The 40th Asia-Pacific Academy of Ophthalmology Congress

Best Scientific Paper Awards

Subspecialty: AI, Digital Innovation and Virtual Health

Universal Optimization of AI-Based Diabetic Retinopathy Diagnosis Through Cross-Camera Image Enhancement

First Author: Sanil JOSEPH
Co-Author(s): Xiaotian CHEN, Zongyuan GE, Mingguang HE, Chi LIU, Thulasiraj RAVILLA

Purpose: To propose a universal adaptation model for images captured using different fundus cameras, towards enhancing the accuracy of AI-based diabetic retinopathy (DR) diagnosis.

Methods: We utilized paired retinal images from 365 outpatients who attended a tertiary eye hospital in southern India, captured using Optain and Topcon fundus cameras. An InceptionNeXt model assessed the disparities in retinal parameters between the two image sets. We used an SCR-Net-based image enhancement model to align the image styles from the two cameras. We conducted a series of experiments with different training datasets, model structures and image resolutions for the model to achieve the best performance gain in predicting Optain images.

Results: After exploring different scenarios, we found that using mixed images (original and adapted) for training and adapted images for inference was the best optimization model. This model had nearly 5 5-point gain in accuracy compared with the baseline model. Using the baseline images, the AI system had an accuracy of 88.65% with a sensitivity of 98.77%, specificity of 74.12%, and AUROC of 0.9740. Whereas, by using the adapted images, the accuracy improved to 93.51% with a sensitivity of 96.33%, specificity of 89.47%, and AUROC of 0.9814.

Conclusions: Our findings underscore the potential of cross-camera AI adaptation techniques in enhancing diagnostic accuracy across diverse populations and making the AI algorithm universally adaptable to images captured using different fundus cameras. This approach might be useful to optimize the range of camera systems to be used in AI-based DR screening models.

Subspecialty: Cataract

Use of Selective Laser Capsulotomy for Mature White Cataracts: Initial Experience in Indian Eyes

First Author: Jai KELKAR
Co-Author(s): Harsh JAIN, Richard PACKARD

Purpose: To report the initial experience of performing capsulotomy in eyes with mature white cataracts using selective laser capsulotomy (SLC) in Indian eyes.

Methods: This was a prospective non-comparative open-label study. All adults presenting to our institution with mature cataracts whose pupils dilated >6mm and willing for phacoemulsification were invited to participate. During surgery, after staining the anterior capsule with CAPSULBlue (proprietary trypan blue), the CAPSULaser device was used to create a capsulotomy of size ranging from 5 to 5.5 mm, and phacoemulsification was carried out. The primary outcome was the size, centration, and continuity of the capsulotomy edge at the end of the surgery. Secondary outcomes were the surgical time for the capsulotomy, capsulotomy centration on the IOL at 3 months, and adverse effects.

Results: Thirty eyes of 30 patients were recruited with a mean age of 66.4 ±8.3years of which 17(57%) were men. The intraoperative size of the capsulotomy was the same as intended in all eyes, and the edges were smooth. None of the eyes experienced any visible capsular tears or runout events; one had a capsular tag. The time for capsulotomy, including capsular staining, was 3 ± 0.23 minutes. All IOLs were well-centred at 3 months, with a capsulotomy size remaining the same. The endothelial cell count had dropped by 8% at 3 months post-op and vision improved significantly to 0.03 logMAR. None of the eyes experienced any intraoperative complications or laser-induced adverse effects.

Conclusions: SLC was a safe and effective technique providing precise, well-centered anterior capsulotomies in mature white cataracts.

Subspecialty: Cornea, Dry Eyes, External Eye Diseases and Eye Banking (2 Awards)

Fresh Human Myopic Lenticule Intrastromal Implantation for Keratoconus Using Smile Surgery in a Long-Term Follow-Up Study: Ultrastructural Analysis by Transmission Electron Microscopy

First Author: Ceren Ece SEMIZ
Co-Author(s): Njomza HIMA-MUSA, Merjem PURELKU, Faruk SEMIZ, Gamze TANRIVERDI

Purpose: To investigate new intrastromal histological structures that develop after myopic human lenticular implantation in keratoconus with femtosecond laser–assisted small incision lenticule extraction (SMILE) surgery using transmission electron microscopy.

Methods: Sixty eyes with advanced keratoconus indicated for corneal transplantation were included in this study. Fresh myopic lenticular implants were placed in all eyes through SMILE surgery. Lenticular implants were extracted from patients with myopic refractive errors of the cornea, untreated keratoconus, and treated keratoconus following 1, 2, and 3 years of surgery. These five lenticule samples were examined under the electron microscope and compared.

Results: Disorganized and thinned collagen fibers were observed in the stroma, with degenerative stromal cells (telocyte-like cells and keratocytes) in the keratoconic cornea. Apoptotic bodies and cell debris were easily observed near the disorganized fibers. In contrast, the myopic refractive error of the control and treatment groups demonstrated well-organized parallel lamellar structures. Healthy keratocytes and telocyte-like cells were observed in samples obtained 1, 2, and 3 years after lenticular implantation. Thus, telocyte-like cells may be activated by appropriate stimuli, such as stem cells, and be involved in stromal regeneration.

Conclusions: Fresh myopic intrastromal lenticule implantation is a safe, economical, and reliable technique that leads to increased corneal thickness, improved visual acuity, and the regeneration of healthy keratocytes and telocyte-like cells that are involved in stromal regeneration.

Ocular Surface Characteristics of Congenital Isolated Lacrimal Gland Agenesis

First Author: Lingyi LIANG
Co-Author(s): Ziyan CHEN

Purpose: To investigate ocular surface characteristics in patients with congenital isolated lacrimal gland agenesis (LGA), which serves as a prototypic condition to understand how aqueous tear deficiency affects the entire ocular surface.

Methods: In this retrospective study, five LGA patients showed bilateral aplasia (6/10 eyes), unilateral aplasia (2/10) with hypoplasia (1/10), or normal (1/10) in the other eye. Corneal sensation, in vivo confocal microscopy, meibography, and ocular surface parameters were conducted and evaluated.

Results: Nine LGA eyes initially presented with reduced or absent reflex tearing and gradually developed superficial punctate keratopathy (SPK, 5/9 eyes) and persistent corneal epithelial defect (PED, 4/9), the severity of which was related to age and bilateral vs. unilateral aplasia. Seven of nine eyes developed neurotrophic keratopathy and presented with reduced corneal sensation and sub-basal nerve density. Additionally, it was accompanied by meibomian gland dropout (5/9), loss of Vogt's palisades (5/9), pterygium (3/9), and tarsal conjunctival scarring (5/9). Punctal occlusion (PO) with or without autologous serum reduced SPK without improvement of the neurotrophic state. PO with recombinant human nerve growth factor reduced PED with the improvement of corneal nerve density but not the reduction of dendritic cell infiltration. PO with repeat self-retained amniotic membrane improved nerve density and resolution of dendritic cell infiltration that lasted for 6 months.

Conclusions: Progressive corneal surface breakdown with LGA is associated with the development of neurotrophic keratopathy accompanied by meibomian gland dropout and loss of Vogt's palisades. Comprehensive measures directed to correct the neurotrophic state should be included to restore ocular surface health in LGA patients.

Subspecialty: Glaucoma

Choriocapillaris and Progressive Ganglion Cell-Inner Plexiform Layer Loss in Non-Glaucomatous Eyes

First Author: Jingwen JIANG

Purpose: To explore the relationship between choriocapillaris (CC) flow deficit percentage (FD%) and ganglion cell-inner plexiform layer (GCIPL) thickness in a population-based sample of non-glaucomatous eyes.

Methods: This is a longitudinal cohort study and a prospective cross-sectional study. Non-glaucoma Chinese subjects aged 18 years or older were enrolled. All participants underwent a detailed ophthalmic examination, including swept-source optical coherence tomography (SS-OCT) and SS-OCT angiography. Average, inner average, outer average, and nine Early Treatment Diabetic Retinopathy Study sub-regions of GCIPL thickness and CC FD% were measured. The correlation between CC FD% and GCIPL was assessed using a linear regression model, and the relationship between the rate of change of GCIPL thickness and CC FD% was further validated in a 2-year longitudinal study.

Results: In the cross-sectional study including 3514 participants (3514 non-glaucoma eyes), a higher CC FD% was significantly associated with a thinner GCIPL (β=-0.32; 95% CI -0.43 to -0.21; $p<0.001$). Further, in a longitudinal study (453 eyes of 453 participants), a faster increase in CC FD% was found to be significantly associated with a faster decrease in GCIPL thickness (β=-0.10; 95% CI -0.17 to -0.03; p=0.004) after adjusting for age, sex, axial length, and image quality score.

Conclusions: This is the first time to show that CC FD% and GCIPL thickness were correlated in both cross-sectional and longitudinal studies of non-glaucomatous individuals, which may potentially provide further insights into the role of CC perfusion in glaucoma development and progression.

Subspecialty: Intraocular Inflammation, Uveitis and Scleritis

Comparative Effectiveness of Immunomodulatory Agents Plus Corticosteroids for Severe Behçet's Disease Uveitis

First Author: Zhenyu ZHONG
Co-Author(s): Peizeng YANG

Purpose: We aim to compare cyclosporine, interferon alpha2a, and adalimumab, each combined with corticosteroids, in preventing uveitis relapse in severe Behçet's disease.

Methods: We conducted a randomised, open-label, assessor-blinded, head-to-head trial. Severe Behçet's disease uveitis patients on corticosteroids and naive to anti-TNF therapy were randomly assigned in a 1:1:1 ratio to cyclosporine, interferon alpha2a, or adalimumab, each combined with tapering doses of corticosteroids with subsequent dose adjustments. The primary outcome was the annualised relapse rate of uveitis.

Results: A total of 270 patients underwent randomization, with 90 assigned to each group, and 261 patients were included in the full analysis set. For the primary outcome, the least-squares mean was 1.84 (95% CI 1.40 to 2.44) with cyclosporine, 1.44 (95% CI 1.10 to 1.89) with interferon alpha2a, and 0.95 (95% CI 0.64 to 1.40) with adalimumab. The annualised relapse rate was significantly higher in patients with cyclosporine than in those with adalimumab (least-squares mean difference 0.90 [95% CI 0.27 to 1.53]). The least-squares mean difference between interferon alpha2a and adalimumab was 0.50 (95% CI -0.04 to 1.04). The primary outcome did not differ substantially between interferon alpha2a and cyclosporine (least-squares mean difference -0.40 [95% CI -1.05 to 0.25]).

Conclusions: Adalimumab plus corticosteroids led to the lowest uveitis relapse rate among the three groups. These findings suggested that when necessary, the combination regimen of adalimumab plus corticosteroids could be a clinical priority in severe Behçet's disease.

Subspecialty: Myopia

Optical Coherence Tomography Angiography in Paediatric Myopes

First Author: Pavitra RAVIKUMAR
Co-Author(s): Dharshini BASKARAN, Atul GUPTA, Anand PARTHASARATHY, Lipika ROY

Purpose: The aim is to study the retinal microvasculature in paediatric myopic eyes using optical coherence tomography angiography (OCTA).

Methods: It was a prospective comparative study done in the period of October 2023-June 2024.160 paediatric myopes of age 6-18 years were included. Astigmatism >+/-1.5D, other causes of myopia (secondary/index), children with corneal ectasia, anterior segment genesis, cataract, retinal pathologies, and metabolic disorders were excluded. Each patient underwent a complete ophthalmological examination. They were divided into low (≤ -0.5 to > -6.00 D) and high(≤ –6.00 D) myopia. Axial length was measured using IOL Master 500.OCTA was done using REVO FC (optopol technology), 6*6 mm scans were taken. Superficial vessel density (SVD), deep vessel density (DVD), Foveal avascular zone (FAZ) area, perimeter, and circularity were analyzed.

Results: Among the 160 children, 75 were girls & 85 were boys. The mean age was 11.3 + 3.07. 154 were in the low myopia group and 6 in the high myope. Comparing the OCTA parameters (SVD, DVD, FAZ) between low & high myopia groups, FULL SVD &DVD were found to be significantly less ($p<0.007$, <0.008) in high myopia. No statistical significance was noted in other parameters. With increasing diopter change in spherical equivalent, a significant correlation ($p<0.001$) is seen in the OCTA parameters.

Conclusions: Our results suggest there is a significant decrease in the full SVD&DVD in the high myopia group compared to low myopia, which warrants further monitoring to rule out early pathological changes in high myopia.

Subspecialty: Ocular Oncology and Pathology (2 Awards)

Diminished MYCN Dosage Endows Cavitary Transformation in Retinoblastoma With Favorable Outcome: A Case-Controlled, Retrospective, Multicentric Study Integrating Spatial Proteomics and Preclinical Interventions

First Author: Peiwei CHAI
Co-Author(s): Renbing JIA

Purpose: Cavitary retinoblastoma (CRB) is a distinct subtype of retinoblastoma characterized by translucent cavities observable via ophthalmoscopic examination. Howbeit, a comprehensive understanding of the clinical implications and molecular underpinnings of CRB is lacking.

Methods: A case-control, retrospective cohort study. Three tertiary retinoblastoma centers in China. Participants: In a longitudinal study encompassing 1,360 retinoblastoma patients, conducted over a 13-year timeframe from June 2008 to February 2022, cavitary spaces were detected within the tumors of 35 eyes of 34 patients. A control cohort of 164 eyes from 138 age-matched patients with non-cavitary retinoblastoma was selected, maintaining a 1:3 case-control ratio. Exposure: Clinical manifestations of CRB. Main Outcomes: Overall survival (OS) and metastasis-free survival (MFS).

Results: CRB was linked to enhanced MFS (log-rank p=0.01) and OS (log-rank p=0.04), as well as an increased proportion of well-differentiated status (p=0.002) and a reduced incidence of vitreous seeding (p=0.04). Spatial proteomic analysis, immunofluorescence, and immunohistopathology revealed a remarkable decrease in MYCN expression in CRB. Silencing MYCN in patient-derived xenografts (PDX) using adeno-associated virus recapitulated these phenotypes of CRB, including the formation of translucent cavities and the emergence of cone-like rosettes.

Conclusions: This study established a novel genetic-phenotypic association, which diminished MYCN expression and induced a re-differentiation of retinoblastoma cells, marked by the formation of translucent cavities. This phenotype is indicative of a less aggressive, well-differentiated CRB subtype with a more favorable prognosis. Targeting MYCN with gene delivery techniques to induce the cavitary phenotype could offer a novel therapeutic approach for the management of retinoblastoma.

Comparison of Outcomes of Gamma-Knife Radiosurgery, Ru-106 Brachytherapy and Enucleation for Uveal Melanoma in Comparable Groups

First Author: Vera YAROVAYA
Co-Author(s): Aiza GALBATSOVA, Andrey GOLANOV, Valeri KOSTUCHENKO, Andrey YAROVOY

Purpose: To compare the effectiveness and survival of patients with UM treated with Gamma-knife radiosurgery (GKRS), brachytherapy (BT), or enucleation (En) in statistically comparable groups.

Methods: The records of 606 UM patients (606 eyes) were reviewed. Seventy patients underwent GKRS, 190 - En, 346 - BT. The GKRS group was compared with the enucleation group only according to survival. GKRS group was compared with BT by tumor control, complications, eye preservation, and survival. All groups had no statistical differences in clinical data ($p>0.1$).

Results: The five-year survival rate of patients treated with GKRS (91%) or enucleation (82%) had no statistical difference ($p=0.095$). The same data were obtained by comparing the GKRS group (92%) with the BT group (85%) ($p=0.9$). There was no difference in tumor regression degree in patients who underwent GKRS and BT ($p=0.45$): tumor regression 97% vs 93% and tumor growth 3% vs7%. The eye retention rate was also equal for BT (94%) and for GKRS (95%) in a 5-year follow-up ($p=0.49$). The number of complications in both groups had no statistical significance ($p=0,11$) and included radiation retinopathy (GKRS 37%, BT 15%), neuroretinopathy (GKRS 9%, BT 12%), vitreous hemorrhage (GKRS 3%, BT 4%), secondary glaucoma.

Conclusions: The survival rate of patients with UM does not depend on the treatment method - GKSRS, BT or enucleation. The number of complications of GKRS does not exceed that of BT. It is possible to save the same number of eyes with UM using GKRS or BT.

Subspecialty: Ophthalmic Epidemiology and Prevention of Blindness

The Impact of Mobile Cataract Program on the Improvement of Effective Cataract Surgical Coverage: Insights From National Eye Surveys in Malaysia

First Author: Wan Radziah WAN NAWANG
Co-Author(s): Norasyikin MUSTAFA, Mohamad Aziz SALOWI, Siti Nurhuda SHARUDIN

Purpose: To report on the improvement of effective cataract surgical coverage in Malaysia based on two population-based eye surveys conducted in 2014 and 2023.

Methods: The cross-sectional population-based eye surveys, known as the National Eye Survey, utilized the rapid assessment of avoidable blindness (RAAB) methodology. The 2014 survey was carried out simultaneously across six regions nationwide, whereas the survey in 2023 was limited to two regions, specifically Sarawak and Eastern zones. A multistage cluster sampling technique was used, with each cluster comprising of 50 residents aged 50 years and older. Presenting visual acuity was checked, and subjects with cataract were identified. The corrected visual acuity of those who had undergone cataract surgery was measured. Cataract surgical coverage (CSC) and effective cataract surgical coverage (eCSC) were calculated at all levels of cataract surgical thresholds.

Results: Comparing the results from the surveys in 2014 and 2023, eCSC was noted to be improved within the range of 13.8%-19.2% and 18.6%-23.8% for Eastern and Sarawak zones, respectively, at various levels of cataract surgical threshold. The relative quality gap was reduced in the range of 18.0%-20.0% (Eastern Zone) and 17.9%-19.4% (Sarawak). Values for eCSC were lower than CSC during both surveys, and the difference between genders was insignificant.

Conclusions: The improvement in eCSC could be attributed to the impact of the mobile cataract service in both regions. A collaborative effort is essential to enhance and broaden the program's reach, allowing the nation to meet the World Health Organization's target of a 30% increase in eCSC.

Subspecialty: Ophthalmic Trauma

Epidemiology of Occupational and Non-Occupational Eye Injuries: Cases Treated in Four Eye Hospitals in Bangladesh

First Author: Salman AHMED
Co-Author(s): Saeema ALHADHRAMI

Purpose: To study the epidemiological profile of occupational and non-occupational ocular injuries in Bangladesh.

Methods: This descriptive cross-sectional study was conducted on purposively selected 117 eye injury cases from four eye hospitals situated in Dhaka (2), Tangail (1), and Rajshahi (1), Bangladesh. A structured questionnaire was used to collect data from the study subjects.

Results: Respondents' mean ± SD age was 29.70± 15.95 years where a maximum (69.2%) of them were male. Secondary-level education was more common among the study subjects (24.8%). A great number of respondents (62.4%) monthly income ranges from 12,000- 30,999 Bangladeshi Taka. Not using/lack of protective measures, carelessness, and road traffic accidents were identified as the leading causes of eye injuries at the workplace, home, and other areas, respectively by most of the participants. On the other hand, maintaining or cleaning instruments at the workplace, looking after children at home, and riding vehicles were mentioned as the activities during eye injuries by the highest number of respondents. A statistical significance $p < 0.05$ was found between eye injuries and participants' age, gender, occupation, educational qualification, and monthly family income

Conclusions: Eye injuries are more or less common at home, the workplace, and other areas irrespective of epidemiological distribution. Therefore, measures should be taken to eliminate eye injuries at personal, community, and national levels.

Subspecialty: Orbital and Oculoplastic Surgery

Inhibition of Interleukin-6 Receptor (IL-6R) Signaling With Satralizumab in Thyroid Eye Disease (TED): Phase 3 SatraGO-1 and SatraGO-2 Trial Design

First Author: Kelvin Kam-lung CHONG
Co-Author(s): Daniel EZRA, Zdenka HASKOVA, Oluwatobi IDOWU, Galin SPICER, Marius STAN

Purpose: Satralizumab, a humanized monoclonal antibody targeting IL-6 and IL-6R, enables extended antibody circulation with subcutaneous administration every 4 weeks. This report details the design of the phase 3 SatraGO-1 and SatraGO-2 trials assessing satralizumab's efficacy and safety in active and inactive TED patients.

Methods: SatraGO-1 (NCT05987423)/SatraGO-2 (NCT06106828) are identical, global, phase 3, randomized, double-masked, placebo-controlled, multicenter studies in participants with moderate to severe active and chronic inactive TED which will recruit ~120 participants. Participants are randomized 1:1 to receive subcutaneous satralizumab or placebo at weeks 0, 2, and 4 (loading doses) and then Q4W through week 20 (maintenance doses). Based on the proptosis response at week 24, non-responders will receive satralizumab Q4W, and responders will be re-randomized 1:1 to receive satralizumab or placebo Q4W through week 44 to evaluate the long-term benefits of satralizumab. Rescue treatment is permitted based on protocol-defined criteria and per the investigator's discretion. Evaluate the long-term benefits of satralizumab. Rescue treatment is permitted based on protocol-defined criteria and per the investigator's discretion.

Results: The primary endpoint is the proportion of participants with active disease who achieve a proptosis response. Secondary endpoints include the proportion of participants with active and chronic inactive disease achieving a proptosis response, the proportion of participants achieving an overall response, and the proportion of participants achieving ≥1 grade improvement in diplopia. Safety outcomes include the incidence, seriousness, and severity of adverse events.

Conclusions: SatraGo-1/SatraGo-2 aims to explore IL-6 signaling inhibition via satralizumab in TED participants, offering a potential disease-modifying treatment while reducing the safety risks of existing therapies.

Subspecialty: Pediatric Ophthalmology and Strabismus

Unlocking Non-Invasive Retinopathy of Prematurity Screening From Tear Proteomic Biomarker Profile - the Suppressed LXR/RXR Activation Pathway

First Author: Alicia LIU
Co-Author(s): Connie LAI, Thomas Chuen LAM, Wai-ching LAM, Man Hin LEUNG, Oi Ying WONG

Purpose: Retinopathy of prematurity (ROP) is the leading cause of preventable childhood blindness. Tear protein biomarkers identified from next-generation label-free proteomics may offer an accessible, non-invasive option for ROP screening.

Methods: Infants whose birth weight was ≤1500g or gestational age ≤30 weeks were recruited. Examination began at 4 weeks chronologic age or 31 weeks postmenstrual age. ROP was diagnosed according to the International Classification for Retinopathy of Prematurity. ROP (n=13) and non-ROP (n=21) tear samples were collected with Schirmer's strips. Tear proteins were identified and quantified using data-independent acquisition mass spectrometry. Further gene ontology functional and enrichment analyses were completed on the resulting differential proteins.

Results: A total of 2,279 unique proteins (1% FDR) were quantified, with 362 significantly differentiated proteins (FC≥1.5 or ≤0.5, $p<0.05$). Gene ontology pathway analysis revealed that the most significantly suppressed canonical pathway was the LXR/RXR activation pathway ($p<0.01$, $|z|\geq 2$), with several key associated proteins of the same class being significantly down-regulated.

Conclusions: LXR/RXR activation pathway is reported to regulate gene expression in the retina. LXRα/β is suggested to regulate angiogenesis and contribute to ocular neovascularization by increasing the expression of ATP-binding cassette transporters (ABCA1 and ABCG1) by interfering with the signaling of vascular endothelial growth factor receptor 2 (VEGFR2). Suppressed LXR/RXR activation pathways can, therefore, result in disrupted lipid rafts that could interfere with neovascularization in ROP. Further validation of the key ROP tear biomarkers that we discovered may facilitate the development of a non-invasive ROP screening kit for clinical application.

Subspecialty: Refractive Surgery

Residual Refraction Correction After LASIK By Adjusting Corneal Q-Value with SMILE Module

First Author: Faruk SEMIZ
Co-Author(s): Fetih Furkan ARSLAN, Njomza HIMA-MUSA, Ceren Ece SEMIZ

Purpose: To show the effectiveness of addressing hyperopia residual refraction and presbyopia post-LASIK by altering corneal shape (Q value) through fresh intrastromal myopic lenticule transplantation (FMLT) using the SMILE module.

Methods: This study involved 64 eyes of 32 patients aged between 38 and 55 years old, who presented with post-LASIK hyperopic residual refraction. The patients had residual hyperopia and astigmatism ranging from +0.75 to +2.75 D and +0.75 to +2.50 D, respectively. Fresh Intrastromal Myopic Lenticule Transplantation was performed using the SMILE module based on corneal topography. To prevent glare disturbances while driving at night, the donor lenticule diameter was maintained 1 mm larger than the recipient's mesopic pupil size. All patients were monitored for an average of 1 year. ClinicalTrials.gov Identifier NCT04793893

Results: The improvement in UDVA from preoperative 0.67±0.08 LogMAR to postoperative at 12 months (0.07±0.05 LogMAR; $p<0.001$) was observed. Preoperative UNVA (near visual acuity at 40 cm) was J7, and postoperative UNVA at 40 cm was J2. Preoperative UNVA at 80 cm was J6, and postoperative UNVA at 80 cm was J3.

Conclusions: Fresh intrastromal myopic lenticule transplantation is a safe and effective treatment for hyperopic residual refractions and presbyopia post-LASIK, modifying the corneal Q value. This procedure improves both distance and near visual acuity.

Subspecialty: Retina (Medical) (2 Awards)

Association Between Mean Platelet Volume and Retinal Vein Occlusion (RVO): A Comparative Study

First Author: Tariq ALI
Co-Author(s): Shahreen FERDOUS

Purpose: To assess the association between mean platelet volume and retinal vein occlusion.

Methods: This was an observational cross-section study involving 30 cases of RVO and 30 cases of age and sex-matched control of 21-80 years. Following a brief history, general and ocular examination blood samples were taken from the subjects to measure platelet count and indices using the Electrical Impedance Cell Counting method in SYSMEX Automated Haematology Analyser.

Results: The mean age in the case was 51.1 (±11.9) years, and that of the control was 54.5 (±12.7) years. The mean platelet count was 2,948,66 (±87772)/ mm3 and 2,97,667 (±60250)/mm3, respectively, in cases and controls, respectively, without any statistically significant difference between these two groups (p=0.886). The mean MPV was 11 (±1.5) fl and 9.8 (±1.3) fl in the cases and controls, respectively, and the difference between them was statistically significant (p=0.002). There was a positive correlation between MPV and RVO (r=0.376; p=0.003) as well as logistic regression analysis demonstrated a 1.9 times higher likelihood of developing RVO for every femto litre increase in MPV (OR=1.949; p=0.001). ROC curve analysis also demonstrated that MPV has good sensitivity and specificity (70% and 67% respectively for an MPV cut-off of 10.35 fl) for the prediction of RVO (p=0.004; AUC=0.717).

Conclusions: Total platelet number and size have long been considered a causative factor for the development of RVO. Our study suggested that not platelet count, but mean platelet volume was an independent risk factor for the development of RVO.

Greater Reduction in Hard Exudates With Faricimab Versus Aflibercept in Patients With Diabetic Macular Edema: Biomarker Results From the Phase 3 Yosemite/Rhine Trials

First Author: Gavin TAN
Co-Author(s): Kara GIBSON, Roger GOLDBERG, Michael IP, Andreas MAUNZ, Diane USCHNER

Purpose: Exploratory analysis of YOSEMITE/RHINE (NCT03622580/NCT03622593) trials evaluated if dual inhibition of angiopoietin-2 (Ang-2) and vascular endothelial growth factor A (VEGF-A) with faricimab reduces hard exudates (HE) in patients with diabetic macular edema (DME) compared with aflibercept.

Methods: Patients with DME were randomized 1:1:1 to receive intravitreal faricimab (6.0 mg every 8 weeks [Q8W] or treat-and-extend [T&E]) or aflibercept (2.0 mg Q8W). HE presence was evaluated by a central reading centre using color fundus photography within the Early Treatment of Diabetic Retinopathy Study grid at screening and weeks 16, 52, and 96. HE volumetric analyses on optical coherence tomography (OCT) will be performed.

Results: HE was evaluated in 1870 patients (faricimab Q8W=626, faricimab T&T=628, aflibercept=616). HE proportions at baseline were similar across the three treatments (80.8-81.6%) and decreased over time. In patients with baseline HE, HE proportions at week 16 were similar between faricimab and aflibercept. By weeks 52 and 96, fewer faricimab (Q8W/T&E) patients had HE vs aflibercept-treated patients (79.0%/75.8% vs 86.2% and 52.8%/55.9% vs 64.5%, respectively). This corresponded to a difference (95% confidence interval) of -7.2% (-12.2%,-2.2%; nominal P=0.0058) and -10.5% (-15.6%,-5.4%; nominal P<0.0001) at 52 weeks and -11.7% (-18.6,-4.8; nominal P=0.0013) and -8.9% (-15.7,-2.1; nominal P=0.0124) at 96 weeks for faricimab Q8W and T&E over aflibercept, respectively. Retinal segmentation and quantification of HE volume on OCT will be presented.

Conclusions: Faricimab showed greater HE reduction than aflibercept in patients with DME and may reflect improved vascular stability with dual Ang-2/VEGF-A inhibition, as demonstrated in other biomarker analyses.

Subspecialty: Retina (Surgical)

Surgical Outcomes of High Myopic Refractory Macular Holes

First Author: Nishant Vijay RADKE
Co-Author(s): Miaoli LIN, Zhizhao PENG, Snehal Nishant RADKE

Purpose: To evaluate the surgical outcomes of refractory myopic macular holes (MH).

Methods: Retrospective case series of 15 eyes of 14 patients with high/pathological myopia with previously failed MH surgeries. All eyes underwent 25G re-vitrectomy with MH repair using internal limiting membrane (ILM) graft under PFCL, Pedicle or ILM inversion, macular massage, and autologous retinal/lens capsular grafts followed by endo-tamponade with perfluoro-octane gas and prone position for 2 weeks. Snellen's best corrected visual acuity (BCVA) was converted to LogMAR. Normal distribution was checked using the KS test. F-test was used to assess variance and subsequently paired T-test was used to determine outcomes. Fisher's exact test/ Chi 2 test was used to evaluate nominal data. Correlation coefficients were calculated to study relationships between MH diameter (MHD)-axial length (AXL), AXL-Final BCVA, and MH Diameter-Final BCVA.

Results: Mean AXL and MHD were 28.443mm and 663.267 microns. 13 eyes achieved MH closure. Male: female = 8:6. T-test p values were insignificant for differences between Male-Female AXL, MHD, pre-op BCVA, and male-female post-op BCVA. The values were statistically significant individually for paired samples of Male pre-op: post-op BCVA, female pre-op: post-op BCVA, and overall pre- and post-op BCVAs. Correlation coefficients were weakly positive for MHD: AXL (r=0.109), AXL: final BCVA (r=0.193), and strongly positive for MHD: final BCVA (r=0.715). Fisher's test evaluating pathological myopic features and type of anesthesia on outcomes were insignificant.

Conclusions: Although challenging, refractory, highly myopic MH achieves satisfactory anatomical and functional outcomes. The presence of pathological myopic maculopathy and the type of anesthesia did not affect the outcomes.

Subspecialty: Translational Research in Ophthalmology

A Clinical Study of Allogeneic iPS Cell-Derived Retinal Pigment Epithelial Cell Strips Transplantation for Retinal Pigment Epithelial Impairment Disease

First Author: Yasuo KURIMOTO
Co-Author(s): Yasuhiko HIRAMI, Tadao MAEDA, Michiko MANDAI, Daiki SAKAI, Masayo TAKAHASHI

Purpose: While there is no established treatment for retinal pigment epithelium (RPE) impairment disease, transplantation of induced pluripotent stem cell (iPSC)-derived RPE can be a curative treatment. Transplanting RPE as cell sheets is reliable but highly invasive, while cell suspension transplantation is less invasive, but cell leakage is inevitable, and it is difficult to control the transplantation site. We established a minimally invasive and reliable transplantation method by aggregating RPE into strip form and conducted a clinical study.

Methods: Allogenic iPSC-derived RPE was aggregated into thin strips and transplanted under the retina of three patients with advanced RPE impairment disease using a 31G cannula. The primary endpoint was the reduction of RPE abnormal area, and the secondary endpoints included efficacy and safety. The patients were observed for one year postoperatively.

Results: One patient of dry age-related macular degeneration and two of retinitis pigmentosa with MERTK mutation underwent 25G vitrectomy, and one or two RPE strips were implanted under the retina with a 25G/31G cannula. One year after transplantation, the primary endpoint of abnormal RPE area reduction was achieved in all patients, and the quality of vision was improved in one patient. No serious adverse events occurred, but one patient developed an epiretinal membrane not thought to be derived from the transplanted cells.

Conclusions: Allogenic iPSC-derived RPE was successfully transplanted subretinally in advanced RPE-impaired cases in a minimally invasive procedure by aggregating iPSC-derived RPE into strip form, and the safety and efficacy were confirmed one year after transplantation.

Subspecialty: Visual Sciences

Patient-Specific Perceptual Visual Stimulation Improves Vision and Contrast Sensitivity in Crosslinked Stable Keratoconus: Results of Randomized Controlled Study

First Author: Lional Raj DANIEL RAJ PONNIAH

Purpose: To evaluate computer-based perceptual visual therapy (PL) regime using Gabor patches for improving best-corrected vision (BCVA) & contrast sensitivity function (CSF) in crosslinked stable keratoconus (KC).

Methods: A prospective, controlled randomized, open-label study. Cross-linked keratoconus (KC), stable over 1 year with BCVA worse than 20/40 were randomized in 2:1 into treatment (G1) in which computer-based perceptual therapy using Gabor patches amidst co-linear flankers was employed, and control (G2) arms. The study consists of 2 phases (screening + therapy periods (PL). Post 20 and 40 training sessions were evaluated for improvements in BCVA distance and near (ETDRS) and CSF at spatial frequencies of 3, 6,12,18 CPD.

Results: Thirty cases were randomized. Baseline BCVA was 68.20+/-8.11 & 67.40+/-7.09 in G1, G2 ($p=0.793$). BCVA of Perceptual therapy arm PL(G1) improved to 73.30+/-7.47 & 79.10+/-8.46 post 20 & 40 sessions (over 2.5 LogMAR lines equivalent, $p<0.0001$) & not in controls(G2). Contrast sensitivity functions (CSF) at 3,6,12,18 CPD analyzed using Friedman repeated measure tests showed significant improvements in the PL group (G1, $p<0.0001$), and not in controls.

Conclusions: Sequential, patient-specific, perceptual therapy improved vision & contrast (CSF) in crosslinked keratoconus with visual deficiencies & acts as proof of concept of improving neural connections at cortical levels. Keratorefractive surgeons could consider it as post-operative therapeutic adjuvant, in crosslinked stable KC with visual deficiencies.