpose:** To validate the internal structure between the Thai version of the low vision quality of life questionnaire (LVQOL) and the World Health Organization quality of life questionnaire (WHOQOL).

**Methods:** A total of 101 participants with visual impairment attending the low vision rehabilitation unit at the Mettapracharak (Watraikhing) hospital completed the LVQOL and the WHOQOL between April 2017 and March 2018. Step 1: Cronbach's alpha coefficient as the reliable method compared the result. Step 2: 120 visually impaired participants completed the test and 2-week retest of the LVQOL.

**Results:** Four domains (physical health, psychological health, social relationship, and environment) were categorized to analyze. The internal consistency yielded the Cronbach's alpha value of the LVQOL and the WHOQOL 0.82 and 0.86 respectively. All domains strongly equaled to 0.91 intraclass correlation coefficient.

**Conclusions:** The LVQOL was one of the reliable quality of life questionnaires to be evaluated as the useful assessment for the Thai population. However, further studies are needed to determine the effectiveness of low vision rehabilitation.

### Hydrogen Promotes M2 Macrophage Polarization Through Activation of Cu, Zn Superoxide Dismutase Enzyme

*First Author: Yutaro TOBITA*

*Co-Author(s): Takeshi ARIMA, Tsutomu IGARASHI, H TAKAHASHI, Masaaki UCHIYAMA*

**Purpose:** To investigate the involvement of hydrogen (H<sub>2</sub>) in macrophage polarization in the rat corneal alkali-burn model.

**Methods:** Physiological saline (saline group) or H<sub>2</sub> dissolved saline (H<sub>2</sub> group) was instilled continuously for 5 minutes before and after alkali exposure on the rat cornea. Infiltration of inflammatory cells and development of neovascularization was immunohistochemically evaluated. Three-dimensional ultrastructural changes of the tissue were analyzed using low-vacuum scanning electron microscopy.

**Results:** Inflammatory cell infiltration and neovascularization was significantly reduced in H<sub>2</sub> group. H<sub>2</sub> also suppressed pan-macrophage expression, while it induced M2 macrophage. In addition, H<sub>2</sub> increased Cu, Zn superoxide dismutase (SOD1) enzyme in the cytoplasm of corneal epithelial cells.

**Conclusions:** H<sub>2</sub> administration suppressed inflammatory cells and corneal neovascularization. In addition, H<sub>2</sub> treatment promoted M2 macrophage polarization by upregulation of SOD1.

## Identification of 2 Gene Variants for Axial Length in Chinese Children

*First Author: Li Jia CHEN*

*Co-Author(s): Shiyao LU, Calvin PANG, Jason YAM, Alvin YOUNG*

**Purpose:** This study is to identify genetic variations associated with axial length (AL) in children and compare the genetic profiles with that in adults.

**Methods:** A total of 2875 Chinese children aged between 6 and 9 were recruited from the Hong Kong Children Eye Study. Genomic DNA was extracted from buccal swab samples. Six single-nucleotide polymorphism (SNPs) that were identified in previous genome-wide association studies (GWAS) of AL in adults were first genotyped in 1062 children (Stage 1). SNPs that showed an association were further tested in 1813 children (Stage 2). Linear regression was utilized to fit an additive model for AL, adjusted by age, gender and height.

**Results:** In stage 1, SNPs rs10453441 and rs12144790 were associated with AL ( $P = 0.024$  and  $0.043$  respectively). In Stage 2, the association of rs10453441 ( $\beta = 0.12$ ,  $P = 1.1 \times 10^{-5}$ ) and rs12144790 ( $\beta = 0.058$ ,  $P = 0.037$ ) with AL were replicated, with both achieving an enhanced, significant association in the pooled cohort ( $\beta = 0.108$ ,  $P = 2.7 \times 10^{-6}$ ;  $\beta = 0.069$ ,  $P = 0.0023$ , respectively).

**Conclusions:** SNPs rs10453441 and rs12144790 were significantly associated with AL in children, with comparable effect sizes in adults, while the other 4 SNPs had no significant association with AL in children. Our data suggest that the genetic profiles of AL could be different between children and adults. Different gene variants may exert their effects on axial length growth in different stages of life.

## Induction of Autophagy After Ethanol Exposure Through the Inhibition of Caspase-2

*First Author: Chun-Chen CHEN*

**Purpose:** To determine whether the caspase-2 deficient cells induced autophagy after ethanol exposure.

**Methods:** The corneal fibroblast cells of wild type (wt) and caspase-2 deficiency were treated with ethanol (EtOH, 20% 20 seconds) and underwent immunofluorescence for LC3. The induction and conversion and LC3-II/LC3-I ratios were determined by Western blot using an antibody specific to LC3; GAPDH was used as loading control. Western blotting for Beclin1 was performed, and GAPDH served as the loading control.

**Results:** Autophagy can be detected by examining the conversion of cytosolic LC3-I to lipidated, autophagosome membrane-bound LC3-II. These autophagosomes in turn form autophagolysosomes by fusing with lysosomes. Immunocytochemistry using LC3 antibody was performed to study its redistribution after EtOH treatment. In the control wt and casp2 deficient cells, LC3 was distributed predominantly as diffuse green fluorescence in the cytoplasm and nucleus with very little lysosomal staining. We also performed Western blotting for LC3. A significant increase in LC3-II was detected in EtOH-treated casp2 deficient cells but not in wt cells, further corroborating the evidence of enhanced autophagy in the EtOH-treated casp2 deficient cells. We also performed Western blotting for Beclin1, a component of the phosphatidylinositol 3-kinase complex known to increase during autophagy. A significant and consistent increase was observed in the levels of Beclin1 in EtOH-treated casp2 deficient cells as compared with wt cells after EtOH treatment.

**Conclusions:** The autophagy was induced in response to oxidative stress induced by EtOH when the corneal cells cannot undergo apoptosis due to lack of caspase-2.

## The Effectiveness of Eye-Hand Coordination on Quality of Life Among Children with Visual Impairment: Experiences at the Mettapracharak (Watraikhing) Low Vision Rehabilitation Center

*First Author: Penpimol YINGYONG*

**Purpose:** To determine the effectiveness of eye-hand coordination in children with visual impairment (VI).

**Methods:** A prospective study of 71 children with VI (aged 7-13 years); 35 (49.3%) boys and 36 (50.7%) girls attending the low vision rehabilitation unit at the Mettapracharak (Watraikhing) hospital completed the low vision quality of life questionnaire before and 3 months after the eye-hand coordination rehabilitation from January 2017 to March 2018. Comprehensive low vision examination and eye-hand coordination rehabilitation skills were administered to enhance their remaining vision (functional activities).

**Results:** Almost all the participants reported change improvement with statistically significant differences ( $P < 0.05$ ) compared with before and after the eye-hand coordination rehabilitation. Overall questionnaire scores implied moderately standardized response mean value.

**Conclusions:** The eye-hand coordination provided improvement on low vision rehabilitation with clinical significance. Although these findings showed great importance in low vision rehabilitation, more scientific practical activities guideline for children with VI warrant further investigation.

## The Relationship Between Presbyopia and Near Stereoacuity in Refractive Errors

First Author: Olly **CONGGA**

**Purpose:** The problem of the relationship of near stereoacuity in presbyopic age is an interesting one as visual function declines by the age of 40. This study aimed to determine the relationship between presbyopia and near stereoacuity on emmetropic and ametropic groups.

**Methods:** This was a modified clinical trial study conducted at Balai Kesehatan Mata Masyarakat in Makassar for 2 months. There were 65 people aged 40-60 years who met inclusion criteria, consisting of 23 men (35.4%) and 42 women (64.6%). Near stereoacuity measurements were performed on 3 categorical groups, namely in the age group, the emmetropic group, and the ametropic group.

**Results:** There was a significant difference of near stereoacuity before and after subjective correction of bifocal lenses ( $P < 0.0001$ ). In the age group, there was a decrease in near stereoacuity to the age group 56-60 years compared to the age group 40-45 years, ( $P = 0.037$ ). There was a significant value of near stereoacuity improvement between subjects with myopia ( $P = 0.021$ ) and subjects with hypermetropia ( $P = 0.004$ ), but no significant value in astigmatism with-the-rule and against-the-rule groups ( $P = 1.0$  and  $P = 0.335$ , respectively) compared with emmetropic group.

**Conclusions:** Age and refractive errors affect near stereoacuity by optical defocus. Correction of bifocal lenses improves near stereoacuity on both groups.

# VIDEOS

## Academia, Research, Teaching and Education in Ophthalmology

### Battle Royale Glaucoma! Angle Surgery Training Models for Segmental and Circumferential MIGS

*First Author: Malcolm GOOI*

*Co-Author(s): Helen CHUNG, Patrick GOOI, Danielle WENTZELL*

**Purpose:** To demonstrate 3 training models for minimally invasive glaucoma surgery (MIGS) and critique their practicality and utility.

**Methods:** The corneoscleral rim (K-RIM) model uses cadaveric corneoscleral rims. Trephinating an “Open Sky” allows visualization of angle structures. Simulated iStent (Glaukos) insertion was performed. Tackdriver used an inverted cadaveric corneoscleral rim. Multiple procedures such as iStent and Gonioscopy-Assisted Transluminal Trabeculotomy (GATT) procedures were performed on a single specimen. The SimuEYE model demonstrated training for GATT with an artificial eye.

**Results:** K-RIM and Tackdriver both provide realistic tissue feedback and allowed for multiple procedures on single tissue specimen. However, the K-RIM model was less stable and more difficult to set up. The ABiC iTrack model (SimulEye) is an artificial eye with a premade goniotomy that can be used for ABiC and GATT. It can be reused multiple times, and is the easiest to set up, but model cost, lack of tactile feedback, and a limited amount of procedural skills that can be performed on each model are drawbacks.

**Conclusions:** All of these models provide the means of practicing bimanual gonioscopy skills, with relatively simple setups that were ergonomically practical. K-RIM provides an upright view but is time-consuming to prepare, and cannot simulate circumferential techniques (ABiC and GATT). Tackdriver has realistic tissue feedback, and is conducive to high-volume training with both segmental and circumferential techniques. However, tissue orientation is inverted. ABiC iTrack model provides the fastest setup without concerns for tissue cost or storage. It is potentially the most cost-effective, as the model is reusable.

### Making and Evaluating Regional Language Translator Apps for Ophthalmologists

*First Author: John AKKARA*

*Co-Author(s): Davis AKKARA, Devika BHATTACHARYA, Ethamma DAVIS, Anju KURIAKOSE*

**Purpose:** To address the language difficulties of ophthalmologists working in India, the authors themselves made Android smartphone apps to help with clinical history, examination, and counselling of patients who speak a different regional language as them.

**Methods:** The authors used a smartphone app programming framework called PhoneGap to make a few language apps - for Tamil, Telugu, Bangla, and more on the way. The words and phrases were collected from native language speakers involved in ophthalmic hospitals. The apps were uploaded on Play Store and distributed free of cost to ophthalmology residents and trainees. Feedback was obtained from these app users, and suggestions which were feasible were implemented and the apps were updated. These were more useful for asking leading questions and to get simple one-word answers. Longer conversations often had difficulties.

**Results:** The apps produced by these ophthalmologists were useful for the ophthalmology residents and trainees, who were new to the native languages of the patients. They found patient interactions faster and more fruitful, and their learning became easier. They were more confident of interacting with patients who did not speak the languages known to the residents. Suggestions included audio of pronunciations and a searchable dictionary in addition to pictures for certain terms.

**Conclusions:** Simple smartphone apps can help bridge the language barrier, especially in simple interactions where leading questions and simple answers were usable. These apps can be further improved to several other areas of medicine and several other languages to help residents and trainees working in different places.

### Simulation of Yamane Technique of Intraocular Lens Fixation and Variations

*First Author: Patrick GOOI*

*Co-Author(s): Helen CHUNG, Kevin WARRIAN, Danielle WENTZELL*

**Purpose:** To demonstrate the use of a training model for simulating intraocular lens (IOL) scleral fixation

using the Yamane technique, and a variation of offset sclerotomies and nasal paracentesis.

**Methods:** The SimuEYE model for iris suturing and IOL fixation was used for simulated scleral fixation of a 3-piece IOL using the Yamane technique previously described. Scleral fixation points were marked at 2 mm posterior to the limbus. A 3-piece non-silicone optic IOL with haptics was injected anterior to iris. The haptics were docked to a 27G hypodermic needle with an ab-interno technique. Also demonstrated was the use of offsetting the 27G needle sclerotomies 1 clock hour counter-clockwise, previously described by Dr. Brian Kim. Our novel modification shown included adding a nasal paracentesis to facilitate docking of the haptic on the surgeon's right.

**Results:** The Yamane technique of IOL fixation was successfully demonstrated using the SimuEYE iris suturing and IOL fixation model. This model was relatively inexpensive and straightforward to prepare.

**Conclusions:** The advent of procedure-specific artificial eyes for simulation training is helpful in practicing advanced anterior segment reconstruction techniques. This is potentially useful in maintaining surgical skills in procedures that are technically challenging but infrequently performed.

## Cataract

### 4-Point Fixation of Scleral Sutured Foldable Intraocular Lens Using Hoffman Pocket

*First Author: Puspha RAMAN*

**Purpose:** Traditionally, scleral fixation of intraocular lenses (IOLs) is performed after preparation of scleral flaps with 2-point fixation of rigid PMMA lens. We described a surgical technique that uses a Hoffman pocket and 10-0 prolene suture for 4-point scleral fixation of a foldable posterior chamber IOL in a patient with insufficient capsule support.

**Methods:** The surgery was performed in a 55-year-old patient who was left aphakic after the primary repair of corneal laceration and traumatic cataract with extensive zonulolysis. According to the Hoffman technique, scleral pockets dissected posteriorly from a partial-thickness peripheral clear corneal incision. The preloaded 4 looped Micro+ A 123 (PhylOL) was injected through 3 mm clear corneal incision. A double-armed 10-0 Prolene suture was passed through the nasal side Hoffmann pocket into the loops of the IOL. The needle was subsequently retrieved through the corneal incision. The same suture needle threaded through another loop of the IOL and retrieved through Hoffmann pocket via handshake technique using a 25-gauge needle. The same procedure is repeated with the other end on the temporal side. Sutures

externalized to the pocket to tie the ends with good IOL centration. After it is tightened, the knot slides into the safety of the pocket.

**Results:** At 1-month review, the 4 loop IOL was stable with good centration. The patient's vision had improved from HM to 6/18 postoperatively.

**Conclusions:** Four-point scleral fixation of foldable IOLs allows small incision surgery with greater lens stability that reduces operative time and minimizes astigmatism and inflammation, thereby providing faster visual rehabilitation.

### Anterior Segment Reconstruction After Complicated Small Incision Cataract Surgery

*First Author: Maneesh BAPAYE*

**Purpose:** To describe a case of successful management of iridodialysis caused during small incision cataract surgery.

**Methods:** A 70-year-old diabetic male patient was referred for management of intraoperative complications of small incision cataract surgery (SICS). At presentation, patient had almost 180-degree inferior iridodialysis, retained nuclear fragment with cortical sheet and organized hyphema inferiorly. Iris was incarcerated in superior scleral tunnel. Intraoperatively, nuclear fragment and hyphema were removed with vitreous cutter. Cortical sheet was cleared with bimodal aspiration and infusion cannulae. Iris was released from superior scleral tunnel and iridodialysis was repaired with 10-0 prolene sutures. Intraocular lens (IOL) was inserted in sulcus.

**Results:** Postoperatively, patient had round mid-dilated pupil. IOL was stable. Patient was noted to have proliferation diabetic retinopathy with vitreous hemorrhage in both eyes and was treated for same with intravitreal anti-VEGF injections and panretinal photocoagulation.

**Conclusions:** Intraoperative iridodialysis is a rare but serious complication of SICS. The video describes successful management of the same.

### Coring to Conquer Posterior Polar Cataract

*First Author: Minu MATHEN*

**Purpose:** To evaluate the safety and efficacy of a new phacoemulsification technique for posterior polar cataracts, and to validate the usefulness of a newly designed phaco needle to suit this technique.

**Methods:** Prospective case series of 23 consecutive cases of posterior polar cataracts identified by slit lamp examination. No hydroprocedure or nucleus rotation was performed. A novel technique of mid-peripheral coring of central nucleus, with a specially designed phaco needle, was employed. The newly designed phaco tip and the technique will be demonstrated in

the video.

**Results:** Successful phacoemulsification with intraocular lens (IOL) implantation was achieved in all cases. Intraoperative complications included 1 capsulorhexis tear during nucleus emulsification and 1 posterior capsule rupture at the end of epinucleus/cortex aspiration. For both these cases, multipiece hydrophobic IOL was implanted in the sulcus. There was no case of nucleus drop. Postoperative corneal edema and iritis were minimal in all cases. The mean endothelial cell count pre and 3 months postoperative were  $2342 \pm 35$  and  $2276 \pm 29$  cells/mm<sup>3</sup> respectively. Best corrected visual acuity was 6/6 in all cases after 3 weeks.

**Conclusions:** This novel coring technique for phacoemulsification of posterior polar cataracts is a safe and efficient method to prevent nucleus drop, which is a dreaded complication in such cases. The newly designed phaco needle suits well in performing this technique effectively.

### Excellent Visual Outcome After Manual Small Incision Cataract Surgery for Phacolytic Glaucoma

*First Author: Shams* **NOMAN**

**Purpose:** To show the easier technique and to evaluate the visual outcome after manual small incision cataract surgery (MSICS) as a treatment of phacolytic glaucoma.

**Methods:** Video will show the easier technique of doing MSICS in the phacolytic glaucoma, and will also show the result of 43 patients with phacolytic glaucoma treated by manual small incision cataract surgery with intraocular lens implantation. Preoperative and postoperative visual acuity and intraocular pressure (IOP) have been recorded and compared at the end of 6 weeks after surgery.

**Results:** The mean preoperative IOP was  $36.23 (\pm 10.86)$  mm Hg. There were no significant intraoperative complications such as posterior capsular tear or expulsive hemorrhage. Postoperative mean IOP was  $12.58 (\pm 3.45)$  mm Hg. Preoperative visual acuity in all the affected eyes were perception of light with projection of rays in all quadrants. Postoperative best corrected visual acuity was 6/6-6/18 in 27 patients (62.80%), 6/24-6/36 in 10 patients (23.25%), and  $\leq 6/60$  in 6 patients (13.95%).

**Conclusions:** Manual small incision cataract surgery is a safe and effective method of treatment for phacolytic glaucoma, and the visual outcome and IOP reduction is satisfactory.

### Intraocular Lens Implantation: Complexity in Simplicity

*First Author: Lakshmi* **SREEDHARAMURTHY**  
*Co-Author(s): Deepti* **JOSHI**, Krishnaprasad **R**

**Purpose:** To find simple solutions to apparently complex intraocular lens (IOL) implantation process.

**Methods:** This video demonstration showed an uncomplicated IOL implantation technique followed by a bouquet of IOL implantation mishaps, which is further followed by tips and tricks to be followed to have a trouble-free IOL implantation.

**Results:** IOL implantation is a simple but technically demanding technique. Simple measures often save the day.

**Conclusions:** To most ophthalmic surgeons, experienced and novice, IOL implantation is a step that is considered undemanding. But the actuality is that IOL implantation, if not done correctly, can result in a variety of complications ranging from damage to the lens or the capsulozonular apparatus of the eye, which becomes detrimental to the final visual outcome.

### Misty Phacoemulsification

*First Author: Namrata* **SHARMA**

**Purpose:** To highlight tips and tricks in cases of phacoemulsification with coexisting corneal haze.

**Methods:** In cases of partial corneal opacification involving the peripheral or paracentral cornea, a technique of eccentric capsulorhexis with eccentric crater is useful along with the use of nylon hooks, endoilluminator, and trypan blue dye in challenging cases of healed keratitis, stem cell deficiency, Steven Johnson syndrome, ocular cicatricial pemphigoid, and healed chemical injuries. Further, in cases of central corneal opacification involving the anterior or posterior layers, combined anterior or posterior lamellar keratoplasty along with phacoemulsification is required.

**Results:** Optimal results of corrected distance visual acuity (CDVA) of  $>6/12$  was obtained in 80% of eyes using the above technique. However, in 20% of eyes, combined keratoplasty with phacoemulsification was required which yielded CDVA of 6/9.

**Conclusions:** Optimal results can be obtained in challenging cases of cataract with coexisting corneal haze.

### Modification of Technique for Performing Manual Small Incision Cataract Surgery by Left-Handed Surgeons: It's Different

*First Author: Charudutt* **KALAMKAR**  
*Co-Author(s): Amrita* **MUKHERJEE**, Jaideep **POPLI**, Rohit **RAO**

**Purpose:** To present modifications in manual small

incision cataract surgery (MSICS) technique by left-handed surgeons (LHS) and highlight differences from standard procedure performed by right-handed surgeons (RHS).

**Methods:** A total of 215 adult eyes underwent MSICS by LHS. Instead of copying steps as done by RHS, customization of each step was done to suit dominant left hand. Major modifications: scleral tunnel (starting left and extending to right), capsulorhexis (initial nick: opposite direction, flap rotation clockwise rather than traditional anti-clockwise), irrigation-aspiration, IOL holding and dialing (instead of starting from 12 o'clock, bring trailing haptic to 6 o'clock and dialing into bag).

**Results:** There were no major intraoperative complications. All 215 eyes gained BCVA of 20/40 or more. Limitation: increased difficulty in performing tunnel in right eyes. Increased the ease of doing surgery and reduced surgical time.

**Conclusions:** Use of modified technique by LHS would improve ease of doing surgeries and postoperative outcomes. The modifications, customized for LHS, were done to make steps easier and reduce risk of intra-op complications.

### Needle-Assisted Haptic Externalization and Sutureless Transconjunctival Fixation of AcrySof Multipiece Lens

*First Author: Zia MAZHRY*

**Purpose:** To demonstrate an innovative technique of 27-gauge needle-assisted haptic externalization and sutureless transconjunctival fixation of AcrySof multipiece lens.

**Methods:** A 52-year-old patient presented with Marphanoid dislocated cataract in his right eye and subluxated cataractous lens in his left eye. PPV with lens removal and Acrysof multipiece intraocular lens (IOL) haptic externalization and fixation was planned. Twenty-three-gauge PPV was performed. The small-sized cataractous lens was brought in AC with the suction pressure of vitreous cutter and removed through 6.00 mm incision. A 27G hypodermic needle was passed 1.00 mm behind limbus, fashioning a tangential tunnel of about 1.00 mm in scleral and then directed towards the center of the vitreous cavity and entered into the eye. The needle was guided through already placed 6.00 mm incision outside of the eye with the help of visco cannula. The AcrySof multipiece IOL haptic was threaded into the needle and gently externalized. The haptic end was transformed into a bulb by applying gentle heat. The similar procedure was repeated 180 degrees apart with second IOL haptic. The IOL was dialed in position, and haptic ends were internalized in the scleral tunnel and fixed. The main wound was closed.

**Results:** The IOL was well fixated, centered, and stable at the end of the procedure and remained so to date,

that is 1 year postoperatively.

**Conclusions:** The needle-assisted haptic externalization appears a viable option for haptic externalization. After haptic externalization, the bulbous transformation of haptic ends by gentle heat application may provide a long-term sutureless fixation of the IOL.

### Nucleus Snap Back Sign: A New Sign to Recognize Incomplete Nucleus Cracking in Phacoemulsification of Hard Cataracts

*First Author: Charudutt KALAMKAR*

*Co-Author(s): Amrita MUKHERJEE, Rohit RAO*

**Purpose:** To describe 'Nucleus Snap Back Sign' (NSBS) for identification of incomplete nucleus chopping during phacoemulsification (PE).

**Methods:** After initial division of nucleus into 2 halves, incomplete chopping of heminucleus or smaller fragment results in pieces being attached at the posterior plate. Incomplete separation of nuclear pieces can be identified by NSBS: on impaling nuclear piece with phaco tip, when surgeon starts pulling piece towards center the piece falls back to original location like a spring. This happens because piece is still attached posteriorly to adjoining fragment. On identification of this sign, PE should be stopped, and re-cracking should be done.

**Results:** Timely identification of incomplete separation with NSBS leads to better chopping and mobilization of pieces. There were no intra/postop complications in these cases.

**Conclusions:** NSBS helps in early identification of incomplete chopping, reduces energy use, decreases surgical time, and reduces risk of complications.

### Posterior Capsular Rent: Pearls of Early Diagnosis and Systematic Management for Trainees

*First Author: Amrita MUKHERJEE*

*Co-Author(s): Jaideep POPLI, Rohit RAO, Charudutt KALAMKAR*

**Purpose:** To guide surgeons undergoing phacoemulsification (PE) training in identifying posterior capsule rents (PCR) occurring at various steps of surgery, and strategies to manage PCR according to stage at which it occurs. Demonstration of PCR occurring at various stages of surgery and proper management according to the step was done to help train surgeons.

**Methods:** This was a video series of 6 cases of PE, being done by trainees, with PCR. All patients underwent systematic PCR management with anterior vitrectomy and 3-piece intraocular lens (IOL) implantation in sulcus. Case1: PCR during trenching, Case 2: Rhexis extension, Case 3: During initial chopping and emulsification, Case 4: Emulsification of last nuclear

piece, Case 5: During removal of epi-nuclear sheet Case 6: PCR went unrecognized and was noticed after IOL implantation. Signs to recognize PCR at each step and specific management demonstrated. Correct technique of 3-piece IOL implantation (PMMA and Foldable) was also shown.

**Results:** All the patients successfully managed with IOL implantation. All gained BCVA of 6/18 or better on first postoperative day (POD) and 6/12 or better at POD 30. No patient required any re-surgery or developed further complications.

**Conclusions:** The key to success in PCR management is early recognition and timely management. With proper intraoperative management, the risk of postoperative complications is minimal.

## Posterior Polar Cataract: The Bugbear

*First Author: Mohan RAJAN*

*Co-Author(s): Sujatha MOHAN*

**Purpose:** To highlight the management of posterior polar cataract (PPC) during phaco surgery.

**Methods:** Posterior polar cataract is always a bugbear for even an experienced phaco surgeon. There is an increased incidence of posterior capsule rupture, pre-existing dehiscence and nucleus drop in PPC. This video highlights the various manifestation of PPC and the various phaco techniques for managing these types of difficult cataracts with good results.

**Results:** We have shown the surgeon skills to give the best results in PPC surgery.

**Conclusions:** This video highlights the difficult situations and management techniques and precautions to be involved in posterior polar cataract surgeries.

## Pupilloplasty for Traumatic Mydriasis

*First Author: Michelle FAN*

*Co-Author(s): Lawrence IU*

**Purpose:** Traumatic mydriasis and cataract resulting from ocular blunt trauma can cause disturbing symptoms such as photophobia and glare. Insertion of aniridia implant is feasible but it is expensive and may not be readily available. The long-term safety regarding risk of endothelium cells loss and glaucoma are uncertain. Matching of iris color is also difficult. The purpose of this video was to illustrate the surgical technique of pupillary cerclage to repair traumatic mydriasis.

**Methods:** Pupilloplasty by pupillary cerclage was performed in 2 patients suffering from traumatic mydriasis. Purse-string method using double-arm polypropylene suture was used to reconstruct the distorted and dilated pupil. Additional procedures of phacoemulsification or iridodialysis repair were also performed in the same setting of pupillary cerclage

operation.

**Results:** Pupillary cerclage was successfully performed in both patients. Pupil size could be adjusted during the operation. Both patients had significant improvement of symptoms of photophobia and glare after the operation. There were no complications during or after the operation. Surgical pearls and techniques are discussed in this video.

**Conclusions:** Pupilloplasty with pupillary cerclage is a safe treatment option to repair traumatic mydriasis with promising outcome. The advantages include allowing intraoperative adjustment of pupil size, low cost, avoiding heterochromia iridis, and avoiding complications of aniridia implant such as glaucoma and endothelial cell loss. Phacoemulsification and iridodialysis repair can be done in the same setting of pupillary cerclage.

## Small Eye, Big Problems

*First Author: Nivean MADHIVANAN*

*Co-Author(s): Sridhar BARATAN, Siva Mohan*

*HALAHARVI, Nishanth M, Pratheeba Devi NIVEAN, Abhiyan Kumar PATNAYAK*

**Purpose:** To show how we can do a safer phacoemulsification in a patient with nanophthalmos.

**Methods:** The video showed how we were able to do phacoemulsification in a nanophthalmic eye. The left eye had intraocular lens (IOL) power of 37 diopters (D) (AL-15.40) and the right 40 D (AL-15.47) using SRK-T formula. There was difficulty in maneuvering the phaco probe inside a shallow anterior chamber. The custom-made thicker IOL also created problems due to its high power. Even though the postoperative result was very satisfactory, the decreased maneuverability in anterior chamber put us at risk for endothelial damage and posterior capsular rent. Keeping this in mind, we did the second case by doing an anterior vitrectomy.

**Results:** The phacoemulsification was easier and much safer when doing an anterior vitrectomy than the other eye of the patient.

**Conclusions:** Even though our experience is based on a very small sample size of patients, we feel it is much easier to do phacoemulsification if it can be combined with anterior vitrectomy in such cases. The technique such as soft shell and torsional phaco can protect the endothelium but cannot prevent posterior capsular rent. Our method prevents the posterior capsule being caught in the phaco probe, and debulking the vitreous puts us at lesser risk of suprachoroidal hemorrhage, which is much more common in a nanophthalmic eye.

## Small Pupil Management in Phacoemulsification Surgery for Young Ophthalmologists

First Author: Mukesh **PARYANI**

**Purpose:** The purpose of the video was to demonstrate step wise management in managing small pupil during cataract surgery, which would help young budding ophthalmologists in decision-making in managing these cases.

**Methods:** The author has demonstrated several scenarios of preoperative and intraoperative miosis during cataract surgery and tips and tricks involved in managing at various stages of cataract surgery. The author has also covered managing uveitic cataracts.

**Results:** This video, through its step wise managing, may help young budding ophthalmologists in managing small pupil cataract surgery.

**Conclusions:** This video provides affordable tips and tricks for a safe and better outcome in a phacoemulsification surgery in small pupil.

## Soft Cataract: How to Emulsify Safely?

First Author: Amarendra **DEKA**

Co-Author(s): Lobsang **T**

**Purpose:** To improve the surgical outcome by modifying technique of phacoemulsification of soft cataract.

**Methods:** Several techniques of phacoemulsification for soft cataract are tried.

**Results:** Modified techniques that we described were safe with predictable outcome.

**Conclusions:** Simple modification of techniques can make emulsification of soft cataract safer and easier.

## T Soft: New Technique for Soft Cataract

First Author: Rajendra **PRASAD**

**Purpose:** We aimed to describe T Soft, a new surgical technique, which utilized a unique mechanical force with the help of a specially designed chopper named “terminator” to break and split the soft nuclei into 2 complete segments with ease and minimal manipulation.

**Methods:** While much attention is rightly paid to handling dense, rock hard nuclei, quite often softer cataracts also present a challenge. Soft nuclei are difficult to rotate, grip, and crack. Current chopping and cracking techniques are often ineffective. High vacuum and high-power settings to hold the nucleus for chopping in soft cataract results in the soft lens material aspirating into the phaco probe with resultant loss of suction. Sharp choppers and the phaco probe cheese wire through the soft lens and make it difficult to hold and crack the nucleus. There is also the risk of the phaco tip going rapidly through the soft lens

material and through the capsular bag, resulting in a posterior capsule rupture.

**Results:** T Soft was highly successful in dealing with soft cataract with some brittleness. Nuclear division was possible in 100% of cases attempted and emulsified without much manipulation and use of energy.

**Conclusions:** T Soft represents a simple, safe, and easy strategy for controlled nuclear division, mobilization, and emulsification within the capsular bag in cases of soft cataracts, especially for beginning surgeons. T Soft can be used successfully for removal of adult soft cataracts with good reproducibility.

## Unclip, Tuck, and Stitch: Bring It All Together

First Author: Nivean **MADHIVANAN**

Co-Author(s): Siva Mohan **HALAHARVI**, Manoj **KHATRI**, Pratheeba Devi **NIVEAN**, Abhiyan Kumar **PATNAYAK**, Mohan **RAJAN**

**Purpose:** A 60-year-old male patient presented to us with vision of HM+ in right eye with an iris claw intraocular lens (IOL) in situ, vitreous hemorrhage, and superior iridodialysis post-cataract surgery. After careful examination, we planned to do pars plana vitrectomy with IOL exchange and single-pass 4-throw pupilloplasty (SFT) for repair of iridodialysis in a single sitting.

**Methods:** This video demonstrated 4 surgical techniques that were used to deal with the multiple challenges that this case offered. Unclipping of the claw IOL was a challenge in itself to prevent further damage to the iris or bleeding and its explantation via the previously made sclero-corneal tunnel. Once the lamellar scleral flaps 180 degrees apart 23G pars plana vitrectomy was performed. Vitreous hemorrhage was cleared after inducing PVD. A glued IOL was then implanted using the Handshake technique. The last challenge was to repair the iris, and we used the technique of single-pass 4-throw pupilloplasty with a 10-0 prolene suture. The scleral flaps and the conjunctiva were apposed using fibrin glue.

**Results:** Postoperatively, the patient improved to 6/60 unaided with a few corneal descemet folds, a round pupil, and a stable IOL. At 1 month postoperative visit, the patient had vision of 6/12 unaided, a clear cornea, round pupil, stable IOL, and a normal fundus.

**Conclusions:** A challenging case such as this one can be managed effectively with appropriate preoperative planning and using various techniques to give the patient excellent results.

## Use of Temporary Safety Suture During Intracapsular Fixation of Intraocular Lens for Beginners

First Author: Tommy **CHAN**

**Purpose:** To describe a simple procedure that can

safeguard the intraocular lens (IOL) during intrascleral fixation.

**Methods:** Two 10-0 monofilament nylon sutures were used temporarily to provide additional support to a foldable 3-piece IOL during the surgery.

**Results:** In this technique, each haptic was stabilized by a suture loop to prevent posterior dislocation of the IOL when slippage, breakage, or deformation of haptic occurs intraoperatively. The 2 sutures were subsequently removed after fixation of the externalized haptics was completed. We have incorporated the use of safety sutures during teaching intrascleral IOL fixation to our resident trainees and found it to be very helpful. In this video, the leading haptic was accidentally inserted posterior to the iris plane after the IOL was released from the injector. The IOL was prevented from dropping posteriorly with the safety suture at 2 o'clock, which also aided the manipulation of the leading haptic back to the anterior chamber.

**Conclusions:** The procedure enhanced the safeness of surgery, and can be incorporated into most techniques for sutureless intrascleral fixation of IOL. Although it is arguable that the use of safety sutures may not be necessary for surgeons who are experienced in performing intrascleral IOL fixation, we recommend its usage especially for a number of cases during the learning curve to enhance the safety of the procedure.

## Cornea, External Eye Diseases & Eye Bank

### Compression Suture Technique for Corneal Hydrops Management

*First Author:* Bhupesh **SINGH**

*Co-Author(s):* Sudhank **BHARTI**, Neha **BHARTI**

**Purpose:** To demonstrate compression suture technique of hydrops management along with outcomes and safety of the technique.

**Methods:** Acute hydrops cases were treated with 14% iso expansile concentration of C3F8 gas along with compression sutures. Preoperative ASOCT was done to see the cleft size and direction. The intricacies of surgical technique will be discussed in detail.

**Results:** This technique showed faster resolution of corneal scar with minimal scar formation. Keratoplasty can be deferred for years after this procedure.

**Conclusions:** This is an excellent technique to manage this severe complication of corneal ectasia.

### Dancing Larvae in Conjunctival Fornices

*First Author:* Piyush **BAJAJ**

*Co-Author(s):* Riani **ASRINDI**, Pushkar **DHIR**, Parikshit **DHIR**, Ruchika **GARG**

**Purpose:** Ophthalmomyiasis externa results from the infestation of the conjunctiva by the larval form of sheep botfly. Only a few cases of ophthalmomyiasis externa which are caused by the larva of oestrus ovis were reported from India.

**Methods:** A 65-year-old male patient presented to us with complaints of pain. Irritation complaints similar to conjunctivitis.

**Results:** Slit lamp examination revealed presence of small, wriggling, live foreign bodies, larvae of ostreous ovis. They were confirmed by the microbiologist.

**Conclusions:** Ophthalmomyiasis externa is a potentially dangerous condition. Early and prompt diagnosis and management are essential. In differential diagnosis of acute conjunctivitis, this condition should be considered. This emphasizes the importance of hand hygiene and sanitation. This video also illustrates the need of timely and correct diagnosis and management of ophthalmomyiasis externa.

### Glueless and Sutureless Pterygium Autograft

*First Author:* Piyush **BAJAJ**

*Co-Author(s):* Pushkar **DHIR**, Parikshit **DHIR**, Ruchika **GARG**, Tarun **GUPTA**

**Purpose:** To introduce a new technique which aids adhesion of conjunctival autograft in pterygium surgery.

**Methods:** Fifty-six eyes of 56 patients with primary pterygium were graded, and excision was performed by the single surgeon. To prevent recurrence, free conjunctival autograft was taken from superotemporal or inferior quadrant from the same eye, and bleeding was induced in episcleral vessels of bare sclera and CAG was moved over it without the use of sutures or fibrin glue, allowing natural autologous coagulum of the recipient bed to act as a bioadhesive. The eye was patched for 24 hours. Postoperatively, patients were put on topical antibiotic and steroid eye drops for 6 weeks. The outcomes were assessed in terms of post of foreign body sensation, any recurrence, complication(s), and operative time at each follow-up visit on day 1, 21, 45, and 240 days.

**Results:** There were 41 females (73.2%) and 15 males (26.7%). The mean age of all the patients was  $46 \pm 13.2$  years, range 22 – 70 years. In 8 months documented follow-up, none of eyes had recurrence with few graft malposition. Resurgery was advised, but patient was happy with removal itself. No other complication was noted. An average surgical time was  $22 \pm 2$  mins.

**Conclusions:** This technique is proving to be cheap, easy, patient and doctor friendly with minimum postop

symptoms. The recurrence, complication rate, and the operative time of glue / suture fixated autograft seem to be comparable with the current techniques in practice, without adding possible potential hazard of the surgical adjunct.

### Keratoprosthesis Melt Medley

*First Author: Bhaskar* **SRINIVASAN**

*Co-Author(s): Shweta* **AGARWAL**, *Geetha* **IYER**

**Purpose:** To illustrate various scenarios of keratoprosthesis (Kpro) melt, ways to approach, and possible means to prevent the same.

**Methods:** Videos of surgeries done in various scenarios of Kpro melt with means to manage or prevent them in our center from 2003 to January 2018 were compiled.

**Results:** A total of 214 keratoprosthesis surgeries, including both type 1 (Boston, Lucia and Auro kpro-65) and type 2 (Boston type 2, MOOKP, osteo kpro and Lucia type 2- 149) were performed. Chemical injury was the most common indication for type 1 and Stevens Johnson syndrome for type 2. Functional success (BCVA >20/200) was noted in 69.2% for type 1 and 74% for type 2 Kpro. Haptic melt was noted in 32/65 type 1 and 36/149 type 2. Based on the extent of melt, it was managed with a lamellar graft or bone morphogenic protein (34/214), a reKpro (27/214), or removal (13/214).

**Conclusions:** Haptic melt, either as periopic graft melt or lamina/bone resorption, was noted in all types of keratoprosthesis irrespective of the overlying tissue (conjunctiva, oral mucosa, or skin) and etiology. A medley of sorts, this video compiles presentation, management, and outcomes of Kpro melts – a vision threatening complication that necessitates timely, appropriate intervention.

### Large Conjunctival Cyst Excision

*First Author: Jianhao* **CAI**

**Purpose:** To present a simple surgical approach for removal of a large conjunctival cyst.

**Methods:** A 34-year-old female patient was presented with a large conjunctival cyst in lower fornical conjunctiva. Excision via a conjunctival approach was performed under surgery microscope.

**Results:** The intact conjunctival cyst was removed successfully.

**Conclusions:** A conjunctival approach is an effective method to remove a large conjunctival cyst with subtle manipulation.

### Nature and Nurture

*First Author: Pooja* **KHAMAR**

*Co-Author(s): Arkasubhra* **GHOSH**, *Swaminathan* **SETHU**, *Rohit* **SHETTY**

**Purpose:** Keratoconus is a multifactorial, inflammatory corneal ectatic disorder, where the progressive asymmetrical astigmatism leads to vision loss. Despite the availability of treatment options, the etiopathogenesis of the disease is yet to be fully understood, which hampers an effective preventive and therapeutic strategy.

**Methods:** We do not discard anything we remove. Instead, we preserved them in our biorepository at 80 degrees Celsius in appropriate medium and later analyzed them for studying various molecular and genetic markers, and studied the deregulated pathways.

**Results:** This video depicted our proposed model on the role of genetics (Nature) and epigenetics (Nurture) in KC pathogenesis which was built on our genetic and molecular findings in KC patients. We shared the various biological factors we observed, both systemic and local, that could contribute to the disease process.

**Conclusions:** Harnessing the cellular and molecular information obtained related to KC pathogenesis would enable the development of molecular diagnostic tools, in addition to the currently available ones that would aid in predicting disease progression and treatment (cross-linking) outcomes. Hence, paving the way for evidence-based, bespoke management of KC.

### War on Posterior Corneal Infections

*First Author: Lionel* **DANIEL RAJ PONNIAH**

**Purpose:** To demonstrate a newer drug delivery method in managing posterior corneal infections with implantable antibiotics.

**Methods:** In this prospective, interventional case series, Case 1: 54-year-old male with deep fungal corneal infection along with posterior corneal abscess in whom a femto-assisted stromal bed and 2 incisions created, Amphotericin B impregnated implant placed, healing recorded every day and implant removed on 5th day. Case 2: 35-year-old male with deep bacterial corneal infection underwent therapeutic lamellar keratoplasty with Moxifloxacin implant in the interface. Implant removed after successful healing on 4th day. Case 3: 51-year-old female with deep bacterial corneal infection in whom primary Amikacin implant placed, substituted on day 3 with another implant and healed on 7th day. Healing measured clinically and by anterior segment optical coherence tomography. Intensive topical administration of antibiotics was avoided.

**Results:** Nine cases enrolled. All resolved well. Two cases required repeat implantation after removal of primary implants. No endothelial compromise noted.

Intensive topical administration of antibiotics was avoided. Ocular surfaces were healthy.

**Conclusions:** Intrastromal implantable sustained release corneal antimicrobials are a newer and effective technique in the management of posterior corneal infections with fewer adverse effects on the ocular surface, and they reduce significantly the necessity for topical administration.

## Glaucoma

### A Shotgun Approach to Targeted MIGS: Hemi-GATT for Patients with a Reticular Episcleral Venous Pattern

*First Author: Julia WIENS*

*Co-Author(s): Helen CHUNG, Patrick GOOI, Danielle WENTZELL*

**Purpose:** To report a case of a 180-degree hemispheric gonioscopy-assisted transluminal trabeculotomy (Hemi-GATT) effectively treating a glaucoma patient with a reticular episcleral venous pattern. Hemi-GATT is a simple, cost-effective microinvasive glaucoma surgery (MIGS) option.

**Methods:** A 180-degree inferior Hemi-GATT is completed using the ripcord technique with a 5-0 polypropylene suture to unroof Schlemm's canal to bypass resistance at the trabecular meshwork. Increasing the infusion pressure elevates the intraocular pressure (IOP), causing a surge of balanced salt solution into the episcleral veins. This blanching is known as the EVFW and can be appreciated in the full 360 degrees of the plexus.

**Results:** This patient was a 58-year-old female with pigmentary glaucoma in both eyes (OU), with preoperative IOPs of 21 mm Hg in the right eye (OD), on once nightly travoprost OU. IOP decreased to 18, 12, and 15 mm Hg at 1 day, 1 month, and 3 months after combined cataract extraction and hemi-GATT, respectively. At 3 months post-op, the patient was not on any pressure-lowering topical medications, with an IOP of 15 mm Hg.

**Conclusions:** Patients with reticular episcleral venous pattern are difficult to identify where MIGS should target. We propose that these patients can benefit from 180-degree treatment through hemi-GATT. A full 360-degree EVFW can be elicited with this segmental procedure in patients with reticular pattern, effectively lowering IOP and topical medication burden.

### Ahmed Valve Implantation for Beginners

*First Author: Pankaj BENDALE*

**Purpose:** Simplified steps for Ahmed glaucoma implant for beginners. Ahmed valve is required in various

situations like uveitic Glaucoma, neovascular glaucoma, POST VR surgery glaucoma, and failed trabeculectomy cases. Mastering this technique makes life easy when we are managing difficult glaucomas, with very good vision potential.

**Methods:** Ahmed valve was implanted in superotemporal quadrant as the technique described in the video.

**Results:** Ahmed valve gives good intraocular pressure control over a 5-year period.

**Conclusions:** It's easy to master if we go step wise. It makes us comfortable in managing the spectrum of glaucoma.

### Family Screening: An Effective Way to Combat Glaucoma Blindness

*First Author: Pavan KUMAR*

*Co-Author(s): Srinivasan KAVITHA, Rengaraj VENKATESH*

**Purpose:** To detect the prevalence of glaucoma among the family members of a patient who is newly diagnosed to have primary glaucoma through novel family screening approaches.

**Methods:** The first-degree relatives of a newly diagnosed glaucoma patient were subjected to screening for glaucoma in different ways. Family screening is encouraged at base hospital and satellite centers through motivational cards and opportunistic screening.

**Results:** Through family screening, the rate of detection of glaucoma prevalence was 3-4 times the worldwide prevalence rate of approximately 4% in individuals aged 40 - 80.

**Conclusions:** Family screening is an effective way of detecting asymptomatic glaucoma and thereby helps us to prevent glaucoma blindness.

### GATT: Heme Management Tips. Primary Angle Closure Glaucoma Treated with Phacoemulsification, Goniosynechiolysis, and GATT

*First Author: Malcolm GOOI*

*Co-Author(s): Helen CHUNG, Patrick GOOI, Danielle WENTZELL*

**Purpose:** To demonstrate management of intraoperative hemorrhage during angle surgery and to demonstrate the management of primary angle closure glaucoma (PACG) with cataract extraction, goniosynechiolysis, and gonioscopy-assisted transluminal trabeculotomy (GATT).

**Methods:** After cataract phacoemulsification, goniosynechiolysis was achieved with a 25G needle under gonioscopy. GATT was performed with a 5-0 polypropylene suture. Intracameral hemorrhage can

impede the gonioscopic view. This was managed with injection of additional OVD at the goniotomy site as well as at the corneal endothelium. Using cohesive OVD prevents anterior chamber shallowing and prevents additional heme reflux. Occasionally, to fully clear the blood in the AC, irrigation and aspiration of the OVD and blood was necessary, followed by injection of additional OVD. The rest of the GATT procedure was successfully completed.

**Results:** With these maneuvers, there was minimal intracameral hemorrhage at the conclusion of the case.

**Conclusions:** Managing PACG with cataract, goniosynechiolysis, and GATT has an increased risk of intracameral hemorrhage, which can easily be managed to complete the procedure.

### Half Treats the Whole: 180-Degree Hemispheric Goniotomy Creating a 360-Degree Episcleral Venous Fluid Wave in Glaucoma Surgery

*First Author: Danielle WENTZELL*

*Co-Author(s): Gabriela CAMPOS-BANIAK, Helen CHUNG, Patrick GOOI*

**Purpose:** To demonstrate that access to all collector channels can be achieved through segmental, 180-degree shearing of Schlemm's canal via a hemispheric gonioscopy-assisted transluminal trabeculotomy procedure by observing a 360-degree episcleral venous fluid wave (EVFW). Hemi-GATT is a simple, cost-effective, microinvasive glaucoma surgery (MIGS) option.

**Methods:** A Hemi-GATT was performed with a 5-0 polypropylene suture. Lowering the infusion pressure in the anterior chamber after a hemi-GATT procedure engorged the episcleral veins. Hyperinfusion of balanced salt solution (BSS) caused intraocular pressure (IOP) to increase. This supraphysiological elevation in IOP caused an outflow of BSS that blanches the patent episcleral venous system, known as the EVFW.

**Results:** A 67-year-old male with primary open angle glaucoma and cataract OU preoperatively had a max IOP of 20 mm Hg OU on topical brimonidine/timolol BID OU. He underwent cataract and Hemi-GATT surgeries OU, where a 180-degree goniotomy resulted in a full 360-degree EVFW. Five months postoperatively, the patient IOPs were stable at 18 mm Hg OU without taking any glaucoma medications.

**Conclusions:** A full 360-degree EVFW can be elicited with segmental Schlemm's canal shearing through a Hemi-GATT, indicating that a full 360-degree circumferential trabeculotomy is not necessary to access the full distal collector system. Our patient successfully eliminated his medication burden with this approach. Hemi-GATT is generally faster with less manipulation than a full 360-degree GATT. This may offer Hemi-GATT a favorable safety profile.

The additional cost of consumables for GATT is approximately \$10-\$30 USD per case, making this a very accessible and cost-effective MIGS option.

### Hemi-GATT Techniques: Walk the Dog and Ripcord

*First Author: Patrick GOOI*

*Co-Author(s): Helen CHUNG, Steven SAFRAN, Danielle WENTZELL*

**Purpose:** To demonstrate 2 modifications to gonioscopy-assisted transluminal trabeculotomy (GATT) that can be used to complete a hemi-GATT: 1) Walk the dog and 2) Ripcord techniques.

**Methods:** A 5-0 polypropylene suture with bulbed tip was inserted at goniotomy site, created with a 25-gauge needle. The suture was inserted into Schlemm's canal via the goniotomy. Approximately 20 1 mm circumferential advancements into Schlemm's canal were needed to advance the suture 180 degrees. This was indicated by increased resistance and suture bowing with manipulation as the suture advances. The walk the dog technique advanced the trabeculotomy by grasping the suture at the goniotomy site and pulling centrally, creating approximately the first 90 - 100 degrees of the trabeculotomy. Grasping the suture and externalizing it through the temporal wound completed the 180-degree trabeculotomy, described as the ripcord technique.

**Results:** These 2 techniques consistently create a hemi-GATT, while minimizing surgical time and tissue manipulation. They can be repeated in the other direction to open 360 degrees of Schlemm's canal.

**Conclusions:** The walk the dog and ripcord hemi-GATT modifications potentially offer titratability, less surgical time, and improved safety to GATT.

### Just Beneath the Surface: Subconjunctival Anesthesia for Transscleral Cyclophotocoagulation

*First Author: Kevin WARRIAN*

*Co-Author(s): Helen CHUNG, Patrick GOOI, Malcolm GOOI, Danielle WENTZELL*

**Purpose:** To demonstrate subconjunctival anesthesia for transscleral cyclophotocoagulation (CPC) and MicroPulse transcleral cyclophotocoagulation (MPCPC).

**Methods:** Initially, we instilled topical anesthetic drops into the treatment eye (1% tetracaine), followed by topical 5% povidone-iodine drops. A 1:1 0.75% bupivacaine and 2% lidocaine solution was injected into the subconjunctival space in the superior and/or inferior 180 degrees. Alternatively, a pure 2% lidocaine solution may be used if the treatment is performed within 20 minutes of injection. MPCPC or continuous-wave transscleral cyclophotocoagulation (CWPC) may be performed as early as 10 minutes after injection.

MPCPC settings are duty cycle 31.3% at 2000 mW, with 50-80 s per superior or inferior 6 clock hours. CWPC settings are 1250 mW for 4000 ms, with 10-12 applications per superior or inferior 6 clock hours. Antibiotic eye ointment and an eye shield are applied to the treated eye.

**Results:** In a retrospective chart review, 145 eyes were evaluated for successful pain control in patients undergoing MPCPC. Subconjunctival anesthesia was adequate to complete the procedure in 138 (95.2%) of the treatments.

**Conclusions:** Subconjunctival anesthesia is a well-tolerated and safe pain control alternative to retrobulbar anesthesia for the majority of patients undergoing CWPC and MPCPC. Subconjunctival anesthesia substantially reduces the risk of major vision and life-threatening complications such as globe perforation, retinal detachment, endophthalmitis, retrobulbar hemorrhage, and brainstem anesthesia. This potentially improves the safety profile of MPCPC, as it sometimes is used earlier in the treatment paradigm on sighted eyes.

### Long-Term Outcomes of Ex-Press Glaucoma Filtration Device Implant in Glaucoma Patients

First Author: Swyambhu **GHOSH**

Co-Author(s): Pankaj **BENDALE**

**Purpose:** To evaluate the clinical outcomes of Ex-Press implant in patients with medically uncontrolled glaucoma.

**Methods:** Retrospective chart review of all patients that underwent Ex-Press implantation for glaucoma refractory to maximum tolerated for past 5 years. Cases with less than 6 months of follow-up were excluded. Demographic data, type of glaucoma, prior ocular surgeries, intraocular pressure (IOP) value, and the number of drops needed were evaluated before and after surgery, during follow-up visits at first, third, and sixth months, first year, and yearly thereafter. Postoperative complications were also recorded. Two cases had postoperative complications (more frequently hypotony with flat anterior chamber).

**Results:** Ex-Press was implanted as a single procedure in 29 eyes and in combination with phacoemulsification in 3 eyes. Mean follow-up was  $32.1 \pm 18.2$  months. Before surgery, mean IOP was  $29 \pm 6.3$  mm Hg with a mean of  $3.1 \pm 1.1$  IOP lowering drugs. At months 1, 3, and 6, and years 1, 2, 3, 4, and 5 after surgery, mean IOP value was respectively  $10.4 \pm 6.4$ ;  $13.9 \pm 7.1$ ;  $14.7 \pm 5.9$ ;  $15.0 \pm 6.5$ ;  $15.0 \pm 4.9$ ;  $15.4 \pm 4.6$ ;  $15.1 \pm 5.3$ ;  $15.0 \pm 3.5$ . Mean IOP at the end of follow-up was  $15.4 \pm 6.6$  mm Hg, with a mean of  $1.1 \pm 1.2$  IOP lowering drugs.

**Conclusions:** The Ex-Press glaucoma filtration device is a safe and effective option for patients with uncontrolled glaucoma, providing a significant

and sustained drop in IOP, with few associated complications.

### Outcomes of Trabeculectomy with Ologen Implant vs Trabeculectomy with Mitomycin C

First Author: Pankaj **BENDALE**

**Purpose:** To compare the outcomes of trabeculectomy with Ologen implant, and trabeculectomy with mitomycin C (MMC).

**Methods:** Eighty-two eyes from 68 patients were enrolled. Thirty-five eyes underwent trabeculectomy with MMC (0.03% for 3 minutes), and 47 eyes underwent trabeculectomy with Ologen implant. The outcome measures were intraocular pressure (IOP), number of IOP-lowering medications, complications, the best corrected visual acuity, bleb morphologic features (based on the Indiana Bleb Appearance Grading Scale), and ultrasound biomicroscopy bleb characteristics.

**Results:** The mean preoperative IOP improved significantly from  $28.4 \pm 5.60$  mm Hg with  $2.60 \pm 1.24$  anti-glaucoma medications to  $16.11 \pm 2.47$  mm Hg with  $0.33 \pm 0.62$  anti-glaucoma medications at month 6 ( $P < 0.001$  and  $P < 0.001$ , respectively) in the MMC group and from  $27.0 \pm 5.07$  mm Hg with  $2.44 \pm 1.05$  anti-glaucoma medications to  $14.73 \pm 3.56$  mm Hg with  $0.47 \pm 0.99$  anti-glaucoma medications at month 6 ( $P < 0.001$  and  $P < 0.001$ , respectively) in the Ologen group. There were no significant differences in mean postoperative IOP and mean postoperative number of medications at the 6th month between the groups. The cumulative probabilities of total success at the 6th month postoperative follow-up according to Kaplan-Meier analysis were 100% and 93.3% in MMC and Ologen groups, respectively ( $P = 0.543$ , log-rank test).

**Conclusions:** MMC is effective in controlling the scar formation after trabeculectomy, but bleb morphology is much better in Ologen group. Ologen implants may be safe and effective in augmented trabeculectomy, and it may avoid the side effects associated with the use of MMC.

### Phacomorphic Glaucoma After Therapeutic Penetrating Keratoplasty: Management Challenges

First Author: Pawan **PRASHER**

**Purpose:** Phacomorphic glaucomas are always challenging cases to do.

**Methods:** The difficulty level becomes manifold if it occurs after therapeutic PKP with loose sutures, extensive anterior synechie, thick pupillary membranes, and a poor view through cornea.

**Results:** We presented a video of management of phacomorphic glaucoma in a 58-year-old male, subsequent to therapeutic keratoplasty for infective

keratitis in that eye, and discussed various surgical challenges and their management to achieve a successful outcome.

**Conclusions:** Management of phacomorphic glaucoma after therapeutic penetrating keratoplasty can be quite challenging, but a successful outcome is possible with meticulous planning.

### Smartphone Slit Lamp Photography and Videography in Glaucoma: Gonioscopy, Fundus by 90D, and Slit Lamp Imaging

*First Author: John AKKARA*

*Co-Author(s): Davis AKKARA, Ethamma DAVIS, Anju KURIAKOSE*

**Purpose:** To demonstrate low-cost and affordable method of slit lamp photo and videography using smartphone and adapter to make gonioscopy videos, 90/78D fundus photos, and slit images.

**Methods:** Using a low-cost universal smartphone microscope adapter, the author demonstrated how to take good quality slit lamp images and videos using a mid-range smartphone. The nuances of taking gonioscopy photos and videos, the tricks for getting good fundus photos, and the technique of taking slit images were demonstrated. The photos were evaluated for quality compared to conventional imaging techniques.

**Results:** Good quality slit lamp images, gonioscopy images, and fundus photos were obtained at low cost from an ordinary slit lamp and smartphone without spending money on expensive photo slit lamps or expensive cameras. Glaucoma has several avenues where imaging is of importance, and smartphone photographs can revolutionize the field of imaging in glaucoma. The image and video editing apps on smartphones make it easy to further edit and enhance these photos, label them, and share these by email, messenger services, or uploading to services like EyeTube or YouTube.

**Conclusions:** Low-cost smartphone photography can easily replace expensive photographic equipment for the common ophthalmologist and yields photos and videos of excellent quality which can easily be used for publication. This will help in affordable clinical photographs, and help in documentation of patients' findings in a more objective manner. The ease of documentation, editing, sharing, and storage on smartphones makes it convenient for small scale practitioners to go digital at minimal costs.

### Technique of Innfocus Microshunt (Glaucoma Drainage Device)

*First Author: Suria SUDHAKARAN*

**Purpose:** InnFocus microshunt device is an implantable glaucoma drainage device made of an extremely

flexible polymer with a tube of 350 microns outer diameter and a lumen of 70 microns. It is intended for reduction of intraocular pressure (IOP) in eyes of patients with primary open angle glaucoma, where IOP remains uncontrolled with maximum tolerated medical therapy.

**Methods:** Corneal traction suture using 7-0-vicryl-suture and fornix based conjunctival-peritomy over 90-120 degrees was performed. Mitomycin-C (MMC) was prepared to desired concentration and was soaked in half moon sponges and placed under the sub-conjunctival flap for desired duration, followed by removal and rinsing the area in a balanced-salt solution. A point 3 mm from limbus was marked (in the desired location). A 1 mm slit-angle knife was used to create a shallow scleral flap to tuck fin-portion of the shunt. A 25-G needle track is made into anterior chamber (AC) to enter the angle just above iris plane. InnFocus microshunt was inserted, with bevel facing towards cornea through the needle track keeping the fin-face parallel to scleral surface, fin tucked into the scleral flap. Other end of tube was tucked under conjunctival flap. Conjunctiva was sutured using 10-0 Nylon sutures (leak checked using Fluorescein strip). Presence of proximal end of the shunt in AC was confirmed and traction sutures removed. Postoperatively, IOP was monitored to determine tube patency.

**Results:** InnFocus device is implanted after making conjunctival-peritomy at limbus, creating scleral pocket and applying mitomycin-C, creating bleb space for the fluid to be directed from AC through the shunt to the bleb and thereby reducing IOP.

**Conclusions:** Surgical procedure for InnFocus microshunt is simple and can be easily reproduced whenever indicated.

## Neuro-Ophthalmology

### Posterior Rim Cupping and/or Erosion of the Optic Nerve on 3D OCT of Optic Nerve

*First Author: Hamid SAJJADI*

**Purpose:** To show that using 3D OCT of optic nerve head the posterior orbital or brain aspect of the nerve head shows changes compatible with high intracranial pressure.

**Methods:** Over 15 years and 5000 3D OCTs we have done, we found 332 patients with high intracranial pressure proven by MRI and or LP. We have noticed on 3D optic nerve head OCT, a large (over 120 degrees) posterior rim changes that were associated with cases of increased intracranial pressure. The changes were the same in pseudotumor cerebri or tumors large enough to cause increased intracranial pressure.

In non-increased intracranial pressure patients no significant (more than 90 degrees) of cupping nor erosion was seen. These consisted of 2 type changes: 1. Inward cupping or reverse cupping of the optic nerve at orbital entrance into the globe. 2. Posterior rim erosion from the edge of optic nerve exit into the orbit. The only way to show these changes was presentation by video, because in the 2D view of the posterior rim is difficult to discern these changes. So we are presenting an 8-minute scientific video pointing to these findings.

**Results:** Review of 332 cases consisting of 325 pseudotumor cerebri and 7 real brain tumors showed posterior cupping and erosion of the optic nerve to show high intracranial pressure on MRIs and or lumbar punctures.

**Conclusions:** 3D imaging of the optic nerve by OCT, looking from the brain side, can show reverse cupping and erosion changes that were very specifically signs of increased intracranial pressure.

## Ocular Imaging

### Common Misdiagnoses of Polypoidal Choroidal Vasculopathy and Their Distinguishing Imaging Features

*First Author:* Colin **TAN**

*Co-Author(s):* Isaac **CHAY**, Li **KELVIN**, Tock-Han **LIM**, Louis **LIM**, Wei Kiong **NGO**

**Purpose:** The hallmark of polypoidal choroidal vasculopathy (PCV) diagnosis is nodular hyperfluorescence on indocyanine green angiography (ICGA), but not all cases with focal ICGA hyperfluorescence are PCV. Lesions seen on ICGA may be mistakenly identified as PCV, resulting in incorrect management.

**Methods:** We reviewed cases of common misdiagnoses of PCV from standardized confocal scanning laser ICGA images, which were graded by a central reading center and discussed the common misdiagnoses of PCV.

**Results:** Cases initially identified as PCV but were subsequently found to be incorrect included micro-aneurysms, retinal angiomatous proliferation, retino-choroidal anastomosis, retinal pigment epithelial staining, choroidal neovascularization from age-related macular degeneration, and disciform scar.

**Conclusions:** It is important to differentiate PCV from other differential diagnoses. Detailed grading using stereo-imaging and dynamic ICGA can reliably distinguish pseudo-PCV from true PCV.

## Ocular Oncology & Pathology

### Managing Cases of Aggressive Periocular Basal Cell Carcinoma Complicated by Larvae of Human Botfly: A Video Presentation

*First Author:* Virendra P **SINGH**

*Co-Author(s):* Jayanta **DAS**, Syeed **KADIR**, Rajendra **MAURYA**, Mahendra Kumar Singh **SINGH**

**Purpose:** Orbital myiasis is a rare type of ocular parasitic infestation. Neglected wound and malignant lesions are common predisposing factors. We removed >100 live larvae of human botfly in OPD.

**Methods:** A clinical video of mechanical removal of >100 live maggots from 2 patients having extensive periocular basal cell carcinoma was shown. Case No. 1 was a 58-year-old female of neglected ulcerative BCC of left medial canthus, presented us with numerous freely crawling maggots in ulcer crater and orbital extension of tumor. Case No. 2 was a 70-year-old male having untreated ulcerative BCC of left inferior periocular area, presented us with orbital cellulitis and necrosis of maxillary area with several tiny, freely moving maggots. Maggots were removed mechanically with the help of forceps after immobilizing the larvae by putting 4% xylocain and mixture of chloroform plus turpentine oil (1:3) which block the spiracles of larvae. Regular wound debridement and dressing was done for 5 days. Routine topical and systemic antibiotics and anti-inflammatory were administered.

**Results:** More than 100 live maggots were removed from both cases. Maggots were preserved in diluted formaline and sent to entomologists for scanning electron microscopic study. Maggots were identified as *Dermatobia hominis* (human botfly).

**Conclusions:** Orbital myiasis can complicate and aggravate the ocular malignancies. Mechanical removal after suffocating the maggots by using various chemicals is basic treatment. Educating the patients of advanced malignancy about good hygiene and sanitation is important.

### Ocular Surface Squamous Neoplasia Management Options: Not "One Size Fits All"

*First Author:* Ankit **TOMAR**

*Co-Author(s):* Santosh **HONAVAR**, T.Siva **SANKAR**, Sumeet **LAHANE**

**Purpose:** Ocular surface squamous neoplasia (OSSN) is an encompassing term for precancerous and cancerous epithelial lesions of the conjunctiva and cornea, including the spectrum of dysplasia, carcinoma in situ (CIN), and invasive tumor. This video highlighted the treatment algorithm of OSSN.

**Methods:** There are no consistent clinical criteria for distinguishing CIN from invasive OSSN. Diagnostic imaging is an important tool in the diagnosis and management of OSSN. The management ranges from topical immunomodulation therapy to a radical surgery like exenteration depending on the presentation of OSSN.

**Results:** Surgical excision has been the gold standard treatment for OSSN but not everyone fits the mold. With the advent of immunotherapy and plaque brachytherapy, treatment can be customized.

**Conclusions:** Careful management planning and optimal use of treatment options, including multimodal treatment, can result in minimal recurrence and complications. Compliance to therapy and follow-up are the key to remission of the disease.

## The Myoconjunctival Technique: Revisiting Enucleation

*First Author: Akshay NAIR*

*Co-Author(s): Chinmay NAKHWA, S NATARAJAN*

**Purpose:** The aim of this video was to present a step-by-step demonstration of a modification of the standard enucleation procedure: the myoconjunctival technique. The indication for enucleation here was a large intraocular tumor.

**Methods:** Here, in the myoconjunctival technique, after the globe was enucleated, a PMMA implant was placed posterior to the posterior Tenon's within the intraconal space. Following this, the posterior Tenon's capsule was sutured, and the recti muscles were sutured to the anterior Tenon and conjunctiva near the fornices. The anterior Tenon's capsule and the conjunctiva were sutured separately. By suturing the muscles to the conjunctiva (myo-conjunctival), the ocular motility was retained and in return transmitted to the prosthesis placed over it.

**Results:** Here, the indications of enucleation, the advantages of the myoconjunctival technique, the surgical steps, complications, and outcomes were also discussed.

**Conclusions:** This video describes the myoconjunctival enucleation technique in a case of retinoblastoma with minimal globe manipulation. The myoconjunctival technique is a safe, easy, reproducible technique that provides consistent outcomes, and is associated with lesser complications. It provides for adequate prosthesis motility. Furthermore, given that the PMMA implant is relatively inexpensive and the myoconjunctival technique of enucleation is easy to learn and time efficient, it is our recommendation that the myoconjunctival enucleation with PMMA implant insertion should be the procedure of choice in primary enucleation. This also avoids all the complications associated with porous orbital implants and pegging.

## Orbital and Oculoplastic Surgery

### An Eye Opener: Marcus Gunn Jaw Winking Ptosis

*First Author: Akshay NAIR*

*Co-Author(s): Vandana JAIN*

**Purpose:** To demonstrate a modification of a tarsofrontalis sling surgery involving a lid-crease incision-based blepharoplasty, levator excision, and open fixation of a silicone sling to the tarsus in Marcus-Gunn Jaw Winking (MGJW) Ptosis.

**Methods:** In this step-by-step video, we demonstrated unilateral levator extirpation and an open tarsal fixation of silicone sling in a patient with severe ptosis and severe MGJW. Also discussed were the advantages of this technique, the grading of MGJW, surgical complications, and postop sequelae of this procedure.

**Results:** Surgical management of congenital ptosis depends on severity of ptosis and levator function. Some cases have an additional component: synkinetic movements of upper lid on movements of the jaw. MGJW can be tricky to treat. The clinical assessment, surgical options available, and counselling regarding postoperative outcomes in such patients has to be customized based on the patient's primary complaints. In many cases, the ptosis is severe, and the jaw winking is not prominent. In such cases, ptosis surgery alone may suffice. In others, where ptosis is minimal but MGJW is severe, surgery has to be performed to address the winking.

**Conclusions:** An open sky tarsal fixation of a silicone sling, coupled with levator excision, allows for easy adjustment, good contour, and also addresses the primary concern of ptosis as well as the jaw winking phenomenon. It is reproducible and consistently gives good postoperative outcomes.

### Evisceration Techniques: From Known Skills to Emerging Caveats

*First Author: Tarjani DAVE*

**Purpose:** To demonstrate the nuances of various techniques of evisceration.

**Methods:** Evisceration surgery involves removal of the eye's contents, leaving the scleral shell and extraocular muscles intact. The clinical applications of evisceration overlap with those of enucleation as happens in penetrating ocular trauma or blind painful eyes. Evisceration could be an option for the management of end-stage endophthalmitis, but it is absolutely contraindicated in suspected intraocular malignancy. Evisceration is preferred in these cases as it provides superior implant motility. The cosmesis is restored by

fitting an ocular prosthesis over the eviscerated eye.

**Results:** Illustrated here are the essential steps of evisceration surgery and the scleral modifications that help retain larger implants without increasing the risk of implant extrusion.

**Conclusions:** Following the surgical guidelines as outlined in this video presentation will enable the viewer to perform a safe and successful evisceration with gratifying results.

## LeFort II/III and Orbital Floor Fracture Management: A Success Story

*First Author: Joshua LUMBANTOBING*

*Co-Author(s): Yunia IRAWATI*

**Purpose:** To demonstrate a challenging surgical management of LeFort II/III and orbital floor fracture. Early diagnosis and surgical treatment is crucial to prevent functional complications.

**Methods:** Procedural approach of LeFort II/III and orbital floor fracture surgical management presented in video session.

**Results:** The surgical approach consisting of wound debridement, destroyed eye (evisceration with dermatofat graft), open reduction, and internal fixation with plate and screw and silicone block implant for the fractures. After the wound debridement and evisceration with dermatofat graft of the right eye were done, the fracture reconstruction surgery continued by making a transcutaneous subciliary incision, open the periosteal inferior orbital rim and performed the realignment. After realignment, the fracture was fixated using the plate that installed in both orbital rims. Maxillary bone fracture was managed with maxillary vestibular approach and plate installation in maxillary bone. Lastly, the silicone block was inserted on the orbital floor, close the periosteal, and suture the skin.

**Conclusions:** Management of LeFort II/III fracture followed with orbital floor fractures had its own challenge, especially due to patient's high demand for a flawless result. The surgical techniques by using transcutaneous approach for realigning the bone had its own complexity and brought good postoperative scar. The titanium plate usage is still a good option in managing such cases, combined with silicone blocks for the orbital floor fracture. The result will give satisfaction both for the patient and surgeon, especially for the patient's esthetical aspect.

## Orbital Decompression for Thyroid Eye Disease

*First Author: Tarjani DAVE*

**Purpose:** To describe the technical nuances of orbital decompression in orbital diseases.

**Methods:** Thyroid eye disease (TED) is the most frequent extrathyroid manifestation of Graves disease. In its severe form there can be marked proptosis with exposure keratopathy, along with disfigurement that may range from mild to grotesque. Orbital decompression surgery for TED has continued to evolve conceptually as far as the indications are concerned, as well as technically relating to the new areas of bone removal, fat decompression, and the use of smaller, hidden incisions.

**Results:** The video demonstrated transcaruncular, inferior transconjunctival, and eyelid crease approaches on live patient and with the use of demonstrations on cadaver skulls and graphics for better understanding.

**Conclusions:** The viewer will be able to gather indications and contraindications for orbital decompression in TED, preoperative patient preparation, salient surgical steps to accomplish surgical rehabilitation through smaller, less invasive incisions, and the paradigm for a successful and gratifying treatment.

## Outcome of Transcanalicular Laser DCR

*First Author: Syeed KADIR*

*Co-Author(s): Abid AKBAR, Md. Ismail HOSSAIN, Rajendra MAURYA*

**Purpose:** To assess the outcome of transcanalicular laser DCR.

**Methods:** Observational case series study. Transcanalicular laser DCR was done in all cases of primary acquired nasolacrimal duct obstruction with age ranges from 21 to 60 years. Surgeries were performed under local anesthesia with intravenous sedation.

**Results:** Thirty cases were evaluated in this study. 70% were female and 30% were male patients. The mean age was 39.57 years. The mean duration of surgery was 24.47 minutes. Silicone tube was inserted in all cases. Silicone tube was removed after 6 weeks of surgery. Success rate was 83.33%. Success rate depends on size of ostium. Re-DCR was performed in 16.67% of cases. There was minimal hemorrhage during surgery, quick recovery time, and no scar mark on skin postoperatively.

**Conclusions:** Transcanalicular laser DCR is the safest and easiest alternative option to correct the primary acquired nasolacrimal duct obstruction.

## Powered Endoscopic Dacryocystorhinostomy: Raising the Bar

*First Author: Roopa HIREMATH*

**Purpose:** To assess the efficacy of powered endoscopic dacryocystorhinostomy (DCR) with large bony ostium, exposing of fundus of sac, and primary mucosal anastomosis. The study involved prospective

interventional case series with short perioperative follow-up.

**Methods:** Operative and postoperative data were prospectively collected on 42 patients (15 men and 27 women; mean age, 62.4 years; range 14 – 91 years) who presented to a lacrimal clinic with epiphora and obstruction of the nasolacrimal system and who consecutively underwent either primary or revision-powered endoscopic DCR. All surgeries done by the same surgeon by standardized surgical technique. Follow-up evaluations included symptom evaluation and endoscopic assessment of the newly created ostium with fluorescein testing at each postoperative visit.

**Results:** The only surgical complication was 1 case of subcutaneous emphysema. Forty of the 42 DCRs were patent after a mean follow-up of 11 months (standard deviation = 5 months), yielding a success rate of 95.7%. One of the 42 DCRs was a failure because of improper use of medications. Two patients with a patent ostium and positive results on fluorescein testing continued to have some symptoms.

**Conclusions:** Powered endoscopic DCR which meets the with full sac exposure and primary mucosal apposition has a success rate comparable to that achieved with external DCR.

### Pretarsal Orbicularis Oculi Muscle Tightening Plus Skin Flap Excision in the Treatment of Lower Eyelid Involutional Entropion

*First Author: Jianhao CAI*

**Purpose:** To present a modified technique for lower eyelid involutional entropion correction.

**Methods:** The involutional entropion eyelid was corrected by tightening the pretarsal orbicularis oculi muscle and excising the excessive skin of the lower eyelid.

**Results:** Patients who underwent correction with this method achieved good eyelid position.

**Conclusions:** Pretarsal orbicularis oculi muscle tightening plus skin flap excision is a proper surgical approach for lower eyelid involutional entropion.

### Surgical Management of Orbital Floor Fracture with Complex Eyelid Laceration in the Early Phase Following Trauma

*First Author: King KURNIA*

*Co-Author(s): Yunia IRAWATI*

**Purpose:** To demonstrate surgical management of orbital floor fracture with complex eyelid laceration and canaliculus involvement, which was performed in the early phase following trauma.

**Methods:** Procedural approach of orbital floor fracture and complex eyelid laceration management presented

in video session.

**Results:** The surgical approach consisted of identifying the wound, orbital floor fracture reconstruction, bicanalicular silicone tube intubation, and eyelid laceration repair. In identifying the wound, especially in complex eyelid laceration, the principle is not making a new skin incision if possible; whereas we did the procedure by the existing laceration to avoid new scar on the skin. Through the lower eyelid laceration, we incised the inferior orbital rim periosteum, released periorbital tissue entrapment, put the silicone block implant, and closed the periosteum. Following orbital floor reconstruction, bicanalicular silicone tube intubation was done to manage superior and inferior canaliculus involvement. Eyelid laceration repair was performed by reattaching medial canthal tendon, apposing the one-third full-thickness eyelid margin defect, and suturing the posterior lamellae followed by the anterior lamellae. Finally, apposition of the suprabrow laceration was completed.

**Conclusions:** Management of orbital floor fracture with complex eyelid laceration is better conducted in the early phase following trauma. Excellent results can be achieved due to better wound visualization and mobilization in early management.

## Pediatric Ophthalmology & Strabismus

### Pseudoconvergence Refraction Nystagmus in Congenital Fibrosis of the Extraocular Muscles Type 1

*First Author: Fong Yee FOO*

**Purpose:** To demonstrate the clinical sign of pseudoconvergence retraction in a child with CFEOM type 1.

**Methods:** A 14-month-old Chinese boy presented with chin-up posture, bilateral ptosis, and upgaze limitation since early infancy. Clinical examination showed variable esotropia of 30 prism diopters, associated with bilateral severe limitation of upgaze (-5) and abduction (-4). Vertical optokinetic drum examination elicited the presence of pseudoconvergence retraction nystagmus (PCRN). Ocular examination was normal with no pupil abnormalities.

**Results:** The presence of ptosis, as opposed to lid retraction (in dorsal midbrain syndrome), associated with PCRN, makes the consideration of CFEOM more likely. Subsequent genetic testing confirmed the diagnosis of CFEOM type 1.

**Conclusions:** While PCRN can be explained by the tethering effect of tight inferior rectus muscles on attempted upgaze, it is thought also to indicate an

inborn supranuclear deficiency of elevation with aberrant innervation of the horizontal muscles on attempted upgaze. The video demonstrates how the clinical sign of PCRN is elicited in a patient with CFEOM type 1.

## Surgical Approach and Principles for Pediatric Cataract with Persistent Hyperplastic Primary Vitreous

*First Author: Nilutparna DEORI*

*Co-Author(s): Harsha BHATTACHARJEE, Rajendra MAURYA, Diva MISRA*

**Purpose:** To demonstrate the pearls in surgical approach of cataract surgery in children with PHPV.

**Methods:** We demonstrated the surgical techniques of cataract surgery in pediatric cataract and PHPV. The cases underwent single stage procedure of phacoaspiration, followed by primary posterior capsulotomy and limited anterior vitrectomy without cauterization of persistent fetal vasculature through an anterior limbal route. 23G vitrectomy cutter system with an AC mainainer was used for the entire procedure. Hydrophobic foldable intraocular lens (IOL) was implanted in the bag, and wounds were sutured and secured.

**Results:** Four-year-old with a bilateral total cataract. After cataract removal, an anterior PHPV with a classic stalk was seen attached to the posterior lens capsule displaying the characteristic fish-tail sign. Elongated ciliary processes were noted. Phacoaspiration followed by primary posterior capsulotomy and limited anterior vitrectomy. A hydrophobic IOL was implanted in the bag. Seven-year-old with unilateral zonular cataract with a combined PHPV attached to the nasal side of the posterior lens. A circumferential posterior capsulorhexis with a vitrectomy cutter was done. As the stalk was eccentrically attached, the visual axis was cleared off of the opacity and careful limited anterior vitrectomy was done to release vitreous traction.

**Conclusions:** Vitreous hemorrhage, glaucoma and RD limit the surgical outcome of cataract with PHPV. However, a more favorable visual and anatomic outcome is achieved with an anterior PHPV with markedly less intra and postoperative complications. Early intervention and redefining minimally traumatic surgical approach according to the case scenario maximizes postoperative visual and anatomic outcome.

## Refractive Surgery

### Biomarkers of Happiness

*First Author: Nimrata DHAMI*

*Co-Author(s): Rohit SHETTY*

**Purpose:** To decode the reasons for dissatisfaction

of unhappy 20/20 patients post refractive surgical correction.

**Methods:** Using retrospective case analysis, we proposed a model to acquire a deeper understanding into the reasons accounting for the unhappiness of 20/20 unhappy patients, taking into account: patient's personality, optics, and ocular surface cell markers which include a) preoperative factors such as topography, aberrations, tear film quality, tear biomarkers, b) intraoperative factors: type or duration of surgery, epithelial integrity, ease of flap dissection and c) postoperative including medical therapeutic regimen.

**Results:** Hence, a detailed scientific approach can help us decipher the sequence of events leading to patient dissatisfaction and monitor all factors ranging from "Tears to Brain" and thus enable us to predict and modify the outcomes of these subset of patients.

**Conclusions:** Despite tremendous advancement in the science of refractive surgery, we still lack in our understanding of the causes of unhappiness of patients achieving 20/20 vision post refractive surgical correction. This video is our endeavor to highlight the clinical biomarkers which can transform our results from 20/20 unhappy to 20/20 happy.

## Management of Difficult Lenticule Extraction in Learning SMILE

*First Author: Jeewan TITIYAL*

*Co-Author(s): Manpreet KAUR*

**Purpose:** We described intraoperative complications encountered during lenticule dissection and extraction in the initial learning curve of small incision lenticule extraction (SMILE) and their management.

**Methods:** SMILE was performed in 100 eyes of 50 patients with less than 10 diopters (D) of myopia and 3 D of astigmatism. Intraoperative complications, if any, were noted. Postoperatively, visual and anatomical outcomes were assessed.

**Results:** In case 1, an inadvertent posterior plane dissection before separating the anterior plane resulted in cap-lenticular adhesion, and the procedure had to be abandoned with a retreatment (excimer laser ablation) planned at a later date. In case 2, anterior segment optical coherence tomography was used to diagnose the retained lenticule with wrong dissection plane, and Sinskey hook-assisted extraction of the lenticule was performed in the same sitting. Case 3 demonstrated incomplete lenticule removal with retained fragments in a case with difficult lenticule dissection and forceful extraction of the lenticule. Case 4 and 5 showed side cut tears and cap tears resulting from vigorous manipulations in cases with difficult dissection. Delayed visual recovery was observed; however, eventual visual and anatomical outcomes were satisfactory.

**Conclusions:** Learning curve of SMILE is surgically

challenging. Lenticule dissection and extraction is the most difficult step, and leads to a multitude of complications such as cap-lenticular adhesions and lenticule and cap tears, which result in delayed visual recovery.

## Mathematics and the Eye: The Real Future

*First Author: Zelda DADACHANJI*

*Co-Author(s): Mathew FRANCIS, Abhijit SINHA ROY, Neeraj ISRANI, Rohit SHETTY*

**Purpose:** To familiarize the modern-day ophthalmologists with theoretical mathematical models and to equip them with better knowledge leading to true customization and improved treatment planning.

**Methods:** The physical world is governed by mathematical equations, which predict behavior and nature of all objects and processes. The ophthalmology practice of today is largely automated, and the devices have become more intuitive and user-friendly. To truly understand our machines and accurately predict treatment outcomes, it is important for us to understand the mathematical derivatives and assumptions behind them. This video was our attempt to simplify these concepts for the ophthalmologist so as to broaden our clinical perspective.

**Results:** We found that we utilize various indices and formulae to predict best results for patients undergoing refractive surgery in our daily practice. However, despite our reliance on our machines, we do not delve into the depth of understanding the genesis of these derivatives. This has narrowed our vision in developing an in-depth understanding of the disease in its true form. Thus, even our best predictions fail, and we still see surprises in our diagnostic tools of topography, biomechanics, etc.

**Conclusions:** This video helps us improve our comprehension of the mathematical basis behind our machines and treatment. Only developing an in-depth understanding will help us provide true customized treatments as well as improve the accuracy of predicting postoperative outcomes. This will help us avoid unpleasant refractive surprises and better our patient selection criteria to prevent long-term treatment complications.

## Retina (Medical)

### Chorioretinitis Sclopetaria: A Case Series

*First Author: Ramya APPANRAJ*

*Co-Author(s): Veerappan SARAVANAN*

**Purpose:** Blunt trauma is a common entity in our day-to-day practice, and it has various posterior segment presentations like retinal detachment, retinal dialysis,

vitreous hemorrhage, etc. Chorioretinitis sclopetaria is one of the rare presentations, and it was first described by Goldzieher in 1901. This is commonly caused by firearm projectile injury, and actually there is no direct injury to the globe. These high projectile pellets pass adjacent to the globe, producing direct and indirect shock waves causing simultaneous retraction of choroid and retina, leaving an area of bare sclera. The incidence of retinal detachment is very less due to strong chorioretinal adhesion at the site of injury.

**Methods:** In this video, we have discussed a case series of 3 patients of chorioretinitis sclopetaria, their clinical presentation, and its medical and surgical management.

**Results:** The medical and surgical outcome of all these patients were discussed in the video.

**Conclusions:** Association of retinal detachment, along with sclopetaria and sclopetaria following low velocity injury, are the peculiarities of this case series.

### Retinopathy of Prematurity: Quick Guide

*First Author: Pushkar DHIR*

*Co-Author(s): Dipankar DAS, Surpriya HAWAIBAM, Diva MISRA, Tapas PADHI, Ronel SOIBAM*

**Purpose:** To demonstrate practical way of ROP screening.

**Methods:** Demonstrative video.

**Results:** There has been tremendous improvement in ROP management in the last decade, but still the screening process and the apprehension of examining neonates remains a challenge among most ophthalmologists. This video elicits the basic planning, screening methodology, instrumentation, care, and precautions required to examine the little ones.

**Conclusions:** Screening of ROP requires skill and a dedicated approach in a systematic manner. This short video is a quick guide for those who are still in the dilemma of starting ROP screening.

### Sham Injection: Fake It the Best Way

*First Author: Tarun GUPTA*

*Co-Author(s): Piyush BAJAJ, Pushkar DHIR, Parikshit DHIR, Ekta GARG, Ruchika GARG*

**Purpose:** To demonstrate the proper method of giving a Sham injection.

**Methods:** Sham injections are performed by preparing the eye as for a real intravitreal injection. Eye is draped properly, and eye drop betadine is put after putting eye drop proparacaine. Vernier caliper is used to mark the site of injection and then the hub of syringe is pressed against the conjunctiva to mimic a real injection.

**Results:** Sham injections were performed by pressing the syringe hub against the conjunctiva to mimic a real injection.

**Conclusions:** Successful masking of an intravitreal injection can be accomplished when a sham injection procedure carefully mimics a real injection procedure.

## Retina (Surgical)

### 2 Faces of the Internal Limiting Membrane: The Culprit and the Unsung Hero

*First Author: Srinivas JOSHI*

*Co-Author(s): Guruprasad AYACHIT, Apoorva AYACHIT, Puneeth ISLOOR*

**Purpose:** ILM is a thin, acellular membrane which is the culprit in a variety of vitreoretinal pathologies. ILM peeling is being done in epiretinal membrane removal, macular pucker, and diabetic macular edema. On the other hand, ILM transplantation is being done for large-sized macular holes (MH), persistent MH, and in optic disc pit maculopathy. The purpose of this video was to present a surgical potpourri of cases to enlighten on the multiple facets of the ILM and its importance in vitreoretinal surgery.

**Methods:** Prospective study of 51 eyes of 50 patients with Large ( $>400\ \mu$ ) macular holes (MH) and macular hole-associated retinal detachments (MH-RD) was conducted. Twenty-five-gauge pars plana vitrectomy done. ILM flaps were trimmed and placed one over the other on the MH (intraop optical coherence tomography guided) and under PFCL in MH-RDs. In cases of persistent MH, dispersive visco-elastic was injected in the hole. ILM was harvested from adjacent area and stuffed into the MH. In optic disc pit maculopathy, the ILM was harvested similarly and stuffed into the disc pit.

**Results:** A total of 46/51 eyes (90.1%) had type 1 hole closure, while 4/51 (7.8%) had type 2 closure and 1/51 (2.1%) did not show closure. Nine cases of persistent MH, of which 8 showed type 1 closure. Six cases of optic disc pit maculopathy which showed complete resolution of subretinal fluid after ILM transplant.

**Conclusions:** Though ILM causes tangential traction and has been implicated as a culprit in retinal pathologies, it bridges tissue defects in retinal surgeries and is the real unsung hero.

### 23 G PPV for Funnel Retinal Detachment and Marked PVR

*First Author: Kashif IQBAL*

**Purpose:** To describe the surgical management of RD with funnel and marked PVR using 23G PPV.

**Methods:** It was a video presentation to describe the technique using 23G PPV. The use of 23G forceps to open dense PVR membranes is shown. And the use of heavy liquid to flatten the retina followed by endolaser

and silicon oil tamponade was shown effectively.

**Results:** The retina was attached successfully.

**Conclusions:** 23G PPV is an effective method of treating RD with funnel and marked PVR.

### 23 G Vitrectomy for Removal of Subretinal Metallic Intraocular Foreign Body

*First Author: Hussain KHAQAN*

**Purpose:** To evaluate the outcomes of surgery.

**Methods:** 23 gauge pars plana vitrectomy, retinectomy, and removal of subretinal foreign body and air fluid oil exchange.

**Results:** Metallic foreign body removed successfully, retina was flat, and visual acuity improved after surgery.

**Conclusions:** Excellent outcomes after surgery.

### Adapting Yamane Double Needle Flanged IOL Fixation (Sutureless and Glueless)

*First Author: Mandar JOGLEKAR*

*Co-Author(s): Siva Mohan HALAHARVI, Nivean MADHIVANAN, Abhiyan Kumar PATNAYAK*

**Purpose:** To describe the problems encountered while adapting Yamane's double needle intrascleral flanged intraocular lens (IOL) fixation in Indian settings.

**Methods:** Dr Shin Yamane has presented an innovative method of intrascleral IOL fixation. We encountered a few issues while adapting this technique. 1. The 30G needle available did not allow railroading of haptic 2. The scleral path of the haptic was deemed to be too small and imprecise. 3. The angulations described are difficult to follow during actual surgery. 4. The leading haptic tends to dive in vitreous cavity in vitrectomized eyes. 5. The bipolar cautery available did not deform the tip to form the flange. We devised our own solutions to these problems. The video describes these modifications in the setting of an actual case of a dislocated lens in anterior chamber.

**Results:** The modified technique in the described method resulted in good, stable, central fixation with good vision and a satisfied patient and surgeon.

**Conclusions:** We present a modified Yamane's technique which works well in our hands particularly in Indian settings. These can be adapted by other surgeons facing similar issues.

### Combined RD with Posterior Closed Funnel Type and a Hidden Giant Retinal Tear in PDR

*First Author: Venkatesh KADRI*

**Purpose:** This video showed the rare presentation of combined retinal detachment with posterior closed funnel type and a hidden giant retinal tear in

proliferative diabetic retinopathy.

**Methods:** Surgical video.

**Results:** Retina settled well without the use of PFCL.

**Conclusions:** A complex surgical surprise was managed meticulously.

## Complex Diabetic Vitrectomy: Tips and Tricks

*First Author:* Vishal **GOVINDHARI**

*Co-Author(s):* Jay **CHHABLANI**, Sumit **SINGH**

**Purpose:** To demonstrate tips and tricks while performing complex diabetic vitrectomy.

**Methods:** Multiple surgical video clips demonstrating important steps and approaches during diabetic vitrectomy were amalgamated.

**Results:** Few salient points including identification of secondary membranes, the distinction between the membrane and avascular retina, use of scissors and forceps, advantages of chandelier illumination, various approaches to start, management of intraoperative hemorrhage, and the importance of fluid-fluid exchange were demonstrated in the video.

**Conclusions:** Improved understanding of surgical steps during diabetic vitrectomy improves the anatomical success with satisfactory functional outcomes.

## Conquest of the Choroidals

*First Author:* Aditya **KELKAR**

*Co-Author(s):* Jai **KELKAR**, Pankaj **BENDALE**, Swyambhu **GHOSH**

**Purpose:** This video-based presentation will show various aspects of choroidal effusions, with an emphasis on clinical presentation, pathophysiology, management, and prevention.

**Methods:** Choroidal effusion is accumulation of blood between the choroid and the sclera. One of the most dreaded complications. Could result in total loss of vision. It can be 2 types respectively. "Serous" choroidal detachment (fluid filled), associated with low pressure in the eye and are usually only mildly uncomfortable, and "Hemorrhagic" choroidal detachments (blood filled) are commonly painful and often associated with a high intraocular pressure. The video will demonstrate the diagnosis, medical, and surgical approach to manage choroidals.

**Results:** The visual prognosis is more guarded in eyes with massive hemorrhagic choroidal detachments, but proper and timely management can give good results.

**Conclusions:** Choroidal effusions may result from various etiologies. Meticulous surgical steps and preventive measures may help to reduce the risk of choroidal effusions. While most choroidal effusions resolve spontaneously, surgical drainage may be necessary in some cases to restore normal anatomy

and visual function.

## Internal Tamponade Combining Light and Heavy Silicone Oil for Complicated Rhegmatogenous Retinal Detachment

*First Author:* Huma **SAIGOL**

**Purpose:** 360 traumatic retinal dialysis in an 8-year-old boy with pathological myope of -18 diopter. To observe clinically postoperative retinal stability without postural therapy and emulsification in complicated RRD cases when combining silicone oil (1000cst and heavy silicone oil) for internal tamponade following pars plana vitrectomy.

**Methods:** 23-gauge pars plana vitrectomy in 8-year-old boy with pathological myopia of -18 diopters developing traumatic 360 retinal dialysis in 1 eye of 1 month old. After PPV, retina unfolded and stabilized using heavy liquid tamponade. Endolaser applied to stabilize the retina. Heavy silicone oil and silicone oil 1000cst in ratio of 70:30 injected separately using heavy liquid/oil exchange. Endolaser 360 degrees to maintain stability. Ports sutured using vicryl 6/0. Postop retinal stability observed. No postural therapy advised.

**Results:** Clinical examination done on day 1, 1 week, 1 month, and finally 2 months. Retina remained attached with no emulsification on 2-month follow-up. No retinotoxicity was observed during or after the procedure in the 2-month follow-up period.

**Conclusions:** Combining silicone oils for complicated retinal detachment is a good option, giving good retinal attachment. Cumbersome postural therapy, especially in pediatric group, can be avoided.

## Inverted Internal Limiting Membrane Flap Technique for the Treatment of Large Idiopathic Macular Hole

*First Author:* Saurabh **DESHMUKH**

*Co-Author(s):* Pushkar **DHIR**, Krati **GUPTA**, Surpriya **HAWAIBAM**, Diva **MISRA**, Ronel **SOIBAM**

**Purpose:** To highlight the efficacy of inverted internal limiting (ILM) flap technique in the treatment of large idiopathic macular hole (MH). There is an increased risk of surgical failure in cases of large macular holes. They may remain open after 1 surgery. Some of these cases may remain flat-open after surgery. Flat-open macular holes are associated with limited visual acuity.

**Methods:** A 69-year-old female presented with diminution of visual acuity for 6 months. Fundus examination and optical coherence tomography revealed a large (628 microns) MH. She underwent 23-gauge pars plana vitrectomy with inverted ILM flap technique.

**Results:** At 3 months of follow-up, her visual acuity improved to 20/40 with a U-shaped closure of the MH.

**Conclusions:** Vitrectomy with the inverted ILM flap technique seems to be a safe and effective surgery for large macular holes, improving both functional and anatomic outcomes.

## Management of Giant Retinal Tear with Submacular Hemorrhage: A Novel Technique

*First Author: Bhuvan CHANANA*

**Purpose:** To describe a novel technique for management of giant retinal tear (GRT) with submacular hemorrhage.

**Methods:** A 43-year-old female presented with an inferior 180-degree GRT associated with a large, dense submacular bleed following blunt trauma with a cricket ball. The drainage of thick submacular bleed by an innovative technique was being described in the video clip. Two small retinotomies were made near the lower and upper edge of the hemorrhage, and saline was flushed from upper retinotomy, pushing the submacular hemorrhage out of the lower retinotomy. This was followed by flattening of the GRT and insertion of silicone oil.

**Results:** The patient was successfully managed. A choroidal rupture was noted adjacent to the disc intraoperatively. One week postoperative, the patient gained a vision of 20/120 with a clear macula and attached retina. At 1 month, the vision was maintained, and the retina was stable.

**Conclusions:** A novel technique for drainage of submacular dense hemorrhage in attached retina is being described in this video. The present case also had an inferior 180-degree GRT, which was successfully managed.

## Managing Vitreoretinal Interface in Diabetic Vitrectomy

*First Author: Bhuvan CHANANA*

**Purpose:** To demonstrate management of vitreo-retinal interface in proliferative diabetic retinopathy.

**Methods:** The posterior hyaloid phase in proliferative diabetic retinopathy (PDR) is usually thick, taut, and firmly adherent to the underlying retina at multiple sites. Induction of posterior vitreous detachment (PVD) is often difficult due to strong attachments at the disc and areas of neovascularization, and frequent presence of vitreoschisis. Advances in vitreous surgery like microincision vitrectomy systems, better viewing devices, and careful dissection techniques have made it possible to manage such difficult cases.

**Results:** Video clips demonstrating successful PVD induction in difficult situations, management of dense subhyaloid hemorrhage in PDR, dissection of thick and firmly adherent fibrovascular fronds in advanced end-stage PDR, and use of perfluorocarbon liquids (PFCL) during diabetic vitrectomy will be presented.

**Conclusions:** The posterior hyaloid phase in PDR is usually thick and firmly adherent to the underlying retina at multiple sites. However, with microincision vitrectomy system, advanced instrumentation, and careful dissection techniques, most of the cases can be managed successfully.

## Novel and Easy Techniques for 27-Gauge Silicone Oil Infusion and Removal

*First Author: Zhaotian ZHANG*

*Co-Author(s): Shaochong ZHANG*

**Purpose:** To introduce novel and easy techniques to have 27-gauge silicone oil (SO) infusion and removal.

**Methods:** Consecutive patients treated with 27-gauge pars plana vitrectomy (PPV) plus SO infusion (Infusion Group) and scheduled to have SO removal (Removal Group) were prospectively included, respectively. Patients in Infusion Group underwent 27-gauge PPV plus SO infusion. SO infusion was performed with a 24-gauge intravenous catheter connected with the SO syringe. Patients in Removal Group underwent machine-independent SO removal using a short section of infusion tube connected with a 10-mL syringe. Main outcomes were best corrected visual acuity (BCVA), intraocular pressure, surgical time, and intra- and postoperative complications.

**Results:** There were 35 eyes (35 patients) and 40 eyes (40 patients) included in Infusion and Removal Groups, respectively. Mean surgical time of complete SO infusion and removal were  $5.5 \pm 0.9$  minutes and  $9.6 \pm 2.1$  minutes, respectively. In both groups, no patient experienced postoperative vision deterioration or hypotony. No obvious intra- and postoperative complications were observed.

**Conclusions:** We recommend use of the 24-gauge catheter method to have 27-gauge silicone oil infusion when commercial infusion cannula is unavailable. The machine-independent method using easily available plastic infusion tube and syringe would be an ideal option when 27-gauge surgery is anticipated.

## Reoperation for Failed Giant Retinal Tear Surgery

*First Author: Li WANG*

*Co-Author(s): Shaochong ZHANG, Zhaotian ZHANG*

**Purpose:** To present a surgical video of the reoperation on a patient who had undergone a failed giant retinal tear surgery.

**Methods:** A 36-year-old woman referred to us with serious discomfort of her left eye (BCVA = 0.2), with no light perception (NLP) of the fellow eye. The patient was diagnosed as giant retinal tear of his left eye, and underwent episcleral encircling combined with pars plana vitrectomy, air/fluid exchange, and silicon oil tamponade in the local hospital. However, after that,

the patient suffered from severe metamorphopsia of the operated eye, neither with improvement of the vision. Fundoscopy revealed rolling of the retinal edge, fixed retina folds, and epimacular membrane of the left eye. Reoperation was carried out to solve these problems. After silicone oil removal, the operator firstly peeled off the epimacular membrane, subretinal fluid injection was then taken to separate the fixed retina. Heavy liquid was used to stabilize the retinal flap and enable it to reattach to the retinal pigment epithelium (RPE) layer. After that, laser photocoagulation was performed to create retinopexy. To prevent flap slippage, fluid/oil exchange technique was chosen to have silicone oil injection.

**Results:** Flat retina and improved macular edema was observed after surgery. The postoperative BCVA at the final follow-up was 0.4, and the metamorphopsia completely disappeared.

**Conclusions:** Giant retinal tear is sometimes unfavored for the vitreoretinal surgeons to have ideal management. We should keep in mind the possible risks and complications of the surgery. Reoperation should be performed after a profound evaluation of the intraoperative difficulty and prognosis.

### Repositioning of Inadvertent Intralenticular Ozurdex: A Vitreoretinal Approach

*First Author:* Naresh **KANNAN**

*Co-Author(s):* Piyush **KOHLI**, Roshni **MOHAN**, Madhu **SEKHAR**

**Purpose:** To report a vitreoretinal approach for management of inadvertent intralenticular ozurdex implant in a patient with non-responding cystoid macular edema (CME) due to branch retinal venous occlusion (BRVO).

**Methods:** A 60-year-old hypertensive male with non-responding CME due to BRVO was advised ozurdex, which accidentally got injected into crystalline lens, causing an intumescent cataract. The implant, along with cortex and a small piece of epinucleus plate, was pushed into the vitreous cavity through the pre-existing PCR. Twenty-five-gauge pars plana vitrectomy was done to separate the implant from the cortex and epinucleus. Finally, posterior vitreous detachment (PVD) was induced, and a 3-piece intraocular lens (IOL) was placed in the sulcus.

**Results:** Postoperative examination at 1 month showed that the IOL was stable with no anterior segment reaction, and the implant was intact in the vitreous cavity. Optical coherence tomography showed complete resolution of macular edema.

**Conclusions:** Separating the implant from the lens cortex in the capsular bag can lead to its accidental aspiration or zonular dialysis. Such a maneuver is easier to perform in the vitreous cavity. A vitreoretinal approach not only prevents the accidental aspiration of

the implant, but can also help in better resolution of an edema.

### Traumatic Cataract, Intraocular Foreign Body Removal with Intraocular Lens Implantation in One Go

*First Author:* Huma **SAIGOL**

**Purpose:** To observe the clinical results in terms of visual improvement, postop inflammation, and retinal stability when combining the 2 procedures. Phacoemulsification, pars plana vitrectomy, removal of hook-shaped copper intraocular foreign body using limbal approach, followed by foldable intraocular lens (IOL) implantation.

**Methods:** A 24-year-old man with workplace trauma was operated on for corneal repair in emergency with nylon suture. A week later, 23-gauge pars plana ports made and phacoemulsification using 2.75 mm clear corneal incision. Rent present inferotemporally. Anterior vitrectomy done and phaco completed. PPV done. Impacted superior IOFB (copper color, hook shaped) lifted with IOFB forceps through PC rent into AC and removed via limbus. Vitrectomy completed. Endolaser done. Multipiece foldable IOL implanted in sulcus. Gas tamponade.

**Results:** Visual acuity improved to 6/18 at 1-month follow-up. Early postop anterior segment inflammation (pupillary membrane), which was controlled with antibiotic-steroid combination and systemic steroids. Stable flat retina on subsequent follow-ups of day 1, 1 week, and 1 month. No further intervention required.

**Conclusions:** Combining the 2 procedures (phacoemulsification and IOFB removal) is a good option. It provides satisfactory results in terms of earlier functional (VA) and anatomic (retinal attachment) success. Though it requires longer surgical time (combining 2 procedures), it saves repeated patient visits, admissions, and surgical work. It reduces surgical expense as well.

## Translational Research in Ophthalmology

### Many Moods of Ectasia

*First Author:* Anjana **KARUNAKARAN**

*Co-Author(s):* Prerna **AHUJA**, Arkasubhra **GHOSH**, Swaminathan **SETHU**, Rohit **SHETTY**

**Purpose:** Ectasia post refractive surgery is a dreaded complication which is poorly understood and hence often undetected. This video was our attempt to elucidate the complex interplay between clinical factors, imaging, and molecular and genetic markers to make better sense of why we get ectasia, and

understand the different moods and modes of its presentation.

**Methods:** We studied a group of patients who developed ectasia post refractive surgery. We evaluated them thoroughly to establish any known or unknown factors that could have led to the development of ectasia. Detailed history was taken; slit lamp biomicroscopy, refraction, corneal topography, biomechanical assessment, in vivo confocal microscopy, and tear fluid analysis for molecular markers was performed meticulously. Retrospective analysis of preoperative data, whenever available, was done.

**Results:** Confocal microscopy images exhibited poor nerve regeneration and increased dendritic cell density when compared to controls. The tear analyses also showed raised inflammatory markers, suggesting a role of subclinical inflammation in ectasia pathogenesis. Our data led us to believe that biomechanical indices should be given due consideration before deciding between surgical options. A novel find was the reduced LOX levels in our patient that developed ectasia post SMILE – suggesting the role of undetected genetic factors.

**Conclusions:** Ectasia can be caused by a multitude of modifiable and non-modifiable factors, which include inadequate preoperative screening, persistent eye rubbing, poor healing, hormonal fluctuations, subclinical inflammation and inherent genetic susceptibility. The aim is to build an artificial intelligence model that takes into account all possible risk factors that will make refractive surgery truly predictable.

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