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ABSTRACT BOOK

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FREE PAPERS

Eye Trauma, Emergencies & Infections

Dec 12, 2021 (Sun) 14:30 - 15:30

Venue: Livestream 2

Management of Preoperative Posterior Capsular Tear to Expected Vision from Unexpected Scenery

First Author: Billal ***HOSSAIN***
Co-Author(s): Showkat ***HAYAT,*** *Natasha* ***KAZMINA,*** *Md* ***QUADER,*** *Syeda* ***SULTANA***

Purpose: To explore the causes of preoperative posterior capsular tear and to describe output of management.

Methods: This retrospective, interventional, non-comparative study was done from January 2019 to December 2020. Patients presented to retinal clinic with profound loss of vision either after trauma or intravitreal injection. Along with history, clinical evaluation was done with slit lamp, indirect ophthalmoscope and B-scan ultrasonography to confirm preoperative posterior capsular tear. Surgery was done by single surgeon and intraocular lens was implanted. Postoperative best corrected visual acuity, intraocular pressure, lens position and retinal status were evaluated. Post operative follow up was at day 1, week 1, 1 month, 3 months and 6 months.

Results: Total 5 cases were included in our study. 3 patients (60.00%) were male and 2 (40.00%) were female. Mean age was 41.4 years (range 22-62 years). 3 patients (60.00%) had history of intravitreal injection and 2 patients (40.00%) had history of trauma either blunt or perforating. Phacoemulsification with or without anterior vitrectomy were done in 2 cases and pars plana vitrectomy was done in 3 cases. Intraocular lens was implanted in sulcus in 2 (40.00%) cases, in bag in 1 (20.00%) case and optic capture was in 2 (40.00%). Vision was improved in all cases (range logMAR 0.00-0.30).

Conclusions: Preoperative posterior capsular tear is an unexpected event which may occur due to either trauma or intravitreal injection. Meticulous planning and effective vitreoretinal intervention will ensure optimum visual outcomes with stable ocular condition.

General Ophthalmology

Dec 12, 2021 (Sun) 17:00 - 18:00

Venue: Livestream 2

Comparison of Visual Acuity Testing Methods using Smartphone Apps, Snellen Chart and Early Treatment Diabetic Retinopathy Study Chart

First Author: Padma Bharathi ***KANDASAMY***
Co-Author(s): John ***AKKARA,*** *Bhavishya* ***ELAMPURANAM***

Purpose: To investigate if smartphone apps (EyeChart for iPhone and Peek acuity app for Android phones) and traditional Snellen chart measure accurate visual acuity (VA) as compared to the gold-standard Early Treatment Diabetic Retinopathy Study (ETDRS) chart.

Methods: Cross sectional period study including patients above 18 years of age and of VA 6/60 or better at 6 meters was conducted over 2 months. About 252 patients were included. VA of both the eyes of each participant was measured by 4 charts: Snellen chart at 6 m, ETDRS at 3 m, EyeChart app at 1.2 m, Peek acuity app at 2 m. Each VA measured using smartphone apps and Snellen chart was compared to the VA measured using ETDRS chart.

Results: Visual acuity was recorded ranging from 6/60 (logMAR: 1.0) to 6/6 (logMAR: 0.0). The mean VA scores obtained were 0.44 logMAR on Snellen chart, 0.40 logMAR on ETDRS chart, 0.41 logMAR on EyeChart app, 0.37 logMAR on Peek acuity app. VA obtained from Snellen chart and smartphone apps

was highly statistically significant (p<0.01). Smartphone apps and Snellen chart had a strong correlation with ETDRS chart.

Conclusions: Visual acuity measured using smartphone apps and Snellen chart were accurate and reliable compared to ETDRS chart. Automated smartphone-based apps simplify the task of measuring visual acuity, and hence can be used outside the clinical setting where traditional VA charts are typically not available. It can also be useful for tele-consultation where in-person consultation is at risk during pandemic outbursts.

Intraocular Inflammation, Uveitis & Scleritis

Dec 12, 2021 (Sun) 14:30 - 15:30

Venue: Livestream 2

Anatomical and Functional Outcome of Macular Edema Secondary to Non-Infectious Uveitis Treated with Single Low-Dose Suprachoroidal Triamcinolone Acetonide (2mg)

*First Author: Abhishek **ANAND***

Purpose: To study the anatomical and functional outcome of macular edema secondary to non-infectious uveitis treated with single low-dose suprachoroidal triamcinolone acetonide (LD-SCTA) (2mg) injection in non-infectious posterior uveitis.

Methods: Eleven patients with macular edema of more than 280 microns, secondary to non-infectious active uveitis, were included in the study. A single LD-SCTA (0.5 ml) injection was performed in the study eye with the help of a novel suprachoroidal microneedle (Pricon, Iscon Surgicals, Jodhpur, India). The study parameters were noted at 4 and 12 weeks post LD-SCTA injection.

Results: The mean age of the patients was 42.36±15.98 years. The mean best corrected visual acuity at baseline was 0.84±0.41 logMAR which improved to 0.52±0.33 (p<0.001) and 0.25±0.22 (p<0.000) post SCTA at week 4 and 12 respectively. Ten of eleven patients had a significant decrease in central macular thickness (CMT). The mean CMT measurement at baseline was 513.6±191.73 µm for the ten patients who responded to the treatment, reduced significantly to 265.1±34.72 µm (p<0.003) and 260.6±34.72 µm (p<0.002) at 4 weeks and 12 weeks respectively. The mean IOP at baseline recorded was 16.36±2.97 mm Hg, 19.45±4.80 mm Hg (p=0.06) at 4 weeks and 17.27±2.53 mm Hg (p=0.35) at 12 weeks. One eye which did not respond to LD-SCTA was a case of recurrent Vogt-Koyanagi-Harada disease.

Conclusions: Single LD-SCTA injection is efficacious in reducing CMT in macular edema, improving BCVA and controlling the inflammation in non-infectious posterior uveitis and can be used as first line therapy.

Dec 12, 2021 (Sun) 14:30 - 15:30

Venue: Livestream 2

Post-Hoc Analysis of Safety and Visual Function: Suprachoroidal Injection of Proprietary Triamcinolone Acetonide Suspension (CLS-TA/ARVN001) versus Rescue Therapies for Uveitic Macular Edema

*First Author: De-kuang **HWANG***
*Co-Author(s): Colette **HALL,** Qing **LIU,** Edward **WONG***

Purpose: The Phase 3 PEACHTREE study evaluated suprachoroidal injection of CLS-TA/ARVN001 (proprietary triamcinolone acetonide suspension) as targeted and compartmentalized drug delivery for the treatment of uveitic macular edema (UME). This post-hoc analysis compares efficacy and safety of CLS-TA to real-world rescue therapies used in UME.

Methods: In PEACHTREE, 160 patients were randomized to receive suprachoroidal CLS-TA or sham at baseline and week 12, and rescue therapy based on pre-defined criteria. This post-hoc analysis compares the visual function and safety of non-rescued patients in the CLS-TA arm with those who received rescue therapy in the control arm, with the type of rescue at the discretion of the investigator.

Results: At week 24, 86.5% (83/96) of patients in the CLS-TA arm did not require rescue. In the control arm, 71.8% (46/64) were rescued. All rescued control patients received ocular or systemic corticosteroids; 63% received intravitreal steroids. Among unrescued CLS-TA patients, more gained ≥15-ETDRS letters (51.9% vs 37.0%, p=0.115) with greater mean gain in ETDRS letters (15.7 vs 10.9, p=0.08) and greater mean reduction in central subfield thickness (174.0um vs 148.5um, p=0.04) than rescued control patients. With respect to treatment emergent adverse events (TEAE) in these two groups, more rescued control patients reported ≥1 TEAE (63.0 % vs 48.2%), elevated intraocular pressure (IOP)-related AEs (21.7% vs 10.8%), and cataracts (8.7% vs 4.8%).

Conclusions: In this post-hoc analysis, CLS-TA subjects experienced significantly greater reduction in CST while tending towards greater improvement in BCVA and lower incidence of IOP-related safety findings compared with rescued control subjects.

Ocular Imaging

Dec 12, 2021 (Sun) 14:30 - 15:30

Venue: Livestream 2

Analysis of Structural Changes in the Choroid using Choroidal Vascularity Index in Macular Telangiectasia Type 2 with and without a Choroidal Neovascular Membrane

*First Author: Sherina **THOMAS***

Purpose: To evaluate the subfoveal choroidal thickness (SFCT) and choroidal vascularity index (CVI) in eyes with macular telangiectasia type 2 (MacTel 2) using the enhanced depth imaging spectral domain optical coherence tomography (EDI-SD OCT).

Methods: This is a retrospective case-control study of 47 eyes with MacTel 2 and 16 healthy controls. The EDI-SD OCT scans of MacTel 2 patients were compared against controls and between proliferative (13/47) and non-proliferative MacTel 2 subtypes, defined by the presence/absence of choroidal neovascular membrane (CNVM). The SFCT was measured between the retinal pigment epithelium and the choroidal-scleral interface. Images were binarized to derive the choroid's luminal (vascular) area and stromal area. CVI is defined as the percentage of total choroidal area that is vascular.

Results: MacTel 2 patients had larger SFCT (p<0.001) and lower CVI (p=0.033) than the controls. The CNVM group had larger SFCT (p=0.017) compared to the non-CNVM group, with no significant difference in CVI.

Conclusions: Reduced CVI with increased SFCT in MacTel 2 suggested significantly greater increment in the stroma than vasculature. Unchanged CVI with increased SFCT in the CNVM subtype throws light on the retinochoroidal origin of neovascularization with secondary choroidal changes.

Dec 12, 2021 (Sun) 14:30 - 15:30

Venue: Livestream 2

Features of Retinal Conditions Mimicking Polypoidal Choroidal Vasculopathy

*First Author: Colin **TAN***

Purpose: To describe screening failures from a randomized controlled clinical trial in polypoidal choroidal vasculopathy (PCV), and to examine the imaging characteristics that enable differentiation of these conditions from actual PCV.

Methods: Standardized indocyanine green angiography (ICGA) was used by the Central Reading Centre (CRC) for grading images and to confirm PCV diagnosis based on the presence of early focal sub-retinal hyperfluorescence on ICGA, in addition to at least one of the following six diagnostic criteria: 1) nodular appearance of polyp(s) on stereoscopic examination, 2) hypofluorescent halo around the nodule(s), 3) presence of a branching vascular network, 4) pulsation of polyp(s) on dynamic-ICGA, 5) orange sub-retinal nodules on color fundus photography, or 6) massive submacular hemorrhage (≥4 disc-

area in size). An additional detailed image grading with stereo-imaging and dynamic-ICGA enabled the CRC to distinguish pseudo-PCV from actual PCV.

Results: Of the 95 screened cases, 34 were excluded and categorized into three groups, (i) PCV cases not suitable for recruitment per the study protocol (n=14); (ii) borderline or possible PCV cases (n=9); (iii) cases that were definitely not PCV (n=11), identified by differential diagnosis angiographically. The 11 non-PCV cases included one case each of micro-aneurysm, retinal angiomatous proliferation, retino-choroidal anastomosis, choroidal neovascularization, retinal pigment epithelial (RPE) window defect, and disciform scar; two cases of choroidal vascular knuckle; and three cases of late-onset RPE staining.

Conclusions: Standardized image grading techniques enabled effective differentiation of non-PCV from actual PCV.

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Venue: Livestream 2

Foveal Neovascularization in Proliferative Diabetic Retinopathy

*First Author: Ramesh **VENKATESH***
*Co-Author(s): Sameeksha **AGRAWAL,** Nikitha **GURRAM,** Chaitra **JAYADEV,** Naresh Kumar **YADAV***

Purpose: Foveal neovascularization (NV) in proliferative diabetic retinopathy (PDR) is uncommon. The study aim is to analyze a series of cases of foveal NV in PDR and ascertain the factors leading to its development.

Methods: In this retrospective case-control study, optical coherence tomography (OCT) and OCT-angiography (OCTA) images of PDR cases with/without foveal NV diagnosed on fluorescein angiography were analyzed.

Results: From 124 consecutive PDR eyes, foveal NV was identified in 12 (10%) eyes. Eyes with foveal NV showed thin choroid (p=0.001), increased FAZ area and reduced vessel density at the macula compared to control group on OCT and OCTA. After regression analysis, an increased FAZ in the superficial capillary plexus slab (p=0.002) was associated with foveal NV development.

Conclusions: Foveal NV is an uncommon finding, occurring due to reduced choroidal and inner retinal perfusion at the macula. Further studies are required to assess the treatment outcomes in such eyes.

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Venue: Livestream 2

Radial Growth Rates of Definitely Decreased Autofluorescence across Three Mild ABCA4 Genotype Groups

*First Author: Rachael **HEATH JEFFERY***

Purpose: To investigate definitely decreased autofluorescence (DDAF) radius and radius growth rates (RGR) across three mild-intermediate ABCA4 genotype groups: c.5603A>T p.(Asn1868Ile), c.5882G>A p.(Gly1961Glu) and c.3113C>T p.(Ala1038Val) and estimate the sample size required in a clinical trial to demonstrate a 20% reduction in RGR.

Methods: The boundaries of DDAF within the central 30x30-degree lens (Heidelberg) were marked at baseline and follow-up by two expert graders. RGR was determined and compared between the three genotype groups including both eyes using the Kruskal-Wallis test with post hoc pairwise comparisons (Dunn's test).

Results: A total of 50 eyes from 26 Stargardt disease (STGD1) patients had 217 images manually segmented for DDAF. Those patients carrying c.5603A>T, c.5882G>A and c.3113C>T had a mean (±SD) RGR of 0.06±0.05 and 0.10±0.06 mm/year, 0.06±0.04 and 0.06±0.04 mm/year and 0.18±0.04 and 0.16±0.06 mm/year for the right and left eye respectively. The RGR was significantly different between the 3 groups (p=0.0002). Post-hoc analysis showed no differences between c.5603A>T and c.5882G>A (p=0.156). However, c.3113C>T had greater RGR compared to both c.5603A>T (p=0.002) and c.5882G>A (p=0.00004). To detect a 20% reduction in RGR with alpha=0.05 and 80% power, future clinical trials will require

165, 165 and 58 subjects in each group (1:1) for STGD1 patients with c.5603A>T, c.5882G>A and c.3113C>T variants respectively.

Conclusions: We observed genotype-dependent variation in RGR with patients carrying c.5882G>A and c.5603A>T showing a significantly slower RGR than those carrying c.3113C>T. Variants with more rapid RGR require smaller sample sizes to demonstrate therapeutic effects of novel treatments.

Dec 12, 2021 (Sun) 14:30 - 15:30

Venue: Livestream 2

Risk Factors for Onset or Progression of Posterior Vitreous Detachment at the Vitreomacular Interface After Cataract Surgery

*First Author: Sohee **JEON***

Purpose: To study the incidence and the risk factors for onset or progression of posterior vitreous detachment (PVD) at the vitreomacular interface (VMI) after cataract surgery.

Methods: Cox proportional hazard ratios for the onset or development of PVD after cataract surgery in the presence of selected risk factors and demographic data were calculated. To evaluate the ocular risk factors, various ocular metrics including spherical equivalent (SE), axial length (AXL), anterior chamber depth, lens thickness, central subfield thickness, PVD status at macula and optic nerve head (ONH), peripapillary retinal nerve fiber layer thickness, and ONH parameters from optical coherence tomography (OCT) scans were used for the analysis.

Results: Among 988 eyes without PVD at baseline, 174 eyes (17.6%) showed changes in the VMI. Univariate analysis showed that age, SE, AXL, PVD status at macula and ONH, and average and vertical cup-disc ratios (CDRs) were significantly associated with the PVD onset or development. In a multivariate analysis, PVD status at macula and ONH, and smaller CDR were associated with PVD onset or progression after cataract surgery after adjustment of age, SE, and AXL ($P < 0.001$, $P < 0.001$ and $P = 0.005$, respectively).

Conclusions: The risk of PVD onset or progression was dependent on PVD status and the CDR detected on OCT scans, not on age or AXL, in a large patient cohort. Patients who show risk factors on OCT should be monitored carefully during the postoperative period.

Ocular Oncology & Pathology

Dec 12, 2021 (Sun) 14:30 - 15:30

Venue: Livestream 2

Patients Presenting with Metastases: Stage IV Uveal Melanoma, an International Study

*First Author: Gaurav **GARG***
*Co-Author(s): Paul **FINGER,** Tero **KIVELA***

Purpose: To analyze ocular and systemic findings of patients presenting with systemic metastasis.

Methods: It is an international, multicenter, internet-enabled, registry-based retrospective data analysis. Patients were diagnosed between 2001 to 2011. Data included: primary tumor dimensions, extrascleral extension, ciliary body involvement, AJCC-TNM staging, characteristics of metastases.

Results: Of 3610 patients with uveal melanoma, 69 (1.9%; 95% CI, 1.5-2.4) presented with clinical metastasis (stage IV). These melanomas originated in the iris, ciliary body, and choroid in 4%, 16%, and 80% of eyes, respectively. Utilizing 8th edition AJCC, 8 (11%), 20 (29%), 24 (35%), and 17 (25%) belonged to AJCC T-categories T1-T4. The risk of synchronous metastases increased from 0.7% (T1) to 1.5% (T2), 2.6% (T3), and 7.9% (T4). Regional lymph node metastases (N1a) were detected in 9 (13%) patients of whom 6 (67%) had extrascleral extension. Stage of systemic metastases (known for 40 (59%) stage IV patients) revealed 14 (35%), 25 (63%), and 1 (2%) had small (M1a), medium-sized (M1b) and large-sized (M1c) metastases, respectively. Location of metastases in stage IV patients were liver (91%), lung

(16%), bone (9%), brain (6%), subcutaneous tissue (4%), and others (5%). Multiple sites of metastases were noted in 24%. Compared with the 98.1% of patients who did not present with metastases, those with synchronous metastases had larger intraocular tumors, more frequent extrascleral extension, ciliary body involvement, and thus a higher AJCC T-category.

Conclusions: Though higher AJCC T-stage was associated with risk for metastases at diagnosis, even small T1 tumors were stage IV at initial presentation. The liver was the most common site of metastases; however, frequent multiorgan involvement supports initial whole-body staging.

Pediatric Retina

Dec 12, 2021 (Sun) 17:00 - 18:00

Venue: Livestream 2

Coats Disease in India: Clinical Presentation and Outcome in 675 Patients (690 Eyes)

*First Author: Vishal **RAVAL***
*Co-Author(s): Anthony Vipin **DAS,** Phuntsho **DORJI***

Purpose: To study the clinical profile, treatment, and visual outcome of patients with Coats disease in India.

Methods: Cross-sectional hospital-based study of patients diagnosed with Coats disease during a ten-year period using an electronic medical record system.

Results: We identified 675 patients with Coats disease with a prevalence rate of 0.025% from the study population of 2,664,906. The mean age of the patients was 16.8±15.4 years (median: 12 (IQR: 5-22) years). Most of the patients were male (75.3%) presenting in first two decades (n = 309, 45.8%) with unilateral (97.8%) eye involvement. The most common clinical presentation was foveal exudation (stage 2B, n = 161, 23.3%), followed by exudative retinal detachment (stage 3A1, n = 143, 20.7%), extrafoveal exudation (stage 2A, n = 136, 19.7%), and retinal telangiectasia (stage 1, n = 79, 11.4%). At presentation, 328 (48%) eyes had a visual impairment of blindness (20/400 or less). Treatment modalities included observation (156 eyes, 37.2%), laser photocoagulation +/- intravitreal injection (n = 82, 19.5%), cryotherapy +/- intravitreal injection (n = 64, 15.2%), and surgical intervention including enucleation, vitrectomy and scleral buckle (n = 87, 20.7%). Despite appropriate treatment at mean follow up of 16 months, 135 eyes (48%) had a visual impairment of blindness.

Conclusions: The most common clinical presentation of Coats disease in India is foveal exudation in first and second decade affecting the male population. At initial presentation, about half of the affected eyes had blindness and one fifth necessitated surgical intervention.

Dec 12, 2021 (Sun) 17:00 - 18:00

Venue: Livestream 2

Demographic Risk Factors of Retinopathy of Prematurity: A Systematic Review of Population-Based Studies

*First Author: Marko **POPOVIC***
*Co-Author(s): Arjan **DHOOT,** Peter **KERTES,** Rajeev **MUNI,** Caberry **YU***

Purpose: This systematic review was conducted to analyze the association between demographic risk factors and the incidence of retinopathy of prematurity (ROP) in regional population-based studies.

Methods: In this systematic review of population-based studies, Ovid MEDLINE, EMBASE, and Cochrane CENTRAL were searched from January 2010 through May 2020. Original studies investigating cohort demographic risk factors and the incidence of ROP in a region were included. A weighted mean was used for pooling of continuous outcomes. ROP incidence was reported in proportions and compared based on cohort demographics and criteria for screening guidelines.

Results: From 4091 results, 18 studies (n=20,701,040) were included. The overall incidence of ROP across all studies was 0.15%.

Overall, ROP stages ≥3 accounted for 20.5% of ROP cases. The weighted incidence of any, severe, and treatment-requiring ROP was highest at 23 weeks GA (66.5%, 40.3%, and 39.4% respectively). For every week decrease in GA, there was a median adjusted odds ratio (aOR) of 1.4 times of developing ROP. For every 100 gram decrease in BW, the median aOR was 1.8 times. A higher incidence of ROP was also found for infants with neonatal sepsis (n=3 studies, median OR=2.02) and bronchopulmonary dysplasia (n=2, median OR=7.57).

Conclusions: The incidence of ROP increased proportionally with lower GA and BW, with a diagnosis of ROP occurring in 2 of 3 infants born at GA 23 weeks and 1 of 3 infants born at BW ≤1000 grams. The strongest risk factors for ROP are GA, BW, neonatal sepsis and bronchopulmonary dysplasia.

Dec 12, 2021 (Sun) 17:00 - 18:00

Venue: Livestream 2

Efficacy and Safety of Intravitreal Aflibercept compared with Laser Photocoagulation for Patients with Retinopathy of Prematurity: The Phase 3 FIREFLEYE Study

First Author: Wei-chi ***WU***
Co-Author(s): Noriyuki ***AZUMA,*** *Evra* ***KOEFUENCUE,*** *Hidehiko* ***NAKANISHI,*** *Andreas* ***STAHL,*** *Emine* ***SUKGEN***

Purpose: FIREFLEYE (NCT04004208) compared efficacy and safety of intravitreal aflibercept (IVT-AFL) and laser photocoagulation in patients with retinopathy of prematurity (ROP).

Methods: Patients were randomized 2:1 to IVT-AFL (0.4 mg) or laser. Re-treatment and rescue treatment (laser [IVT-AFL arm]; IVT-AFL [laser arm]) were allowed. Primary endpoint was proportion of patients with absence of active ROP and unfavorable structural outcomes at week 24. IVT-AFL was deemed non-inferior if the lower limit of the 2-sided 90% Bayesian credible interval (CI) for the treatment difference was >−5%.

Results: Mean gestational age (IVT-AFL: n=75; laser: n=38) was 26 weeks and 2 days and mean birth weight 862g. Baseline ROP profile was 33.6% Zone I, 66.4% Zone II, including 16.8% aggressive posterior (AP)-ROP (mostly Zone 1). Most patients were treated bilaterally (IVT-AFL: 94.7%; laser: 89.5%). Treatment success was 85.5% (IVT-AFL) versus 82.1% (laser) and 90% CI was −8.0% to +16.2%. 82.2% of eyes received a single injection. Rescued eyes were 4.8% (IVT-AFL arm) and 11.1% (laser arm). Ocular and systemic serious adverse events were reported in 13.3% and 24.0% (IVT-AFL arm), and 7.9% and 36.8% (laser arm). No endophthalmitis was reported. Three deaths (2.7%), all IVT-AFL arm, occurred 4–9 weeks after treatment, and were considered related to complications from prematurity.

Conclusions: In premature infants with severe ROP, treatment success with IVT-AFL was high as expected, and although numerically higher than with laser was statistically not significant. The safety profile of IVT-AFL was consistent with that established in adults. Overall, IVT-AFL treatment showed a favorable benefit–risk profile.

Dec 12, 2021 (Sun) 17:00 - 18:00

Venue: Livestream 2

Inter-Eye Comparison of Refractive Outcomes of Infants following Unilateral Laser Treatment

First Author: Sadik ***BAYRAMOGLU***
Co-Author(s): Nihat ***SAYIN***

Purpose: To compare refractive results of infants with retinopathy of prematurity (ROP) whose one eye was treated with laser for type 1 ROP and the fellow eye spontaneously regressed.

Methods: Medical records of 18 babies who developed type 1 ROP in one eye and received unilateral laser treatment between August 2016 and August 2019 were retrospectively analyzed. Twenty-eight eyes of 14 babies whose refractive errors had been recorded on the patient chart during follow-up were included in the study.

Results: The mean gestational age was 29.64 ± 2.95 weeks, and birth weight was 1362.50 ± 403.50 g. The posterior border of the pre-treatment retinal vascularization was beyond zone 2 in all treated eyes. The mean age at first year examination and last examination were 13.47 ± 5.34 and 25.27 ± 10.04 months, respectively. The mean spherical equivalent (SE) at the first year examination was 1.81 ± 2.54 and 2.56 ± 1.58 diopters (D) in the treated and non-treated groups, respectively (p = 0.215). The mean SE at the last examination was 2.03 ± 2.70 and 2.55 ± 1.54 D, respectively (p = 0.378).

Conclusions: Laser treatment in eyes with ROP, whose posterior border of pre-treatment retinal vascularization exceeds zone 2, did not cause a significant myopic change compared to the fellow eye.

Dec 12, 2021 (Sun) 17:00 - 18:00

Venue: Livestream 2

Outcomes of ROP Screening and Treatment in Mongolia

*First Author: Tsengelmaa **CHULUUNBAT***

Purpose: To investigate the outcomes of ROP screening, intravitreal anti–vascular endothelial growth factor (VEGF) and laser surgery in the treatment of retinopathy of prematurity (ROP) and describe an evidence-based and specific process for identifying birthweight and gestational age screening guidelines in Mongolia utilizing telemedicine.

Methods: This was a retrospective of premature infants screened for ROP from September 2012 to July 2020 and prospective cohort study of premature infants with treatment-requiring ROP who received intravitreal injections, laser surgery and combined therapy from December 2015 to January 2017. Demographic factors, diagnosis and clinical course were recorded in a de-identified manner using REDCap, a secure, web-based platform to collect image and demographic data.

Results: A total of 9126 premature infants with BW ≤ 2500 g and/or GA ≤ 36 weeks were screened for ROP during the study period. 327 (3.5%) of the 9126 infants screened required treatment. The 193 infants who received ROP screening had a mean GA of 30.09 ± 1.7 weeks and mean BW of 1500.3 ± 125.42g. The distribution of birthweight and gestational age in Mongolia was similar to other low-middle income countries, with higher birthweight and older gestational age. As birthweight and gestational age decreased, relative risk of developing ROP increased.

Conclusions: After treatment, resolution of ROP was noted in approximately 90% of the patients who had treatment-requiring ROP. 10% of patients treated with IVB, IVR, laser surgery and combined therapy, however, did not respond and progressed to retinal detachment.

Dec 12, 2021 (Sun) 17:00 - 18:00

Venue: Livestream 2

Paradigm Shift in Management of ROP: From Lasers to Anti-VEGF Therapy

*First Author: Purva **DATE***
*Co-Author(s): Saroj **SAHDEV***

Purpose: To investigate the efficacy, safety, and anatomical outcomes associated with intravitreal anti-vascular endothelial growth factor (VEGF) (ranibizumab) in treatment of retinopathy of prematurity (ROP).

Methods: A retrospective study of 24 infants (48 eyes) was conducted at our tertiary eye care hospital from April 2017 to July 2018. All infants were diagnosed with ROP and primarily treated with intravitreal anti-VEGF ranibizumab (IVR) (0.2 mg/0.02 mL; Lucentis, Novartis, Basel, Switzerland).

Results: A total of 48 eyes were treated with ranibizumab. Mean birth weight of babies was 1.47 ± 0.32 kg. Gestational age at birth was 32.25 ± 1.32 weeks, and post-menstrual age at treatment was 36.08 ± 1.61 weeks. Aggressive posterior ROP was found in 41.7% of subjects. Mean follow-up period was 9.58 ± 1.97 months. We defined treatment success as complete regression of retinopathy and vascularization into zone 3. Treatment success was observed in 36/48 eyes (75%) with primary intervention

only. Remaining six infants [12/48 eyes (25%)] required secondary laser to achieve treatment success. Retreatment occurred at a mean of 7.8 weeks after initial IVR treatment (range 6-10 weeks).

Conclusions: Intravitreal anti-VEGF treatment of ROP with ranibizumab achieved stable retinal vascularization with a low rate of complications and recurrence.

Dec 12, 2021 (Sun) 17:00 - 18:00

Venue: Livestream 2

Retinitis Pigmentosa in Laurence-Moon-Bardet-Biedl Syndrome in India: Electronic Medical Records Driven Big Data Analytics: Report II

First Author: Deepika ***PARAMESWARAPPA***
Co-Author(s): Anthony Vipin ***DAS,*** *Subhadra* ***JALALI,*** *Prabhjot Kaur* ***MULTANI,*** *Srikanta* ***PADHY,*** *Brijesh* ***TAKKAR***

Purpose: To describe the clinical presentation and demographic distribution of retinitis pigmentosa (RP) in Laurence-Moon-Bardet-Biedl (LMBB) syndrome patients.

Methods: This is a cross-sectional observational hospital-based study. 244 patients with RP in LMBB syndrome presenting to our hospital network between March 2012 and October 2020 were included. Electronic medical record database was used for data retrieval.

Results: There were 244 patients in total, with hospital-based prevalence rate of 0.010% or 1,000/100,000 population. The mean and median age of patients was 15.22 ± 7.56 and 14 (IQR: 10-18.5) years respectively with majority being in the age group of 11-20 years (133/244 patients; 54.50%). Males were more commonly affected numbering 164 patients (67.21%) and the majority (182 patients; 74.59%) were students. All 244 patients (100%) complained of defective central vision at presentation. More than one-fourth of the patients had severe visual impairment to blindness at presentation. Prominent retinal feature at presentation was diffuse or widespread retinal pigment epithelial degeneration in all patients.

Conclusions: Patients with RP in LMBB syndrome present mainly in the first to second decade of life with severe visual acuity impairment to blindness early in life. It is important to rule out LMBB syndrome in early onset RP with central visual acuity impairment. On the other hand, all patients diagnosed or suspected with LMBB syndrome systemic features at the clinic should also be referred for ophthalmic evaluation, low vision assessment and rehabilitation.

Dec 12, 2021 (Sun) 17:00 - 18:00

Venue: Livestream 2

Spectral Domain Optical Coherence Tomography Imaging of the Choroid in Children with Cortical Vision Impairment: Do we have a New Imaging Marker?

First Author: Pranjal ***MISHRA***
Co-Author(s): Anand ***VINEKAR***

Purpose: Cortical vision impairment (CVI) is gaining in importance as one of the leading causes of vision impairment and blindness in India and other middle-income countries. Conventionally, the diagnosis is made clinically and with the help of neuroimaging. We explore the role of spectral domain optical coherence tomography (SD-OCT) imaging of the retina in infants with CVI.

Methods: SD-OCT images of the retina were obtained using the handheld EN Visu 2000 (Bioptigen, Leica, USA) device in the office setting without the requirement of sedation. Images underwent basic image processing and subsequent analysis using MATLAB and ImageJ. The choroidal layers were divided into quadrants, segmented and analyzed to obtain a choroidal vascularity index (CHVI). The CHVI was correlated with the presence of CVI and other risk factors and compared with normal controls.

Results: Thirty-five children with CVI and 12 normal controls aged 3 months and 5 years were included. Of these, 30 were boys and 17 girls. The total, central and temporal CHVI was significantly higher in children with CVI compared to controls (P=0.018). Children with

history of neonatal hypoglycemia also showed a higher CHVI compared to controls (p=0.024). No other systemic risk factors were associated with CHVI.

Conclusions: SD-OCT derived choroidal vascularity index correlated with preterm status and cortical vision impairment in our cohort. CHVI index may serve as a possible imaging marker to help us diagnose CVI. Longitudinal studies to correlate the subclassification of CVI and outcome to treatment are needed to explore this potential.

Dec 12, 2021 (Sun) 17:00 - 18:00

Venue: Livestream 2

Super-Selective Triple-Drug Intraarterial Chemotherapy in Retinoblastoma

First Author: Ankita ***AISHWARYA***
Co-Author(s): Santosh ***HONAVAR,*** *Sridhar* ***REDDY,*** *Vijay Anand* ***REDDY***

Purpose: To assess the outcomes in retinoblastoma (RB) treated with triple-drug intraarterial chemotherapy (IAC).

Methods: Retrospective interventional study of 145 eyes of 112 RB patients from 2013 to 2019 treated with super-selective triple-drug (topotecan, carboplatin and melphalan) IAC.

Results: The mean age was 22.8m with a mean follow up of 42.1 months. Of 126 treatment-naïve eyes, ICRB groups were A (n=0), B (n= 10), C (n=16), D (n=59), and E (n=41). Primary IAC was provided in 92 eyes and secondary IAC in 53 eyes, with local consolidation in 128 (88%). Group B and C showed 100% regression, with maximum reduction in tumor volume after IAC cycle 1 and maximum calcification seen after IAC cycle 3. Complications following IAC included vitritis in 4 (2.7%), sterile inflammation in 2 (1.4%) and ptosis in 1 (0.7%). Eye salvage was achieved in all in Group B and C, 54 (92%) in Group D and 22 (54%) in Group E. Three of 19 (16%) enucleated eyes in Group E had histopathological high-risk factors, prompting adjuvant IVC. None developed systemic metastasis.

Conclusions: Triple-drug super-selective IAC is remarkably effective in Group B-D RB, while modest success is possible in Group E.

Dec 12, 2021 (Sun) 17:00 - 18:00

Venue: Livestream 2

The Coronavirus (COVID-19) Pandemic's Impact on Retinopathy of Prematurity Treatment in Makassar, South Sulawesi, Indonesia

First Author: Idayani ***PANGGALO***
Co-Author(s): Ichsan ***ANDI,*** *Dyah Ayu* ***ASMARA PUTRI,*** *Mannyu* ***BUDU,*** *Habibah* ***MUHIDDIN,*** *Andi* ***TAJUDDIN***

Purpose: Retinopathy of prematurity (ROP) is a proliferative disorder that requires urgent treatment. The impact of the coronavirus disease-2019 (COVID-19) pandemic on retinopathy of prematurity falls not only on screening but also on the therapy given. Proper case finding and treatment will prevent permanent blindness in babies. Aim of this study is to describe the impact of the COVID-19 pandemic on treatment measures for ROP in Makassar, South Sulawesi, Indonesia.

Methods: This is a retrospective descriptive study on the treatment of ROP during January to December 2020 and observation on ROP treatment during the large-scale social restriction (PSBB) enforcing by government on April to May 2020.

Results: A total 232 screening procedures from 111 patients during the period of this study found that 20 patients required therapy. Most were diagnosed with ROP stage 3 (55%), followed by aggressive-posterior ROP (30%) and the rest were ROP stage IV A and B. Ten infants received laser photocoagulation, two received intravitreal anti-vascular endothelial growth factor (anti-VEGF) injection, one received both laser photocoagulation and intravitreal anti-VEGF and the rest required surgery. The injection was given first to infants with confirmed COVID-19, and additional lasers performed after being discharged from COVID care. Six infants requiring treatment were left untreated because of parental disclaimer. There

was also a 69% decrease in screening visits during the PSBB period.

Conclusions: The COVID-19 pandemic in Makassar, Indonesia has an effect on ROP services, with both a decline in screening and therapeutic measures.

Dec 12, 2021 (Sun) 17:00 - 18:00

Venue: Livestream 2

Validation of the Postnatal Growth and Retinopathy of Prematurity Screening Criteria

*First Author: Tso-ting **LAI***
*Co-Author(s): Ching-wen **HUANG,** Po-nien **TSAO,** Po-ting **YEH***

Purpose: To validate the performance of Postnatal Growth and Retinopathy of Prematurity (G-ROP) screening criteria among a Taiwanese cohort.

Methods: We retrospectively reviewed premature infants who underwent retinopathy of prematurity (ROP) screening between January 2015 and April 2019 at a tertiary hospital. Infants with known final ROP results and complete longitudinal weight records were included. We applied G-ROP screening criteria, both original and simplified (G-ROP 180 g), as the prediction model for type 1 ROP, with sensitivity and specificity analyzed. The reduction in the number of infants requiring ROP screening and the number of funduscopic examinations were calculated.

Results: Among the 504 infants screened, 303 with documented ROP outcome and complete weight gain records were analyzed. A total of 103 infants developed any ROP, of which 29 developed type 1 ROP; the other 200 did not develop ROP. For the detection of type 1 ROP, the sensitivity and specificity of the original G-ROP screening criteria were 96.6% and 42.3%, and were 100% and 31% for the simplified G-ROP 180 g model, respectively. The reduction in number of infants requiring screening and of funduscopic examinations were 32.6% and 33.5% for the original G-ROP criteria, and 28.1% and 23.2% for the G-ROP 180 g model, respectively.

Conclusions: Both the original G-ROP and G-ROP 180 g criteria reached high sensitivities in detecting type 1 ROP in current Taiwanese cohort, with the G-ROP 180 g model outperforming the original one. Validation and modification may be required before applying G-ROP screening criteria to different populations.

Retina (Medical)

Dec 11, 2021 (Sat) 22:00 - 23:00

Venue: Livestream 2

Age, Initial Central Retinal Thickness, and OCT Biomarkers Have an Influence on the Outcome of Diabetic Macular Edema treated with Ranibizumab: Tri-Center 12-Month Treat-and-Extend Study

*First Author: Chun-ju **LIN***
*Co-Author(s): Chiung-yi **CHIU,** Yi-ting **HSIEH,** Chun-ting **LAI,** Jia-kang **WANG***

Purpose: We aim to report the tri-center one-year real life outcomes of treat-and-extend (T&E) regimen in 4-week intervals with ranibizumab for diabetic macular edema (DME).

Methods: In this retrospective study, all eyes received three monthly loading injections of 0.5mg ranibizumab, followed by a T&E regimen for DME. Regression models were used to evaluate the associating factors for visual and anatomical outcomes.

Results: Ninety one eyes from 64 patients were enrolled. Mean LogMAR best-corrected visual acuity (BCVA) improved from 0.58 at baseline to 0.36 at month 12 and mean central retinal thickness (CRT) decreased from 411 μm at baseline to 290 μm at month 12. Younger age and eyes having thinner baseline CRT, with ellipsoid zone disruption (EZD), and without epiretinal membrane (ERM) were associated with better final CRT. Moreover, eyes with thicker baseline CRT tend to receive more injections. Among the parameters, only having ERM or EZD was associated with significant BCVA recovery.

Conclusions: T&E regimen with ranibizumab in a 4-week interval is effective in improving BCVA and reducing CRT with prominent efficacy since the 3rd month. Clinical parameters including age, initial CRT and having ERM or EZD significantly influenced the therapeutic outcomes. Moreover, the presence of ERM should not preclude DME patients from receiving anti-VEGF therapy. Further study with larger cohort is warranted.

Dec 11, 2021 (Sat) 22:00 - 23:00

Venue: Livestream 2

Anti-VEGF Therapy Leads to an Improvement in Grade of Retinal Pigment Epithelium Alterations in Diabetic Macular Edema

*First Author: Malvika **SINGH***
*Co-Author(s): Somnath **DE,** Sandeep **SAXENA***

Purpose: Retinal pigment epithelium (RPE) is a major secretor of vascular endothelial growth factor (VEGF). Secretion of VEGF in bovine RPE cells has been reported to have a positive linear association with proliferation of RPE. Spectral domain optical coherence tomography (SD-OCT) based study was undertaken to evaluate the improvement in grades of topographic retinal pigment epithelium alterations (RPE-A) after intravitreal anti-VEGF therapy in diabetic macular edema (DME) for the first time.

Methods: A tertiary care center-based, prospective study. Forty-four consecutive patients, 40-65 years of age with type 2 diabetes mellitus (DM) with DME, were administered three doses of anti-VEGF therapy at monthly intervals. Pre- and post-intervention SD-OCT was done and cube average thickness (CAT) and topographic grades of RPE-A were assessed using single layer RPE map (SL-RPE) as: Grade 0: No alterations, Grade 1: Alteration in two quadrants, Grade 2: Alteration in more than two quadrants.

Results: CAT reduced from 340.6±6.5µm pre-intervention to 274.1±5.1µm post-intervention. Significant improvement in grades of RPE-A pre- vs post-intervention were observed (Grade 0: 0 vs 39; Grade 1: 17 vs 3; Grade 2: 27 vs 2) ($p<0.001$).

Conclusions: Anti-VEGF therapy is associated with an improvement in grades of RPE-A in DME.

Dec 11, 2021 (Sat) 22:00 - 23:00

Venue: Livestream 2

Blindness Post-COVID Disease

*First Author: Swati **HIRE***
*Co-Author(s): Sanchit **BHALGAT,** Purva **DATE,** Saroj **SAHDEV,** Neha **SHAH***

Purpose: To report a case series of central retinal artery occlusion in 15 consecutive patients with past history of COVID-19 infection associated mucormycosis.

Methods: This is a retrospective observational study of 15 consecutive cases of rhino-cerebro-orbital mucormycosis that presented to our tertiary referral center between March 2021 and June 2021. All patients had unilateral or bilateral central retinal artery occlusion.

Results: Total 15 patients were studied: 13 males, 2 females, mean age of 55.06 years. Majority had uncontrolled type 2 diabetes mellitus. Tissue and radiological diagnosis of mucormycosis was made in all patients. Mean time interval between COVID-19 and rhino-orbital mucormycosis was 21 days. 12 patients had unilateral central retinal artery occlusion and 3 patients had bilateral central retinal artery occlusion.

Conclusions: The COVID-19 disease has been described to induce inflammatory homeostasis changes that predispose to thrombotic disease in both venous and arterial circulation.

Dec 11, 2021 (Sat) 22:00 - 23:00

Venue: Livestream 2

Clinical Characteristics of Comorbid Retinal Dystrophies and Primary Angle-Closure Disease

*First Author: Deepika **PARAMESWARAPPA***
*Co-Author(s): Mariya **DOCTOR,** Subhadra **JALALI,** Padmaja **KUMARI RANI,** Ramya **NATARAJAN,** Sirisha **SENTHIL***

Purpose: To assess the clinical characteristics of comorbid retinal dystrophies and primary angle closure disease.

Methods: This retrospective study from January 1992 to June 2020 included 92 eyes of 46 patients with comorbid retinal dystrophies and primary angle closure disease (PACD) that included eyes with primary angle closure suspect, primary angle closure and primary angle closure glaucoma. Demographic profile, clinical characteristics of PACD and its association with retinal dystrophies are described.

Results: The study included 46 patients (92 eyes). Males were majority, 63%. Mean (± standard deviation) age when retinal dystrophy was diagnosed was 29.6 ± 9.4 years and PACD was diagnosed at 32.23 ± 7.92 years. Mean BCVA at presentation was 1.07 ± 0.87 logMAR (95% confidence interval (CI): 0.87, 1.26). Mean intraocular pressure at diagnosis of glaucoma was 27 ± 16 mm Hg (95% CI: 23.5, 31.5 mm Hg). The most common retinal dystrophy associated with PACD was retinitis pigmentosa (RP) followed by RP with retinoschisis. The hospital-based prevalence of PACD among all patients with RP and retinoschisis was 0.19% and 0.15% respectively. Laser peripheral iridotomy (LPI) was performed in 74 eyes (80.5%). Glaucoma was managed medically in the majority of the eyes (58 eyes, 63.04%) and a minority required surgical management with trabeculectomy (11, 11.9%).

Conclusions: Retinitis pigmentosa is the most common retinal dystrophy associated with PACD. Comorbid PACD in eyes with retinal dystrophies was observed in the 2nd to 3rd decade of life. This calls for screening for angle closure in eyes with retinal dystrophies from the second decade onwards to identify the comorbid PACD and treat or refer them appropriately.

Dec 11, 2021 (Sat) 22:00 - 23:00

Venue: Livestream 2

Determinants for Anemic Retinopathy

First Author: Aditi ***GUPTA***
Co-Author(s): Rohit ***AGRAWAL,*** *Santosh* ***GOPIKRISHNA GADDE,*** *Pranjal* ***MISHRA***

Purpose: To calculate the prevalence of retinopathy in patients with primary anemia (AR) and to define its risk factors using ROC curve analysis.

Methods: For this retrospective study, patients diagnosed with anaemia (WHO criteria) with dilated fundus examination by a retina specialist from May 2019 to April 2020 were included. Retinopathy was present if hemorrhages in different layers of retina, Roth's spots, exudates, cotton wool spots, retinal edema and optic disc changes were noted. Patients with secondary anemia were excluded. 2 groups were identified: group 1, patients with AR; group 2: patients with no AR with normal fundus. Demographic features, fundus findings and hematological parameters were noted.

Results: 38 (30%) eyes of 23 patients had AR; 90 (70%) eyes of 47 patients had no AR. Mean age in group 1 and group 2 was 54.7 ± 18.9 and 58.6 ± 15.3 years respectively. Low hemoglobin (Hb) [mean = 7.82 ± 1.64 gm/dl, $p < 0.001$] and packed cell volume (PCV) [mean = 26.93 ± 5.22 %, $p = 0.002$] values were noted in the AR group. AUC values for Hb (0.737) and PCV (0.719) were higher for the AR group. Hb < 8.95 g/dl could predict AR with 85.8% sensitivity and 68.9% specificity and PCV < 30.5% could predict AR with 80% sensitivity and 53.2% specificity. On univariate regression analysis, Hb ($p < 0.001$) and PCV ($p = 0.000$) were associated with AR.

Conclusions: Retinopathy is frequently seen in severely anemic patients. It is recommended that patients with severe anemia should undergo a dilated fundus examination.

Dec 11, 2021 (Sat) 19:30 - 20:30

Venue: Livestream 2

Dual Angiopoietin-2/Vascular Endothelial Growth Factor-A Neutralization Prevents Vascular Leakage, Cell Death, and Subretinal Macrophage Infiltration in Mouse Models of Retinal Ischemia/Reperfusion Injury and Spontaneous Choroidal Neovascularization

First Author: Jérémie ***CANONICA***
Co-Author(s): Steve ***ABCOUWER,*** *David* ***ANTONETTI,*** *Marina* ***GARCIA GARRIDO,*** *Cheng-mao* ***LIN,*** *Sabine* ***UHLES***

Purpose: To explore the impact of dual angiopoietin-2 (Ang-2)/vascular endothelial growth factor-A (VEGF-A) targeting on vessel destabilization in the retinal ischemia/reperfusion (I/R) injury model, and retinal inflammation in JR5558 spontaneous choroidal neovascularization (sCNV) mouse model, in the context of phase 2/3 clinical data on faricimab.

Methods: Antibodies against Ang-2, VEGF-A, both (VA2), and IgG (control) were intravitreally injected 2 days before I/R injury in I/R model. Vascular permeability (retinal FITC-BSA accumulation) and ongoing cell death (DNA fragmentation assay) were assessed 48 hours after injury. JR5558 mice were treated intraperitoneally at postnatal days P45 and P52 with anti−Ang-2, anti−VEGF-A, VA2, and IgG. Subretinal inflammatory cell (Iba1+, CD45+, CD11b+) infiltration was evaluated by flat-mount retinal pigment epithelium (RPE)/choroid histology at 1 (PT1), 3 (PT2), and 5 weeks (PT3) post treatment.

Results: Post I/R injury, VA2 significantly prevented retinal vascular permeability by 64%; anti−VEGF-A by 37%; anti−Ang-2 produced no significant change. VA2 significantly reduced ongoing cell death by 47%; VEGF-A and Ang-2 alone had no significant effect. In JR5558 mice, VA2, not anti−VEGF-A or anti−Ang-2 alone, significantly reduced Iba1+ microglia/macrophages on RPE/choroid and around lesions versus IgG at PT1 and PT2. At PT3, anti−Ang-2/VA2, not anti−VEGF-A, showed significant reductions in Iba1+ cells versus IgG. CD45+ and CD11b+ cells on RPE/choroid and around lesions were significantly reduced only with VA2 versus IgG.

Conclusions: Dual Ang-2/VEGF-A inhibition synergistically prevented retinal vascular leakage, cell death, and inflammation in retinal I/R injury and sCNV mouse models, suggesting Ang-2 drives leakage/inflammation, and supporting clinical data on sustained efficacy of faricimab versus intravitreal anti-VEGF monotarget therapy and extended durability up to every 16 weeks.

Dec 11, 2021 (Sat) 19:30 - 20:30

Venue: Livestream 2

Effect of Pigment Epithelial Detachment Thickness and Variability on Visual Acuity Outcomes in Patients with Neovascular Age-Related Macular Degeneration: 96-Week Pooled, Treatment-Agnostic Data from the HAWK and HARRIER Studies

First Author: Andrew ***CHANG***
Co-Author(s): Srinivas ***SADDA,*** *Insaf* ***SAFFAR,*** *David* ***SARRAF,*** *Ramin* ***TADAYONI,*** *David* ***WONG***

Purpose: Post hoc analysis to investigate the effect of pigment epithelial detachment (PED) thickness (or height) and variability on best-corrected visual acuity (BCVA) in patients with neovascular age-related macular degeneration (nAMD) in the HAWK and HARRIER studies. The association between PED thickness and the presence of retinal fluid was also assessed as these may be indicators of disease activity.

Methods: Patients from the pooled brolucizumab 6mg (n=700) and aflibercept 2mg (n=696) arms were grouped according to their PED thickness at baseline and week (W) 12 (after loading). Patients were also grouped into four quartiles (Qv1-4) based on their PED variability in thickness from W12 to W96 and into a further four quartiles based on PED thickness (Qt1-4) at W48 (primary endpoint).

Results: Least square mean (LSM ± standard error) BCVA gains from baseline were higher at W96 in patients with lower PED thickness at baseline (<200µm, 7.0±0.5 Early Treatment Diabetic Retinopathy Study [ETDRS] letters

[p=0.004]; ≥200µm, 4.6±0.6 letters) and at W12 (<200µm, 6.5±0.4 letters [p=0.04]; ≥200µm, 4.3±1.0 letters). Less fluctuation in PED thickness from W12 through W96 was also associated with higher BCVA gains at W96 (Qv1 [<9µm], 6.2±0.8 letters versus Qv4 [>33µm], 3.3±0.8 letters). Compared with patients in Qt1, Qt2–4 patients showed an increasing association between PED thickness and the presence of both intraretinal and subretinal fluid at W48.

Conclusions: This pooled, treatment-agnostic analysis indicates that PED thickness and variability are potential biomarkers for 2-year visual outcomes in patients with nAMD. Furthermore, PED thickness may also be a biomarker for disease activity.

Dec 11, 2021 (Sat) 22:00 - 23:00

Venue: Livestream 2

Estimation of Hydrogen Sulfide in Intraocular Environment as a Novel Biomarker for Diabetic Retinopathy

*First Author: Aparna **GHODAKE***
*Co-Author(s): Manabjyoti **BARMAN,** Harsha **BHATTACHARJEE,** Dipankar **DAS***

Purpose: Hydrogen sulfide (H2S) is a gaseous messenger molecule. Evidence shows that high concentrations of H2S can act as endogenous stimulus for angiogenesis in macrovascular environment. However, its role in the microvascular environment is not yet established. This study is conducted to assess and compare H2S and VEGF level in vitreous, aqueous and blood, and to correlate it with disease severity in diabetic retinopathy (DR).

Methods: Prospective, case-control study after getting clearance from Institutional Research & Ethics committee as per Helsinki declaration. Aqueous, vitreous and blood samples were collected from treatment naïve DR cases (40-60 yrs) and age-matched non-diabetic cases (as control). Cases were randomized into 3 groups, 50 in each; Gr A, PDR; Gr B, NPDR; Gr C, Control. H2S was estimated by spectrophotometry and VEGF by ELISA test.

Results: H2S in aqueous, vitreous and plasma in Gr A and B was significantly higher than Gr C. VEGF level in Gr A and B was also found to be significantly higher than Gr C in all test samples.

Conclusions: H2S level was found to be significantly raised in intraocular environment as well as blood of patients with diabetic retinopathy. It was found to be comparable with VEGF and blood glucose level in varying severity of diabetic retinopathy. H2S level was also found to be more in PDR in comparison to NPDR cases, though statistical significance could not be established. There is scope of future research to further explore the significance of H2S in complications related to diabetic retinopathy, which may help to explore newer treatment and interventional strategies.

Dec 11, 2021 (Sat) 22:00 - 23:00

Venue: Livestream 2

Evaluation of Vascular Endothelial Growth Factor Level in the Tears of Patients with Age-Related Macular Degeneration

*First Author: Mohamad **SHAHIDATUL ADHA***
*Co-Author(s): Mahaneem **MOHAMED,** Embong **Z***

Purpose: A simple non-invasive vascular endothelial growth factor (VEGF) level detection in tears may perhaps be helpful in monitoring disease progression in age-related macular degeneration (AMD). Our aim is to evaluate VEGF level in the tears among AMD patients.

Methods: A comparative cross-sectional study among AMD patients was conducted between October 2016 and October 2018. Basal tear fluid was collected using diagnostic ophthalmic Schirmer strip. VEGF levels in the tears were measured by enzyme-linked immunosorbent assay.

Results: A total of 108 subjects were included in the study (early AMD: 36 patients, late exudative AMD: 36 patients, control: 36 patients). The study showed mean tear VEGF were significantly higher among AMD patients (late exudative AMD: 292.88 ± 73.89 pg/ml and early AMD: 161.15 ± 36.73 pg/ml) as

compared to control (117.56 ± 16.66 pg/ml, p<0.001). A significant mean difference of tear VEGF was observed between late and early AMD (p<0.001), between late AMD and control (p<0.001), and between early AMD and control (p=0.001) after Bonferroni post hoc analysis.

Conclusions: This study demonstrates VEGF level in tears correlates with the severity of AMD. Thus, tear VEGF level measurements can be a good noninvasive method for detection of high-risk early AMD patients and helpful in monitoring the disease progression.

Dec 11, 2021 (Sat) 19:30 - 20:30

Venue: Livestream 2

Exploring Angiopoietin-2 Signaling in Vascular Stability in Patients With Diabetic Macular Edema Receiving Faricimab in Phase 2 and Phase 3 Trials

*First Author: Gemmy **CHEUNG CHUI MING***
*Co-Author(s): Rose **EDMONDS,** Zdenka **HASKOVA,** Jeffrey R. **WILLIS,** Peter **WESTENSKOW***

Purpose: Angiopoietin-2 (Ang-2)/vascular endothelial growth factor-A (VEGF-A) are key drivers of vascular instability. We explored the impact of faricimab, a bispecific Ang-2/VEGF-A neutralizing antibody, on visual outcomes and vascular stability (VS) using clinical and preclinical data.

Methods: Effect of faricimab administered every 8 weeks (Q8W) per personalized treatment interval (PTI) after 4 Q4W doses versus aflibercept Q8W on BCVA and VS (change in central subfield thickness [CST] from baseline, absence of diabetic macular edema [DME] [CST <325 µm] or intraretinal fluid [IRF] in year [Y] 1) was assessed in phase 3 YOSEMITE/RHINE (NCT03622580/NCT03622593). Sustained retinal stability (SRS; occurrence, <10% worsening of CST ≤325 µm to W24) and inflammatory biomarker (ICAM-1) levels in aqueous humor were assessed in phase 2 BOULEVARD (NCT02699450). Effects of anti–Ang-2, anti–VEGF-A, both, or none/IgG on VS (vascular leakage/neovascularization, inflammation, and fibrosis) were assessed in mice developing spontaneous CNV.

Results: In YOSEMITE/RHINE, mean Y1 BCVA gains with faricimab Q8W and PTI were noninferior to aflibercept Q8W. Mean Y1 CST change consistently favored faricimab. More faricimab- versus aflibercept-treated patients achieved absence of DME and IRF. In BOULEVARD, >50% of patients receiving faricimab 6.0 mg, 1.5 mg, and ranibizumab achieved SRS at W8, W16, and W20, respectively. ICAM-1 levels increased with ranibizumab and decreased with both faricimab doses. Preclinical data demonstrated that Ang-2/VEGF-A blockade significantly improved VS, suggesting a mechanism for durability gains observed in clinical studies.

Conclusions: Clinical and preclinical data show that Ang-2/VEGF-A inhibition improves BCVA and VS, and results in greater anatomic improvement compared with anti-VEGF injections, with potential for improved durability up to Q16W in patients with DME.

Dec 11, 2021 (Sat) 19:30 - 20:30

Venue: Livestream 2

Faricimab Personalized Treatment Interval Dosing Dynamics Illustrated with Patient Case Profiles: Phase 3 YOSEMITE and RHINE Trials for Diabetic Macular Edema

*First Author: Timothy **LAI***
*Co-Author(s): Francis **ABREU,** Kemal **ASIK,** Bianca **GERENDAS,** Zdenka **HASKOVA,** Glenn **JAFFE***

Purpose: Faricimab, a bispecific antibody designed to inhibit angiopoietin-2 (Ang-2) and vascular endothelial growth factor (VEGF)-A, promotes enhanced vascular stability and anatomic and durability benefits beyond those achieved with VEGF-A inhibition alone. Using illustrative cases from the phase 3 YOSEMITE/RHINE (NCT03622580/NCT03622593) trials, we present the faricimab treatment frequency dynamics.

Methods: YOSEMITE/RHINE are randomized, double-masked, active comparator–controlled, 100-week trials where patients with diabetic macular edema (DME) were randomized (1:1:1) to faricimab 6.0 mg every 8 weeks (Q8W), faricimab 6.0 mg personalized treatment

interval (PTI) or aflibercept 2.0 mg Q8W. The PTI arm was a protocol-driven treat-and-extend regimen in which intervals (4-week increments/decrements) were adjusted based on individualized treatment response as measured by central subfield thickness (CST) and best corrected visual acuity (BCVA). Achievement of treatment intervals (every 4 weeks [Q4W], Q8W, every 12 weeks [Q12W] or every 16 weeks [Q16W]) was assessed at week 52.

Results: At 1 year, faricimab demonstrated noninferior vision gains (mean change BCVA YOSEMITE/RHINE: faricimab Q8W: 10.7/11.8; faricimab PTI: 11.6/10.8; aflibercept: 10.9/10.3 letters, respectively), improved anatomic outcomes (mean change CST YOSEMITE/RHINE: faricimab Q8W: -206.6/-195.8; faricimab PTI: -196.5/-187.6; aflibercept: -170.3/-170.1 µm, respectively), and potential for extended dosing. At week 52, treatment intervals and proportions of patients achieving them were as follows: ≥Q12W (>70%), Q16W (>50%), Q8W (16%), and Q4W (12%). Representative cases, including retinal images, will be presented.

Conclusions: This post-hoc analysis of individualized treatment frequency dynamics illustrates how the faricimab PTI algorithm was used effectively to optimize treatment intervals according to the heterogeneous needs of patients with DME.

Dec 11, 2021 (Sat) 19:30 - 20:30

Venue: Livestream 2

Faricimab in Diabetic Macular Edema: 1-Year Results from the Phase 3 YOSEMITE and RHINE Trials

First Author: Young Hee ***YOON***
Co-Author(s): Karen ***BASU,*** *Zdenka* ***HASKOVA,*** *Hugh* ***LIN,*** *Shaun* ***MOHAN,*** *Ramin* ***TADAYONI***

Purpose: To evaluate the efficacy, safety, and durability of faricimab (bispecific angiopoietin-2/vascular endothelial growth factor-A antibody) in treating patients with diabetic macular edema (DME).

Methods: YOSEMITE (NCT03622580, N=940) and RHINE (NCT03622593, N=951) are randomized, double-masked, active comparator–controlled, 100-week trials of faricimab in DME. Patients were randomized 1:1:1 to faricimab 6.0 mg every 8 weeks (Q8W) after 6 initial Q4W doses, faricimab 6.0 mg per personalized treatment interval (PTI) after 4 initial Q4W doses, or aflibercept 2.0 mg Q8W after 5 initial Q4W doses.

Results: The primary endpoint was met; mean 1-year (weeks 48/52/56 average) best-corrected visual acuity gains with faricimab Q8W (YOSEMITE +10.7; RHINE +11.8 ETDRS letters) or faricimab PTI (+11.6; +10.8 letters) were noninferior to aflibercept Q8W (+10.9; +10.3 letters). Consistent results were seen in treatment-naïve patients (YOSEMITE: n=725; RHINE: n=757); no faricimab arm showed superiority to aflibercept. Mean change in central subfield thickness (CST) consistently favored faricimab (YOSEMITE: -206.6, -196.5, -170.3 µm; RHINE: -195.8, -187.6, -170.1 µm; faricimab Q8W, PTI, aflibercept, respectively, at 1 year [weeks 48/52/56 average]), and absence of protocol-defined DME (CST <325 µm) and intraretinal fluid were achieved by more faricimab-treated than aflibercept-treated patients. At week 52, >50% of the faricimab PTI arm achieved Q16W dosing and >70% achieved ≥Q12W dosing. Faricimab was well tolerated; no cases of vasculitis or occlusive retinitis were reported.

Conclusions: Faricimab Q8W or per PTI offered noninferior vision gains versus aflibercept Q8W, while demonstrating improvements in anatomic endpoints and the potential for extended (up to Q16W) dosing at 1 year.

Dec 11, 2021 (Sat) 22:00 - 23:00

Venue: Livestream 2

Intracystic Hyperreflective Material as a Prognostic Biomarker and its association with Diabetic Nephropathy

First Author: Sandeep ***KUMAR***
Co-Author(s): Charu ***GUPTA,*** *Daraius* ***SHROFF***

Purpose: To evaluate characteristics of intracysytic hypereflective material (ICHRM) in

central involving cystoid macular edema (CME) and its association with diabetic nephropathy.

Methods: Retrospective evaluation of 10 eyes of 9 patients from retina clinic database with intracystic hyperreflective material in center-involving CME was done. The CME was evaluated under HD 51 SCAN module of swept-source optical coherence tomography (plex elite). Patients having hyperreflective clump deposition in the intraretinal space with no shadowing were taken up for assessment. Patients with ICHRM were retrospectively examined in terms of final visual acuity (VA), response to anti-VEGF and steroid implant, number of anti-VEGF required and association with diabetic nephropathy.

Results: Patients with ICHRM had poor final visual outcome with mean VA being logMAR 0.8, and needed a higher number of anti-VEGF. Also the response to anti-VEGF and steroid implant was suboptimal when compared with patients having clear CME. We also found that 7 out of 9 patients had diabetic nephropathy.

Conclusions: Central involving CME with ICHRM has a poor visual outcome, needs multiple intravitreal anti-VEGFs and steroid implants. It was noted that they had a curtailed response to anti-VEGFs when compared with non ICHRM patients. There's a strong association with diabetic nephropathy. ICHRM has strong potential to become a novel marker for visual outcome.

Dec 11, 2021 (Sat) 22:00 - 23:00

Venue: Livestream 2

Leptochoroid associated Choroidal Neovascular Membrane in High Myopes using SSOCT

*First Author: Bhavana **VASUDEV***
*Co-Author(s): Sherine **DSOUZA***

Purpose: Pathological myopia is the second most common cause of choroidal neovascularization which accounts for nearly 60% of choroidal neovascular membrane (CNVM) cases in patients younger than age 50. The aim is to study the anatomical characteristics and thickness of the choroid in myopic CNVM patients using swept source optical coherence tomography (SSOCT).

Methods: Retrospective case series of 20 eyes of 17 patients with clinically diagnosed myopic CNVM. OCT images with scans passing through the neovascular membrane were studied. Central macular thickness (CMT), submembrane choroidal thickness, and 1000 microns on either side were measured using the built-in caliper. Two independent observers performed all measurements which were correlated with the visual acuity (VA), analyzed the type of CNVM and the changes in the choroidal vasculature under the membrane.

Results: 20 eyes of 17 patients with mean age of 55.8 years [25-89yr] were included; 8 were females, 9 males. The refractive error ranged from spherical power of -2.50 D to -25.50 D. The best corrected visual acuity ranged from 2/60 to 6/6 Snellen VA. Clinically out of 17 patients, 16 patient had subfoveal, 1 had peripapillary CNVM. On OCT 13 patients had type 1 CNVM, and 7 patients had type 2 CNVM. The CMT was 254.9+/-24.04 microns, and sublesional choroidal thickness was 89 +/-34.64 microns. All 20 eyes had dilated Hallers layer, choriocapillary (CC) atrophy and underlying Sattler layer atrophy in 13 eyes.

Conclusions: Due to the relative rarity of myopic CNVM, there is a lack of exact understanding on the pathogenesis in myopic CNVM. CNVM in myopes is associated with general rarefaction of choroid and dilated Haller and thinned out Sattler and CC which causes hemodynamic disturbance leading to breach in Bruch's and resulting in formation of CNVM.

Dec 11, 2021 (Sat) 19:30 - 20:30

Venue: Livestream 2

Neovascular Age-Related Macular Degeneration Treated with Intravitreal Aflibercept Treat-and-Extend: Post hoc Analysis of Injection-Intensive Requirement for Patients in the ARIES Study

First Author: Paul ***MITCHELL***
Co-Author(s): Frank ***HOLZ,*** *George* ***LAMBROU,*** *Edoardo* ***MIDENA,*** *Eric* ***SOUIED,*** *Sebastian* ***WOLF***

Purpose: To assess vision and anatomic outcomes in patients with neovascular age-related macular degeneration (nAMD) and requirement for intravitreal aflibercept (IVT-AFL) treatment intervals <8 weeks (w).

Methods: ARIES (NCT02581891) investigated efficacy of two IVT-AFL proactive, individualized, treat-and-extend regimens in nAMD. This post hoc analysis determined patients as injection-intensive (I-I) if a treatment interval <8w was needed and they had ≥1 interval of 4w or 6w after 3 initial monthly doses. Statistical analysis is descriptive.

Results: Of 269 patients (full analysis set, ARIES treatment arms combined), 23.0% (n=62) were I-I (Year 1: 13.8% [n=37]; Year 2: 9.3% [n=25]). Time from IVT-AFL initiation to I-I determination varied (range: 16–100w; median: 43.2w). Mean treatment interval was 8.4w before and 6.1w after I-I determination. Mean±SD best-corrected visual acuity (BCVA) was lower and central retinal thickness (CRT) higher in I-I patients at the I-I determination visit compared with w16 (BCVA: 61.9±16.7 vs 65.7±12.6 letters; CRT: 411±112 vs 379±113 µm). I-I patients showed BCVA (62.6±18.7 letters) and CRT (337±101 µm) improvements at w104. Vision improvements from baseline to w104 were smaller for I-I than non-I-I patients (BCVA change: +2.3±15.6 vs +5.9±12.3 letters). Anatomic outcomes were similar between I-I and non-I-I patients (CRT change from baseline: −160±154 and −167±136 µm). Overall, 59.7% achieved treatment intervals ≥8w following I-I determination.

Conclusions: In ARIES, investigators opted for IVT-AFL injections more frequently than every 8 weeks in 23% of treatment-naïve patients with nAMD. I-I patients showed improved vision and anatomic outcomes. For most, treatment intervals could be extended to ≥8w following I-I determination.

Dec 11, 2021 (Sat) 19:30 - 20:30

Venue: Livestream 2

Novel Biomarkers in Hypertensive Retinopathy

First Author: Thirumalesh M ***B***

Purpose: To study the retinal and choroidal vascular changes in non diabetic hypertensive patients with chronic kidney disease (CKD) using SSOCT.

Methods: 90 eyes of 45 patients with history of non diabetic CKD on hemodialysis visiting a multispecialty hospital were included in this cross-sectional study. DRI OCT TRITON PLUS, 12 mm radial swept source OCT scans centered on the fovea were obtained. Red free image and radial OCT were analyzed by a retina specialist. Retinal vein and artery along with changes in Haller, Sattler and choriocapillary layers were documented and studied.

Results: There were 45 patients with mean age of 46.1 years, 35 males and 10 females. All of these patients were on hemodialysis for non diabetic CKD with a mean systolic blood pressure of 138 mm Hg [120-150], diastolic BP of 80 mm Hg [70-100] and on oral antihypertensive medications. Arteriolar attenuation was seen in 13% of eyes, venous tortuosity in 38.9% and retinal vein occlusion in 2.2% of eyes. On OCT, 1.1% of eyes had cystoid macular edema secondary to vein occlusion, 16.6% of eyes showed focal retinal pigment epithelial changes. Haller layer was dilated in all cases, dilated Sattler layer vasculature was seen in 50% and choriocapillary focal atrophy was seen in 3.3%.

Conclusions: As shown by our study in young hypertensives, retinopathy was seen in only 13% of patients as per current definitions;

venous dilatation/tortuosity may be an early change of retinopathy. All patients showed choroidal vascular changes. Thus, it is important to consider choroidal changes in grading the severity of hypertension rather than just considering retinal vascular changes alone.

Dec 11, 2021 (Sat) 22:00 - 23:00

Venue: Livestream 2

Prevalence and Clinical Implications of Subretinal Fluid in Diabetic Macular Edema and Retinal Vein Occlusion

First Author: Jeff ***PARK***
Co-Author(s): Filiberto ***ALTOMARE,*** *David* ***CHOW,*** *Tina* ***FELFELI,*** *Imaan Z.* ***KHERANI,*** *David T.* ***WONG***

Purpose: To characterize the baseline prevalence of subretinal fluid (SRF), and its effects on anatomical and visual acuity (VA) outcomes in diabetic macular edema (DME) and retinal vein occlusion (RVO) patients following intravitreal anti-vascular endothelial growth factor (VEGF) injections.

Methods: Retrospective cohort study of 122 DME and 54 RVO patients who were initiated on intravitreal anti-VEGF injections between January 2016 to December 2017. The DME and RVO cohorts were subclassified into SRF or non-SRF groups based on the presence of SRF on optical coherence tomography (OCT) at baseline. Changes in vision and central subfield thickness (CST) were assessed up to 24 months.

Results: Amongst all patients with DME and RVO, SRF was present in 22% and 41%, respectively. DME patients with SRF were more likely to have bilateral macular edema at baseline. In the DME cohort, the mean VA improved by 0.25 logMAR for SRF and 0.08 logMAR for non-SRF (P<0.05) at 24 months. The mean percentage improvement in CST was 25% for SRF and 11% for non-SRF (P<0.05) at 3 months. In the RVO cohort, the mean improvement in VA was similar between the groups, while the mean percentage improvement in CST was 36% versus 18% (P<0.05) at 1 month for SRF and non-SRF, respectively.

Conclusions: Baseline SRF is a good marker for a greater reduction in CST in both DME and RVO, but an improvement in VA associated with SRF may be only noted in DME.

Dec 11, 2021 (Sat) 22:00 - 23:00

Venue: Livestream 2

Relationship Between Visual Acuity and Intraretinal or Subretinal Fluid in Patients with Neovascular Age-Related Macular Degeneration Treated with Intravitreal Aflibercept Treat-and-Extend: A Post hoc Analysis of the ARIES Study

First Author: Paul ***MITCHELL***
Co-Author(s): Varun ***CHAUDHARY,*** *Frank G* ***HOLZ,*** *Edoardo* ***MIDENA,*** *Eric* ***SOUIED,*** *Sebastian* ***WOLF***

Purpose: To explore the relationship between intraretinal and subretinal fluid (IRF/SRF) and best-corrected visual acuity (BCVA) in neovascular age-related macular degeneration (nAMD) treated with intravitreal aflibercept (IVT-AFL) in a proactive, individualized, treat-and-extend regimen to guide treatment-extension decisions.

Methods: ARIES (NCT02581891) was a multicenter, randomized, Phase 3b/4 study comparing efficacy of 2 IVT-AFL treat-and-extend regimens over 2 years in treatment-naïve nAMD. This post hoc analysis explored the relationship between presence of SRF/IRF and BCVA (letters) at baseline and fixed visits (Weeks [w] 4, 8, 16, 52, and 104).

Results: In 210 patients (treat-and-extend treatment arms combined), SRF absence at baseline was associated at every timepoint with lower BCVA than if present (55.5 vs 61.2 [baseline]; 64.5 vs 67.2 [w4]; 66.3 vs 68.5 [w8]; 66.4 vs 70.7 [w16]; 68.3 vs 73.6 [w52]; 65.4 vs 72.9 [w104]). IRF presence at baseline was associated at all but one timepoint with lower BCVA than if absent (57.6 vs 65.2 [baseline]; 61.2 vs 65.9 [w4]; 66.6 vs 66.8 [w8]; 59.0 vs 69.3 [w16]; 66.2 vs 70.0 [w52]; 70.1 vs 67.4 [w104]). Baseline SRF+IRF was associated with lower BCVA (6–8 fewer letters) than if only SRF was present but higher BCVA (3–9 more letters) than if only IRF was present. Absence of

SRF+IRF was not associated with better BCVA at any timepoint.

Conclusions: In ARIES, SRF was associated with better functional outcomes in nAMD treated with IVT-AFL, whereas IRF was associated with poorer functional outcomes. These findings indicate the need to differentiate SRF from IRF to guide treatment-extension decisions.

Dec 11, 2021 (Sat) 22:00 - 23:00

Venue: Livestream 2

Retinal Neural Dysfunction in Diabetes Revealed with Chromatic Pupillometry

*First Author: Tien-en **TAN***
*Co-Author(s): Maxwell **FINKELSTEIN,** Dan **MILEA,** Raymond **NAJJAR,** Anna **TAN,** Gavin **TAN***

Purpose: To evaluate the ability of chromatic pupillometry to reveal and localize retinal neural dysfunction in diabetic patients with and without diabetic retinopathy (DR).

Methods: This cross-sectional study included 82 patients with diabetes (DM) and 93 controls (60.4 ± 8.4 years, 44.1% males). The DM population included patients without (n=25, 64.7 ± 6.3 years, 44.0% males) and with DR (n=57, 60.3 ± 8.5 years, 64.9% males). Changes in pupil diameter in response to gradually increasing blue (469nm) and red (640nm) light stimuli were assessed monocularly, in clinics, using a custom-built handheld pupillometer. Pupillometric features (phasic constriction [from outer retina], maximal constriction [from inner and outer retina] and post-illumination pupillary responses [PIPRs; from inner retina]) were extracted from baseline-adjusted pupillary traces and compared between controls, DM without DR, and DR. Net PIPR was the difference between blue and red PIPR.

Results: Phasic constriction amplitudes to blue and red lights were decreased in DR compared to controls ($p<0.001$; $p<0.001$). Maximal constriction amplitudes to blue and red lights were decreased in DR compared to DM without DR ($p<0.001$; $p=0.02$), and in DM without DR compared to controls ($p<0.001$; $p=0.006$). Net PIPR was decreased in both DR and DM without DR compared to controls ($p=0.02$; $p=0.03$), suggesting a wavelength-dependent (and hence retinal) pupillometric dysfunction in diabetic patients with or without DR.

Conclusions: Chromatic pupillometry can detect retinal neural dysfunction in diabetic patients, even without DR. Patients with DM but no DR displayed primarily inner retinal dysfunction, while patients with DR showed both inner and outer retinal dysfunction.

Dec 11, 2021 (Sat) 22:00 - 23:00

Venue: Livestream 2

Risk of Stroke and All-Cause Mortality in Retinal Vein Occlusion: A Population-Based Cohort Study

*First Author: Yu-yen **CHEN***
*Co-Author(s): Tzu-chen **LO***

Purpose: To investigate whether the risk of subsequent stroke, ischemic stroke, hemorrhagic stroke, and all-cause mortality is increased among retinal vein occlusion (RVO) patients compared to non-RVO patients.

Methods: From the entire population of the Taiwan National Health Insurance Research Database (NHIRD) from 2001 to 2013, a total of 22919 subjects with RVO were enrolled in the RVO group, and 114595 propensity score (PS)-matched non-RVOs were enrolled in the comparison group. PS matching was based on age, gender, obesity, diabetes, hypertension, hyperlipidemia, coronary artery disease, atrial fibrillation, hyperviscosity syndrome, Charlson comorbidity index, glaucoma, and the use of antithrombotic drugs. A multivariate Cox regression analysis was used to estimate the adjusted hazard ratios (HRs) with a 95% confidence interval (CI) for each of the clinical outcomes, including stroke, ischemic stroke, hemorrhagic stroke, and all-cause mortality.

Results: After adjusting for PS, the RVO group had a significantly higher risk of stroke (adjusted HR = 1.36; 95% CI: 1.32–1.40), ischemic stroke (adjusted HR = 1.36; 95% CI: 1.32–1.40), and hemorrhagic stroke (adjusted HR = 1.34; 95% CI: 1.24–1.44). However, the all-cause

mortality did not exhibit significant differences. Furthermore, both the BRVOs and CRVOs had a significantly higher risk of subsequent stroke, ischemic stroke, and hemorrhagic stroke than did the comparisons, whereas all-cause mortality was similar among the groups.

Conclusions: People with RVO are at a significantly greater risk of developing stroke, ischemic stroke, and hemorrhagic stroke. However, RVO does not significantly increase the risk of all-cause mortality.

Dec 11, 2021 (Sat) 19:30 - 20:30

Venue: Livestream 2

Simultaneous Angiopoietin-2/Vascular Endothelial Growth Factor-A Inhibition Prevents Subretinal Fibrosis Progression in Preclinical Mouse Models of Choroidal Neovascularization

First Author: Markus ***LINDER***
Co-Author(s): Jérémie ***CANONICA,*** *Richard* ***FOXTON,*** *Marina* ***GARCIA GARRIDO,*** *Sabine* ***UHLES,*** *Peter* ***WESTENSKOW***

Purpose: To investigate the impact of dual angiopoietin-2 (Ang-2)/vascular endothelial growth factor-A (VEGF-A) blockade versus anti-VEGF monotherapy on fibrosis in laser-induced and spontaneous choroidal neovascularization (CNV) (JR5558) mouse models in the context of phase 2/3 clinical data on faricimab.

Methods: 10- to 12-week (W)-old wild-type mice were treated intraperitoneally with antibodies against Ang-2, VEGF-A, both (VA2), and IgG (control) on days 0 and 7. Fibrosis was analyzed by immunostaining for fibronectin and collagen-hybridizing peptides (CHPs), which detect remodeling collagen, in retinal pigment epithelium (RPE)/choroid flat mounts at 21 days post laser injury. 7W-old JR5558 mice were treated intraperitoneally with anti–Ang-2, anti–VEGF-A, VA2, and IgG. Fibronectin was assessed in RPE/choroid flat mounts at 1W, 3W, and 5W, and CHP binding was assessed 3W post treatment.

Results: In laser-induced CNV mice, VA2 significantly reduced both fibronectin-positive (47%; $P < 0.05$) and CHP-positive (39%; $P < 0.01$) areas at 3W; anti–Ang-2 and anti–VEGF-A alone had no significant effect. Fibronectin-positive area in RPE/choroid of JR5558 mice was significantly reduced with VA2 (38%; $P < 0.01$) and anti–Ang-2 (41%; $P < 0.001$) versus IgG at 1W, not with anti–VEGF-A alone. Only VA2 maintained significant reduction at 3W (47%; $P < 0.01$) and 5W (54%; $P < 0.05$), and significantly prevented collagen remodeling at 3W (66%; $P < 0.01$). Anti–Ang-2 and anti–VEGF-A alone showed no significant effect.

Conclusions: Preclinical data from 2 CNV mouse models suggest sustained prevention of fibrosis with dual Ang-2/VEGF-A inhibition, supporting hypotheses that Ang-2 and VEGF-A contribute to vascular instability and drive subretinal fibrosis. Future studies to determine how Ang-2/VEGF-A inhibition limits subretinal fibrosis are underway.

Dec 11, 2021 (Sat) 19:30 - 20:30

Venue: Livestream 2

Structural and Functional Outcomes of Lamellar Macular Holes with Epimacular Proliferations

First Author: Rohit ***AGRAWAL***
Co-Author(s): Chaitra ***JAYADEV,*** *Akhila* ***SRIDHARAN***

Purpose: To compare the clinical, optical coherence tomography features and surgical outcomes of lamellar macular hole (LMH) depending on the presence of epimacular membrane proliferation (EMPF).

Methods: One hundred and twelve eyes with LMH were enrolled for this retrospective study. The patients were divided into two groups depending on the presence of EMPF. Group 1 had LMH without EMPF and Group 2 had LMH with EMPF. The best-corrected visual acuity was recorded and optical coherence tomography scans were obtained.

Results: Lamellar macular hole without and with EMPF was noted in 62 (55%) and 50 (45%) eyes respectively. The presence of EMPF was associated with lower presenting visual acuity (p=0.049), larger MH size (p=0.001), thinner

residual retinal tissue (p<0.0001), and larger IS-OS defects (p<0.0001) compared to non-EMPF group. Of the 112 eyes, 18 eyes underwent surgery for LMH. Of these, 7 eyes had EMPF and the remaining 11 eyes did not have EMPF. A significant improvement in visual acuity was noted in operated eyes with no EMPF (13.6 letters) compared to eyes with EMPF (-3.43 letters; p=0.008). Worsening in visual acuity (-5.76 letters; p=0.021) was noted in eyes with LMH with EMPF who did not undergo surgery.

Conclusions: LMH with EMPF showed a higher association with accompanying ellipsoid zone disruption. Better anatomical and functional outcomes were achieved in eyes who underwent surgery for LMH when they were not accompanied with EMPF and ellipsoid zone defect.

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Venue: Livestream 2

The Archway Phase 3 Trial of the Port Delivery System With Ranibizumab in Neovascular Age-Related Macular Degeneration: Updated Results and Analysis of Retinal Fluid and Vision Outcomes

First Author: Shwu-jiuan ***SHEU***
Co-Author(s): Giulio ***BARTESELLI,*** *Steven* ***BLOTNER,*** *Anne E.* ***FUNG,*** *Merce* ***MORRAL,*** *Sneha* ***MAKADIA***

Purpose: Port delivery system (PDS) is an investigational drug delivery system for continuous delivery of ranibizumab into the vitreous that is being evaluated in the Archway phase 3 trial for nAMD. The primary analysis focused on results through week (W) 40. Here we present updated results from the September 2020 data cut and analysis of retinal fluid and vision outcomes.

Methods: Archway (NCT03677934) is a randomized, active treatment–controlled trial comparing PDS with ranibizumab 100 mg/mL with fixed 24-week refill-exchanges (PDS Q24W, n=248) with intravitreal ranibizumab 0.5 mg every 4 weeks (monthly ranibizumab, n=167) in nAMD. Results through ≥48W of follow-up and an analysis of the presence/potential impact of retinal fluid are presented.

Results: Change in adjusted mean BCVA score from baseline averaged over W44/48 was noninferior for PDS Q24W versus monthly ranibizumab (difference [95% CI], –0.2 [–1.8, +1.3] letters). Most PDS patients did not receive supplemental ranibizumab during first (98.4%) or second (94.6%) refill-exchange intervals. In general, PDS implant insertion/refill-exchange procedures were well tolerated and the ocular safety profile was unchanged from the primary analysis. Mean (95% CI) BCVA change from baseline at W40 was comparable between PDS Q24W and monthly ranibizumab, regardless of presence/absence of retinal fluid, including presence (+0.2 [–1.6, 2.0] vs +1.0 [–1.7, 3.8]) of subretinal fluid in the center 1 mm.

Conclusions: Archway BCVA results for W44/48 average were consistent with the primary analysis, with PDS Q24W noninferior to monthly ranibizumab. PDS Q24W treatment was generally well tolerated and maintained vision outcomes, regardless of retinal fluid status.

Dec 11, 2021 (Sat) 22:00 - 23:00

Venue: Livestream 2

The Development and Evolution of Lamellar Macular Hole in Highly Myopic Eyes

First Author: Yun ***HSIA***
Co-Author(s): Tzyy-chang ***HO,*** *Cheng-yung* ***LEE,*** *Chang-hao* ***YANG,*** *Chung-may* ***YANG***

Purpose: To study the developmental processes, evolution, outcomes, and prognostic factors of lamellar macular hole (LMH) in highly myopic patients.

Methods: Fifty eyes from 47 highly myopic patients with LMHs were enrolled from a tertiary referral center retrospectively. Relevant pre- and post-LMH optical coherence tomography findings and visual acuity were collected.

Results: Four developmental processes were identified, with a traction component noted in each case. Type 1 LMHs (8, 16%) developed from foveal avulsion caused by vitreomacular traction. Type 2 (32, 64%) and 3 LMHs (5, 10%) formed from ruptured parafoveal and central foveal cysts, respectively. Progressive foveal

thinning caused by epiretinal membranes (ERMs) without cystic changes led to the development of type 4 LMHs (5, 10%). Half of the eyes had retinoschisis, which developed before (9 eyes), after (10 eyes), or simultaneously with (6 eyes) the formation of LMHs. Type 2 (P = 0.023) and type 4 (P = 0.020) LMHs had more severe anatomical progression than type 3 LMHs. Multivariable Cox proportional hazards regression showed that a greater residual foveal thickness (P = 0.001, OR = 0.22), and the absence of retinoschisis were protective against anatomical progression. Multivariable linear regression showed that poor baseline visual acuity and type 4 LMH were associated with worse visual outcomes.

Conclusions: Four traction-related LMH developmental processes were observed in highly myopic eyes. LMHs have different evolution and outcomes according to the developmental process. LMHs with progressive foveal thinning induced by ERMs had the worst anatomical and visual outcomes.

Dec 11, 2021 (Sat) 19:30 - 20:30

Venue: Livestream 2

The Effect of Lipopolysaccharides on Inducible Nitric Oxide Synthase in Human Microvascular Endothelial Cells and Human Choroidal Endothelial Cells

*First Author: Ruoxin **WEI***
*Co-Author(s): Winfried **AMOAKU,** Elizabeth **STEWART***

Purpose: Toll-like receptors (TLRs) are a family of proteins that initiate the innate immune response in reaction to invading microbes. It has been confirmed the TLR4 expressed more in both human microvascular endothelia cells (HMEC-1) and human choroidal endothelia cells (hCECs). Lipopolysaccharide (LPS), recognized by TLR4, is the component of the outer membrane of Gram-negative bacteria. The TLR4-LPS complex activates MAPK and NF-kB pathways, which will induce the expression of nitric oxide synthase (NOS), a known mediator of angiogenesis that is involved in the pathogenesis of choroidal and retinal diseases. Therefore, this research aims to investigate the expression of inducible NOS (iNOS) in HMEC-1 and hCECs following LPS stimulation.

Methods: The hCECs were isolated and cultured as the method previously developed and published in our laboratory. The protein expressions of iNOS were examined by western blotting.

Results: The expression of iNOS protein increased in a time-dependent manner in response to LPS stimulation in HMEC-1. The protein expression reached a maximum following 24-hour treatment. In hCECs, the expression of iNOS was up-regulated significantly after 12-hour incubation with LPS. The rise was then followed by a fall at 24 hours.

Conclusions: This study has identified iNOS expression more prominent in primary cells, and the TLR4-LPS mechanism for initiating angiogenic factors which associate and affect progression of neovascular disease. This study will help improve understanding of different choroidal vascular disease, as well as the development of future treatments of intraocular vascular diseases.

Dec 11, 2021 (Sat) 19:30 - 20:30

Venue: Livestream 2

The Impact of Disease Activity on 5-Year Outcomes in Patients Undergoing Treatment for Neovascular Age Related Macular Degeneration

*First Author: Kelvin Yi Chong **TEO***
*Co-Author(s): Daniel **BARTHELMES,** Gemmy **CHEUNG CHUI MING,** Vuong **NGUYEN,** Mark **GILLIES***

Purpose: To assess the impact of disease activity on clinical outcomes in a "real-world" cohort with neovascular age related macular degeneration (nAMD) over 5 years.

Methods: Data were obtained from the prospectively-defined Fight Retinal Blindness! registry. Eyes were divided into tertiles based on the proportion of visits where choroidal neovascular lesion was active (low, moderate and high) up until 5 years.

Results: Data from 2109 eyes were included. The adjusted mean (95% CI) VA change was -0.5 letters (-1.8, 1.1), 1.8 letters (0.2, 3.4) and -2.5 letters (-4.2, -1.3) in the low, moderate and high activity groups respectively, p<0.001. Eyes in the low activity group were more likely to develop macular atrophy (56%, 47% and 26% in the low, moderate and high activity groups respectively, p<0.001) but less likely to develop subretinal fibrosis (27%, 35% and 42% in the low, moderate and high activity groups respectively, p<0.001).

Conclusions: Eyes with higher and lower levels of disease activity had poorer outcomes than eyes with moderate activity over 5 years, apparently due to the development of subretinal fibrosis or macular atrophy.

Dec 11, 2021 (Sat) 19:30 - 20:30

Venue: Livestream 2

Three-Year Treatment Outcomes of Aflibercept versus Ranibizumab for Diabetic Macular Edema

*First Author: Mark **GILLIES***

Purpose: To compare the three-year treatment outcomes of intravitreal injections of ranibizumab versus aflibercept in eyes with diabetic macular edema (DME) in routine clinical practice.

Methods: Data were obtained from the prospectively designed observational Fight Retinal Blindness! registry. Treatment-naïve eyes starting intravitreal injections of either ranibizumab (0.5mg) or aflibercept (2mg) for DME from 1 January 2013 to 31 December 2017 were identified. Visual acuity (VA) and central subfield thickness (CST) were compared over 36 months in all eyes (completers, non-completers, and eyes that switched treatment). Outcomes were adjusted for baseline characteristics including age, VA, CST, DME activity, and nesting of outcomes within practice and eyes from the same patient.

Results: A total of 534 eyes (267 ranibizumab, 267 aflibercept) from 402 patients were identified. The adjusted mean (95% confidence interval [CI]) VA change over three years was significantly (P < 0.001) higher for aflibercept-treated eyes. However, this was due to larger gains in aflibercept in the first 12 months. By three years, the adjusted VA changes for ranibizumab +1.3 (-0.1, 4.2) and aflibercept +2.4 (-0.2, 5.1) letters were similar. The adjusted CST change appeared to remain significantly different throughout the entire three-year period with higher reductions in favor of aflibercept (mean [95% CI] -114.4 [-134.4, -94.3] µm vs -87.8 [-108.3, -67.4] µm for ranibizumab; P < 0.001) at 3 years.

Conclusions: Both drugs were effective for DME at improving vision. The aflibercept-treated group had better anatomic outcomes throughout the three years.

Dec 11, 2021 (Sat) 19:30 - 20:30

Venue: Livestream 2

Treat-and-Extend Dosing of Intravitreal Anti-VEGF Agents in Neovascular Age-Related Macular Degeneration: A Meta-Analysis of 1697 Eyes

*First Author: Prem **NICHANI***
*Co-Author(s): Arjan **DHOOT,** Peter **KERTES,** Rajeev **MUNI,** Ananya **PATHAK,** Marko **POPOVIC***

Purpose: Intravitreal injections of antiangiogenic agents are pivotal in treating neovascular age-related macular degeneration (nAMD). The comparative efficacy and safety of treat-and-extend (T&E) versus bimonthly, monthly, and pro re nata (PRN) dosing remains unclear.

Methods: A systematic search was conducted to identify English-language RCTs reporting on efficacy and/or safety outcomes of dosing regimens of anti-VEGF agents in nAMD. The primary outcome was improvement in best corrected visual acuity (BCVA, ETDRS letters) at last follow-up; secondary outcomes included changes in central subfield thickness (CSFT, µm), injection burden, and incidence of adverse events. Meta-analysis was conducted using a random effects model.

Results: Across six RCTs, 781 T&E-, 663 monthly-, 130 PRN-, and 123 bimonthly-treated eyes were included. Mean changes in BCVA and CSFT at last follow-up were similar between T&E versus monthly (WMD, –0.62 letters; 95% CI, –2.12 to 0.87; P=0.41; WMD, 5.30 microns; 95% CI, –10.67 to 21.26; P=0.52, respectively), bimonthly (WMD, 0.30 letters; 95% CI, –3.49 to 4.09; P=0.88; WMD, –18.91 microns; 95% CI, –46.41 to 8.60; P=0.18, respectively), and PRN (BCVA WMD, 0.05 letters; 95% CI, –3.55 to 3.66; P=0.98) regimens. T&E was associated with a reduced injection burden versus monthly (WMD, –4.52 injections; 95% CI, –6.66 to 2.39; P<0.001) but higher injection burden versus PRN (WMD, 1.81 injections; 95% CI, 1.12 to 2.51; P<0.001) dosing. There was no significant difference in safety outcomes amongst comparators.

Conclusions: There was no significant difference in efficacy and safety between T&E, bimonthly, monthly, and PRN dosing. T&E resulted in fewer injections versus monthly and fewer clinic visits versus PRN.

Retina (Surgical)

Dec 11, 2021 (Sat) 14:30 - 15:30

Venue: Livestream 2

An Innovative Scleral Fixation IOL Implantation Technique with a Single Suture Loop Without Scleral or Conjunctival Flaps

First Author: Durgesh ***KUMAR***
Co-Author(s): Pankhuri ***JOHARI***

Purpose: The present pilot study was 4.5 years long and in 54 patients with IOL implantation done using this technique. Eligible candidates were those with large posterior capsular tears or total bag removals peri-operatively or aphakic patients requiring IOL implantation.

Methods: After anterior vitrectomy four radial 3mm radial conjunctival/scleral partial thickness incisions were made on the limbus at 10:30, 1:30, 4:30 and 7:30 o'clock positions. A nylon 8-0 suture with needles at both ends was passed through 4:30 and 7:30 o'clock scleral incisions and intra-sclerally; then into the eyeball to emerge through the corneo-scleral phacoemulsification tunnel at 12:00 o'clock, and fed into the tip of lens injector and four haptics of the IOL. The lens is loaded and injected as usual and the two suture strands along with the needles were pulled out. The needles are pushed back into the anterior chamber and out through limbal entry at 6:00 o'clock and maneuvered to exit at 10:30 and 1:30 o'clock and the loop is completed, passing intra-sclerally and ends tied.

Results: IOL was implanted in all 54 cases. There were astigmatic errors of >1D in 36 cases, >2D in 18 cases and >3D in only 4 cases. There was transient hypotony in 16 cases, vitreous hemorrhage in 3 cases and striate keratitis in 14 cases. In one case suprachoroidal hemorrhage was managed successfully; there were signs of uveitis in 21 cases and macular edema seen in 12 cases. Final visual acuity of 6/6 to 6/12 was achieved in >90% of cases.

Conclusions: The procedure has been found to be simple and safe, to be practiced with encouraging outcomes.

Dec 11, 2021 (Sat) 14:30 - 15:30

Venue: Livestream 2

Clinical Outcomes of a Beveled-Tip, Ultra-High Speed, 25-Gauge Pars Plana Vitrectomy Cutter Probe

First Author: Harvey ***UY***
Co-Author(s): Jose Carlo ***ARTIAGA,*** *Vicente Lorenzo* ***CABAHUG,*** *Pik Sha* ***CHAN,*** *Jordan* ***FAMADICO***

Purpose: To assess the clinical outcomes and efficiency of a 25-gauge, beveled-tip, 10000 cuts-per-minute (cpm) vitrectomy cutter probe.

Methods: Prospective, single-center series of 50 eyes undergoing primary pars plana vitrectomy (PPV) for various indications. The probe was utilized for vitreous aspiration and other surgical maneuvers. The main outcome measures were achievement of surgical objectives, operative times, number of surgical steps, usage of ancillary instruments, corrected

distance visual acuity (CDVA), and adverse events.

Results: The surgical objectives were met in all eyes. The mean total operative duration, core, shave and total vitrectomy times were 1891 ± 890, 204 ± 120, 330 ± 320, 534 ± 389 seconds, respectively. The mean number of surgical steps was 4.3 ± 1.5. The mean number of times an ancillary instrument was placed inside the eye was 4.5 ± 1.9. The mean CDVA at the three-month postoperative visit improved by -0.53 ± 0.56 logMAR units (P<0.001). Postoperative adverse events included elevated IOP (8%), hypotony (6%), and re-detachment (2%). Majority (82%) of patients reported no postoperative discomfort. None of the eyes required sclerotomy sutures.

Conclusions: A beveled-tip 10000 cpm probe appears to enhance surgical efficiency by decreasing vitrectomy duration and reducing ancillary instrumentation usage.

Dec 11, 2021 (Sat) 14:30 - 15:30

Venue: Livestream 2

Correlation between M-Charts and Subjective Perception of Metamorphopsia in Patients with Retinal Detachment

*First Author: Paola **OQUENDO***
*Co-Author(s): Natalia **FIGUEIREDO,** Carolina **FRANCISCONI,** Verena **JUNCAL,** Samara **MARAFON,** Rajeev **MUNI***

Purpose: M-Chart testing has been validated for other retinal pathologies. It is unclear whether findings from them can reflect a patient with rhegmatogenous retinal detachment's (RRDs) subjective perception of metamorphopsia. We aim to assess patients with RRDs subjective metamorphopsia using a previously validated questionnaire and correlate subjective and objective findings of metamorphopsia with M-chart.

Methods: We present a prospective observational, single-center study. Subjects with RRD needing pars plana vitrectomy or pneumatic retinopexy were included using subjects with normal ocular function as control. Subjective metamorphopsia was determined using the metamorphopsia questionnaires and M-Chart testing was performed 3 months postoperatively.

Results: Fifty subjects in each group were analyzed. Overall, 76% (n = 38) of the subjects with RRD scored any degree of metamorphopsia on M-Chart testing and 82% (n = 41) self-reported metamorphopsia at 3 months. Metamorphopsia questionnaire, horizontal, vertical, and total M-Chart scores were significantly higher in subjects with RRD compared to controls (all U < 0.0001). Cronbach's alpha reliability coefficient of the metamorphopsia questionnaire in subjects with RRD measured 0.956. The questionnaire scores significantly correlated to the horizontal, vertical, and total M-Charts scores (rs=0.4, P=0.004; rs=0.399, P=0.004; rs=0.459, P=0.001; respectively). Total M-Chart showed 85.4% sensitivity and 66.7% specificity with an area under the ROC curve of 0.801. A high interaction was found when comparing subjects who graded an M-Chart score greater than 0.1 and presented subjective metamorphopsia (x2(1) = 10.954, P=0.001).

Conclusions: Metamorphopsia is a frequent occurrence after RRD repair and M-Chart testing appears to be a valid objective tool to measure it with significant correlation with the metamorphopsia questionnaire.

Dec 11, 2021 (Sat) 14:30 - 15:30

Venue: Livestream 2

Effects of the Number of Intravitreal Gas Bubbles following Pneumatic Retinopexy on Anatomical and Visual Outcomes in Rhegmatogenous Retinal Detachment

*First Author: Manachaya **PRUKAJORN***
*Co-Author(s): Nopasak **PHASUKKIJWATANA,** Supalert **PRAKHUNHUNGSIT,** Nuttawut **RODANANT,** Somanus **THOONGSUWAN,** Nida **WONGCHAISUWAT***

Purpose: To explore the effect of the number of intravitreal gas bubbles following pneumatic retinopexy (PR) on anatomical and visual outcomes in rhegmatogenous retinal detachment (RRD).

Methods: Primary PR patients between 2014 and 2020, with a minimum follow-up of 1 month, were retrospectively reviewed. Baseline characteristics, number of post-operative intravitreal gas bubbles, and anatomical and visual status at 1 and 3 months after PR were recorded. Univariate and multivariate analyses were performed.

Results: Total of 170 patients who met conventional indication for PR were included. Forty-two patients were excluded because of previous procedures, ocular trauma, inadequate data and secondary RRD. There were 128 eyes left. Sixty-nine eyes (54%) achieved a single post-operative gas bubble (group A), whereas 59 (46%) eyes had greater than one bubble (group B). Single-operation anatomical success rates at 1 and 3 months were 71.0% and 60.0%, respectively, for group A compared with 52.5% and 43.1% for group B. All eyes with fish-egg bubbles failed PR (n=4). A single intravitreal gas bubble was the only factor independently associated with single-operation anatomical success at 1 month (P = 0.018), but no association was found at 3 months (P = 0.088). Among the successful PR cases, there was no association between the number of bubbles and visual outcome.

Conclusions: The number of gas bubbles following PR significantly affects anatomical outcomes for RRD. Appropriate injection technique to achieve a single bubble should be taken into consideration in order to ensure surgical success. Patients with multiple gas bubbles may be advised for other surgical options.

Dec 11, 2021 (Sat) 14:30 - 15:30

Venue: Livestream 2

ILM Peeling: Searching for Hope in ERM associated Ectopic Fovea

First Author: Krishnendu ***NANDI***

Purpose: To determine the anatomical and functional impact of internal limiting membrane (ILM) peeling in cases of idiopathic epiretinal membrane (ERM) associated ectopic fovea.

Methods: A retrospective, interventional case series of 39 eyes with idiopathic ERM associated with ectopic fovea at presentation. The study period was between January 2016 and December 2019. Relationship between pre-operative and post-operative logMAR BCVA, pre-operative and post-operative central foveal thickness (CFT) were evaluated. Effect of ILM peeling on post-operative logMAR BCVA and post surgery ectopic fovea were evaluated. Relationship of presence of ellipsoid zone (EZ) disruption and recurrence of ERM were compared with post-operative logMAR BCVA. Parametric and non-parametric tests were used to compare categorical and non-categorical variables and with appropriate significance ($p<0.05$).

Results: Thirty-nine patients with mean age of 58.34 years and mean duration of complaint of 8.97 months were included. Mean duration of follow up was 20.74 months and mean duration of ectopic fovea resolution was 2.97 months. Treatment options included pars plana vitrectomy and ERM removal with or without ILM peeling. Post-operative BCVA was noted to be better than pre-operative value, which was statistically significant also ($p = 0.001$). CFT was noted to be reduced after surgery and that too was statistically significant ($p = 0.001$). ILM peeling was not noted to have a statistically significant relation with absence of post-operative ectopic fovea ($p = 0.256$).

Conclusions: In our study ILM peeling was noted to have significantly good impact on anatomical as well as functional outcomes in ERM associated ectopic fovea.

Dec 11, 2021 (Sat) 14:30 - 15:30

Venue: Livestream 2

Intravitreal Recombinant Tissue Plasminogen Activator before Vitrectomy for Diabetic Tractional Retinal Detachment: A Randomized Controlled Trial

First Author: Khalil ***GHASEMI FALAVARJANI***
Co-Author(s): Fatemeh ***ABDI,*** *Pasha* ***ANVARI,*** *Mohammad Hasan* ***DEHGHAN NIRI,*** *Ahad* ***SEDAGHAT,*** *Esrafil* ***SHAD***

Purpose: To investigate the effect of intravitreal recombinant tissue plasminogen activator (rt-PA) injection before vitrectomy on surgical facility and outcome in diabetic tractional retinal detachments (TRD).

Methods: Prospective, randomized, interventional clinical trial. A total of 38 eyes with diabetic TRD who were candidates for vitrectomy. Patients were randomized 1:1 to receive intravitreal rt-PA five to seven days before vitrectomy or no injection. Intraoperative surgical facility and anatomic success at month 3 after surgery were assessed.

Results: Mean patient age was 54.2 ± 9.4 years. There was no statistically significant difference between rt-PA and no injection groups with regard to anatomic success (89% versus 95%, respectively, P=0.547) and best corrected visual acuity at 3 months (2.0 versus 2.1 logMAR, respectively, P=0.840). However, surgical facility score was statistically significantly lower in rt-PA injection group compared to no injection group (4.1 ± 1.7, 5.8 ± 2.0, respectively, P=0.007).

Conclusions: Vitrectomy for TRD was easier after preoperative rt-PA injection, without affecting the anatomic and visual outcomes.

Dec 11, 2021 (Sat) 14:30 - 15:30

Venue: Livestream 2

Inverted Internal Limiting Membrane Flap Technique for Macular Hole Surgery with and without Perfluorocarbon Liquid

First Author: Kanwaljeet Harjot ***MADAN***

Purpose: To assess the inverted internal limiting membrane flap technique in macular hole surgery with and without perfluorocarbon liquid (PFCL) in achieving anatomical and functional success.

Methods: 30 patients were included in the study. They were divided in 2 groups with 15 patients in each group. All patients had stage 4 macular hole. Group 1 patients underwent macular hole surgery with inverted ILM flap using PFCL along with gas tamponade. Group 2 patients underwent surgery with inverted ILM flap without PFCL along with gas tamponade. Preoperative best corrected visual acuity (BCVA), fundus photo and optical coherence tomography (OCT) were done in all patients. OCT parameters measured were: stage of macular hole, height, base diameter, macular hole index (MHI).

Results: Average age of the patients was 66.9 years. There were 20 females and 10 males. 11 patients were phakic and 19 were pseudophakic. The mean follow up period was 9.2 months. In group 1, the mean preoperative BCVA was 0.14. The mean postoperative BCVA was 0.52. In group 2, the mean preoperative BCVA was 0.13. The mean postoperative BCVA was 0.25. Type 1 closure was seen in all patients.

Conclusions: Inverted flap technique using PFCL in macular hole surgery helps in achieving better anatomical closure with better functional results.

Dec 11, 2021 (Sat) 14:30 - 15:30

Venue: Livestream 2

Pars Plana Vitrectomy combined with Scleral Buckle for Retinal Detachment secondary to Ocular Toxocariasis

First Author: Noriell Jonathan ***MAMACLAY***
Co-Author(s): Emilio Serafin ***ADRIANO,*** *John Vyle* ***PASCARAN***

Purpose: To present a case of ocular toxocariasis and highlight the use of 23-G pars plana vitrectomy and scleral buckle for its management.

Methods: This is a case of a 27-year-old female who presented with decreased vision due to

combined tractional-rhegmatogenous retinal detachment in the right eye associated with peripheral granuloma secondary to ocular toxocariasis. On examination, there was a dense fibrous membrane in the peripheral temporal area which was attached to an area inferotemporal to the macula. Multiple retinal tears noted on the area of traction. Retinal detachment of the posterior pole was present. Vision was 20/200. Surgical management was done by 23-G pars plana vitrectomy combined with scleral buckling. Adequate removal of the vitreous was done around the peripheral granuloma. An attempt to remove the peripheral granuloma was abandoned due to risk of further retinal damage. Macular epiretinal membrane peeling was done. Drainage of subretinal fluid was done on the retinal tear around the granuloma. Endolaser was done on the retinal tears. Silicone oil was used as tamponade. An encircling band was used to lessen peripheral-posterior traction.

Results: Retinal attachment was observed on 1 month post-operative with mild subretinal fluid on the fovea. However, vision remained the same as pre-operatively.

Conclusions: Pars plana vitrectomy with scleral buckling provided reattachment of the retina in our case but vision remained poor. Functional improvement in these cases are relatively poor.

Dec 11, 2021 (Sat) 14:30 - 15:30

Venue: Livestream 2

Patient Compliance for Prone Positioning after Vitrectomy Surgery

*First Author: Ashish **AHUJA***

Purpose: To investigate the use of an innovative device (post vitrectomy recovery system) that has a sensor embedded in the headrest with data-logging function in real time to measure compliance of patients to maintain face down positioning (FDP) after vitrectomy surgery.

Methods: All surgeries were performed by a single surgeon. Surgeries done included macular hole, retinal detachment with inferior retinal breaks and open globe injury with IOFB with retinal detachment. 13 patients were evaluated but 2 patients had to be excluded as they could not maintain FDP in the postoperative period due to chest pain and breathlessness during FDP. 11 patients were evaluated in this pilot project, out of which 6 were male and 5 were females with age ranging from 28-71 years. The duration of prone position maintained varied from 4 days to 12 days.

Results: The average duration of face down positioning was 5.5 hours in the first 24 hours. The adherence was significantly better after MH surgery than after RRD surgery. Out of 11 patients, 5 underwent macular hole surgeries which showed a successful closure of MH in all cases. Out of 5 patients with retinal detachment, 4 cases achieved anatomical success and one case required resurgery in the postoperative period.

Conclusions: To summarize, we observed a good acceptance of our device to measure compliance of patients after vitrectomy surgery to maintain FDP.

Dec 11, 2021 (Sat) 14:30 - 15:30

Venue: Livestream 2

Single-Layer Inverted Internal Limiting Membrane Flap versus Conventional Peel for Small- or Medium-Sized Full-Thickness Macular Holes

*First Author: Hung-da **CHOU***
*Co-Author(s): Kuan-jen **CHEN,** Chi-chun **LAI,** Wei-chi **WU,** Laura **LIU***

Purpose: To compare the outcomes of using an inverted internal limiting membrane (ILM) flap and the conventional ILM peel technique for small- or medium-sized full-thickness macular hole (FTMH) repair.

Methods: Eyes with an FTMH ≤ 400 μm that underwent vitrectomy with either a single-layer inverted ILM flap (flap group, 55 eyes) or an ILM peel (peel group, 62 eyes) were retrospectively reviewed. Best-corrected visual acuity (BCVA, mean ± SD) and optical coherence tomography (OCT) measurements

were obtained preoperatively and at 1, 3, 6, and 12 months postoperatively, and the results were compared between the groups.

Results: Primary hole closure was achieved in 54 (98%) and 60 (97%) eyes in the flap and peel groups, respectively. The preoperative and postoperative 12-month BCVA were comparable between the groups but were significantly better in the flap than in the peel groups at 1 month (logarithm of the minimum angle of resolution (logMAR) 0.83 ± 0.43 vs 1.14 ± 0.50, P = 0.001), 3 months (0.58 ± 0.33 vs 0.82 ± 0.43; P = 0.002), and 6 months (0.56 ± 0.32 vs 0.72 ± 0.48; P = 0.028). At 1 month, foveal gliosis was significantly less common in the flap group (23%) than in the peel group (42%; P = 0.030).

Conclusions: Both the single-layer ILM flap and conventional ILM peel techniques effectively closed FTMHs and improved vision. ILM flaps were associated with better visual outcomes and foveal morphology up to 6 months postoperatively and should therefore be considered in FTMHs ≤ 400 µm.

Dec 11, 2021 (Sat) 14:30 - 15:30

Venue: Livestream 2

Time from Presentation to Surgical Repair of Rhegmatogenous Retinal Detachments: A Meta-Analysis

First Author: Amirthan ***SOTHIVANNAN***
Co-Author(s): Arjan ***DHOOT,*** *Arshia* ***ESHTIAGHI,*** *Peter* ***KERTES,*** *Rajeev* ***MUNI,*** *Marko* ***POPOVIC***

Purpose: Time to rhegmatogenous retinal detachment (RRD) repair may influence surgical outcomes. This meta-analysis aims to determine the relationship between time to repair and visual acuity (VA) outcomes for macula-on and macula-off RRDs.

Methods: We searched MEDLINE, EMBASE, and Cochrane CENTRAL from inception to September 2020 and included controlled studies reporting on time to RRD repair and VA. Primary outcomes were final VA and change in VA (ΔVA) between macula-off RRD repair in 1-3 versus 4-7 days and macula-on repair in ≤24 versus >24 hours. Secondary outcomes examined other timepoints.

Results: 39 articles (1 RCT, 38 observational) reported on 7030 patients. Macula-off RRD repair in 1-3 days was superior to 4-7 days for final VA (mean difference -0.06 [-0.09, -0.03] logMAR, p<0.001), but was not different for ΔVA (0.03 [-0.18, 0.25], p>0.05). Macula-on repair in ≤24 hours was superior to >24 hours for final VA (-0.02 [-0.03, -0.01], p<0.05), but was not different for ΔVA (0.00 [-0.02, 0.02], p>0.05). Macula-off repair in ≤7 days was superior to >7 days for final VA (-0.20 [-0.30, -0.10], p<0.001) and ΔVA (-0.29 [-0.46, -0.13], p<0.001). Macula-off repair in ≤10 days was superior to >10 days for final VA (-0.48 [-0.65, -0.31], p<0.001) and ΔVA (-0.42 [-0.66, -0.17], p<0.001). There was no difference between ≤15 days and >15 days for final VA (-0.06 [-0.23, 0.11], p>0.05) or ΔVA (-0.02 [-0.43, 0.38], p>0.05).

Conclusions: Macula-off and macula-on RRDs have the best visual outcomes when repaired in ≤3 days and ≤24 hours, respectively.

Translational Medicine

Dec 12, 2021 (Sun) 14:30 - 15:30

Venue: Livestream 2

Single-Cell RNA-Seq Analysis Maps Early Retinal Development of Mouse and Human Retina

First Author: Xi ***CHEN***

Purpose: Vision starts with image formation at the retina, which contains diverse neuronal cell types that extract, process, and relay visual information to higher order processing centers in the brain. Though there has been steady progress in defining retinal cell types, very little is known about early retinal development in mice and humans, which starts well before birth.

Methods: In this study, we performed transcriptomic profiling of developing mouse embryonic and early-born retinae, including

embryonic (E) days 14.5, 17.5 and postnatal (P) day 3, which correspond to early, intermediate, and late stages of retinal neurogenesis, respectively. Using single-cell RNA-sequencing (scRNA-seq) and pseudotime analysis, the developmental trajectories of retinogenesis were reconstructed. We also analyzed human fetal retinae of gestational weeks 8 and 9.

Results: Our analysis revealed transcriptional programs driving differentiation from retinal progenitor cells (RPCs), to fate-deciding RPCs and ciliary marginal zone cells, and then down to three different cell types, which suggested that fate-deciding RPCs might serve as embryonic progenitors in early retinal development. In addition, we also showed that transcriptional differences separated into distinct subtypes and used this information to reconstruct RPC developmental trajectories and cell fate. Our results supported a hierarchical program of differentiation governing cell-type diversity in the developing mouse and human retina.

Conclusions: In summary, our work details comprehensive molecular classification of retinal cells, reconstructs their relationships, and paves the way for future mechanistic studies on the impact of gene regulation upon human retinogenesis.

Dec 12, 2021 (Sun) 14:30 - 15:30

Venue: Livestream 2

Stimulation of c-Kit+ Retinal Progenitor Cells by Stem Cell Factor Confers Immunomodulatory Protection against Retinal Degeneration

*First Author: Xi **CHEN***

Purpose: Transplantation or endogenous activation of stem/precursor cells represents a promising therapeutic modality for treating retinal degeneration (RD). We previously identified a population of C-Kit+ retinal progenitor cells (RPCs) in retinas of both postnatal and adult mice. However, whether endogenous C-Kit+ RPCs can exert protective effects during RD remains unclear.

Methods: Three days after N-methyl-D-aspartate (NMDA) injury, C-Kit ligand stem cell factor (SCF), C-Kit antibody aC-Kit and selective glial cell inactivating agent α-aminoadipic acid (AAA) were injected respectively. Morphological changes of the inner retina were demonstrated by immunochemistry.

Results: Stimulation of endogenous C-Kit+ RPCs by SCF conferred immunomodulatory protection against RD, via downregulating the pro-inflammatory effects of microglia and inhibiting gliosis. In retinas, the C-Kit ligand SCF was mainly expressed in Müller cells under physiological conditions, and significantly decreased upon NMDA challenge. Both electroretinogram and light/dark transition tests showed that intravitreal injection of exogenous SCF effectively protected mice against NMDA-induced ganglion cell loss. By the parallel RNA sequencing and the Gene Ontology analysis, a number of differential expressed genes (DEGs) closely related to immune responses were found in the transcriptome of SCF-treated retinas. Consistently, we showed that the SCF treatment prevented the gliosis and the activation of microglia in the retinas of NMDA-challenged mice, therefore improving the degenerative microenvironment and inhibiting the apoptosis of ganglion cells.

Conclusions: These results not only demonstrate that stimulation of endogenous C-Kit+ RPCs by SCF may have the potential to treat retinal diseases, but also expand our understanding of the role of endogenous C-Kit+ RPCs.

Dec 12, 2021 (Sun) 14:30 - 15:30

Venue: Livestream 2

Validation of an Automated, Offline Deep Learning-Based Tool to Screen for Age-Related Macular Degeneration

*First Author: Divya **RAO***
*Co-Author(s): Florian M **SAVOY,** Jun Kai **TOH***

Purpose: Age-related macular degeneration (AMD) is the third leading cause of vision loss in the world. We developed and assessed an automated screening tool for AMD using deep

learning (DL) on color fundus images. The model is deployable on-the-edge on the target device, and runs offline in seconds.

Methods: We trained an AI algorithm on two distinct datasets with macula centered images: 128,015 images (47% referable AMD) from the Age-related Eye Disease Study (AREDS) and 598 images (26% referable AMD) captured on Asian eyes using the target device. The model is trained to indicate the presence of referable AMD (intermediate and advanced AMD). The validation set comprises 334 images (34% referable AMD) and test set A comprises 332 images (33% referable AMD), both from target device. Test set B comprises 909 images (49% referable AMD) from AREDS dataset. The reference standard for AREDS dataset is fundus image grading by a central reading center. On the target dataset, it was the consensus image grading of two vitreo-retinal specialists.

Results: The DL algorithm had sensitivity of 87.7%, specificity of 85.0% and AUC of 0.92 in detecting referable AMD on the validation set. On test set A, sensitivity was 78.9%, specificity was 84.8% and AUC 0.90. On test set B, sensitivity was 81.5%, specificity was 90.9% and AUC 0.93.

Conclusions: The DL algorithm shows promising results, despite relying on a training set predominantly captured by traditional cameras and different population. This on-the-edge AI deployed on a portable camera has potential to make AMD screening accessible, affordable and effective.

E-POSTERS

Eye Trauma, Emergencies & Infections

A Case Series of Parinaud's Oculoglandular Syndrome secondary to Sporothrix schenckii

First Author: Kumutha ***M***
Co-Author(s): Ang ***JEAT,*** *Norliza* ***RAJA***

Purpose: To report three rare cases of Parinaud's oculoglandular syndrome (OGS) caused by sporotrichosis.

Methods: Case series.

Results: We hereby present three patients aged between 38 to 64 whom had lymphocutaneous presentation of ocular sphorothrichosis. All patients had fungal culture of Sporothrix schenckii isolated. A regime of oral itraconazole 200mg OD was started for these patients for an average period of 12 weeks. All of them recovered well with no ocular complications.

Conclusions: Parinaud's OGS has a wide spectrum of causative organisms and it is pertinent to find the culprit in order to treat patients successfully. Although sporotrichosis is a relatively uncommon cause of this condition, it is known to be endemic in many humid tropical countries. A high degree of suspicion must be maintained in such cases. Culture biopsy must be taken in an expedited manner to aid diagnosis and tailored treatment. Contact with domestic animals such as cats must be elicited in history clearly.

A Ticking Timebomb!

First Author: Joseph ***DANASAMY***
Co-Author(s): May-may ***CHOO,*** *Mimiwati* ***ZAHARI***

Purpose: To report a case of internal carotid artery aneurysm mimicking mononeuritis multiplex of the 3rd cranial nerve.

Methods: Case report.

Results: A 67-year-old female presented to the emergency department (ED) with complaint of right sided headache with nausea and vomiting. Her blood pressure (BP) was found to be high at 206/96 with no other neurological signs or symptoms. A diagnosis of hypertensive urgency was made. Her BP was stabilized with medications and she was discharged. However, her symptoms kept recurring and she developed partial ptosis of the right eye (RE) a few weeks later. She was investigated with neuroimaging which showed a right thalamic lacunar infarct. On presenting to the ophthalmology department, she had been having unilateral partial ptosis for 1 week which had not worsened. Her ptosis was attributed to a mononeuritis multiplex of the 3rd cranial nerve. Two weeks later she developed complete right ptosis and examination revealed presence of anisocoria and limited extraocular movements consistent with complete 3rd nerve palsy. Urgent neuroimaging with angiography confirmed the presence of an unruptured aneurysm of the supraclinoid segment of the internal carotid artery. She was treated successfully by the neurosurgical team with endovascular coiling.

Conclusions: This case describes how a surgical 3rd nerve palsy was missed due to concurrent history of hypertension and cerebral infarct with the absence of classical signs and symptoms. In summary a high index of suspicion and detailed neuroimaging is necessary to make an early diagnosis of surgical 3rd nerve palsy and avoid disaster.

Ailurophile's Red Eye

First Author: Afifah ***MANSOR***
Co-Author(s): Krishnalatha ***BUANDASAN,*** *Muhammat Asyari* ***ISMAIL,*** *Ui Lyn* ***LOH,*** *Preshaantini R* ***PONNAIAH,*** *Rahimah* ***RAMLI***

Purpose: Parinaud oculoglandular syndrome (POG) is an atypical presentation of cat scratch disease. The clinical presentation is characterized by unilateral granulomatous conjunctivitis with ipsilateral regional lymphadenopathy. This case series highlight three POG with various initial presentations.

Methods: Retrospective review.

Results: We report three cases of POG from 2019 to 2020. All three cases had history of direct contact with cats. The first case was a 16-year-old patient who presented with right painful red eye for three weeks and was initially treated as allergic conjunctivitis. After one week of topical treatment, symptoms did not resolve. On further examination the unilateral granulomatous conjunctivitis and right upper cervical lymphadenopathy were noted. Patient's Bartonella Henselae serology showed elevated IgM level. Second case was a 1-year-old child who had left lower lid swelling for a month but had no fever. Upon everting the lower lid, the tender, injected granulomatous conjunctivitis associated with preauricular lymph nodes were noted. The last case was an 18-year-old patient who presented with left painful red eye associated with ipsilateral upper cervical lymphadenopathy. However, no serological test was sent for the last two cases due to unavailability of test reagent in our center at that time. Oral azithromycin was promptly commenced for all ranging from four to six weeks depending on patients' clinical course with topical dexamethasone 0.1%. Upon completion of treatment, all recovered completely.

Conclusions: A high index of clinical suspicion is required for accurate diagnosis and treatment plan for good clinical outcome.

Alteration of Foveal Structure and Thickness following Blunt Ocular Trauma: A Case Series

First Author: Shyam Sundar ***DAS MOHAPATRA***

Purpose: To describe alteration of foveal structure and thickness following blunt ocular trauma in three cases.

Methods: Three cases with alteration of foveal structure and thickness following blunt ocular trauma associated with permanent vision loss have been described here. Optical coherence tomography (OCT) was performed in each case to document the changes of foveal structure and thickness. The first case presented five days after trauma with cricket ball, and was initially diagnosed with Berlin's edema. The second case presented one day after trauma with bamboo stick, and was also diagnosed with Berlin's edema on presentation. The third case presented three days after trauma with iron pipe, and was initially diagnosed with disruption of photoreceptor inner segment - outer segment junction of fovea. The first and third case had shown complete loss of photoreceptor layer with foveal thinning at two weeks following blunt trauma. The second case had complete loss of photoreceptor layer with foveal thinning at four weeks following blunt trauma.

Results: The visual acuity was maintained at 6/18, N10 in the first and third cases respectively, while in the second case, the visual acuity was poorer than the other 2 cases and maintained at 3/60, N36.

Conclusions: Vision loss following blunt ocular trauma can occur due to various reasons, which are yet to be elucidated completely. Alteration of foveal structure and thickness is associated with permanent vision loss following blunt ocular trauma. Clinical examination and evaluation using OCT may help in detecting the foveal sequelae and visual outcomes in eyes with blunt trauma.

BD BACTEC Peds Plus/F versus Conventional Culture in Detecting Bacterial Contamination of Non-Contact Condensing Lenses in a Malaysian University Hospital

First Author: Mae-lynn ***BASTION***
Co-Author(s): Somasundranayaky ***SIVALINGAM,*** *Syed Zulkifpli* ***SYED ZAKARIA,*** *Wan Haslina* ***WAN ABDUL HALIM,*** *Kon Ken* ***WONG,*** *Syarifah Azura* ***WONG***

Purpose: To compare the results of culture swabs employing conventional culture plates (CCP) and BD BACTEC Peds Plus (BACTEC) broth in the detection of bacteria isolation on non-contact ophthalmology viewing condensing lenses. To relate the results of culture to the hand hygiene practices of the participants.

Methods: This comparative cross-sectional study involved collection of swabs from

primary lenses used by ophthalmology trainees from a postgraduate training center. Swabs were inoculated onto both CCP and BACTEC. Participants were required to fill in questionnaires adapted from World Health Organization (WHO) Hand Hygiene Knowledge and Perception Questionnaire (WHO-HHKP-Q), and their hand hygiene compliance was observed by trained nurses from the Infective Control Unit of the hospital. Positive culture yields from both methods was measured.

Results: All samples (100%) had positive yields by at least one isolation method. BACTEC had higher yield compared to CCP with 47 (90.38%) isolates compared to 37 (71.15%), (p=0.041). CoNS sp (38.9%) was the most common isolate from both methods, followed by Bacillus sp (25.3%). Three fungal isolates were also detected from CCP (3.2%) but none from BACTEC. There were no significant correlations between hand hygiene practices with positive yields from either BACTEC or CCP.

Conclusions: BACTEC has significantly higher bacterial yields than CCP when cultured from non-contact ophthalmology viewing lenses. High positive culture rates of 100% are alarming and reflect the potential risk of pathogen carriage on these objects, which can be passed to patients. Good knowledge and perception of hand hygiene do not necessarily translate to good hand hygiene practices.

Central Retinal Artery Occlusion: A Sign of Orbital Mucormycosis

*First Author: Anuj **SONI***

Purpose: We describe a series of 3 cases presenting with central retinal artery occlusion (CRAO). All the patients had signs of orbital cellulitis and later were diagnosed with orbital mucormycosis.

Methods: This is a retrospective series of 3 cases.

Results: CRAO can be a presenting feature of orbital mucormycosis.

Conclusions: CRAO in a patient with history of COVID infection or other immunocompromised state must alert the physician to look for signs of mucormycosis.

Corneal Bee Sting with Retained Bee Stinger

*First Author: Tsu Hong **LIM***
*Co-Author(s): On Heong **LIEW***

Purpose: To report a rare case of corneal bee sting with retained bee stinger.

Methods: Case report.

Results: A 21-year-old female working in a palm oil estate presented with excruciating pain in the right eye, conjunctival redness and blurring of vision after being stung by a bee. Her visual acuity was 1/120 and 6/7.5 in the right and left respectively upon presentation. On examination of the right eye, there was generalized conjunctival chemosis with visible bee stinger at 11 o'clock over the pupillary margin with generalized corneal edema and striae. Right eye anterior chamber cells were unable to be appreciated due to corneal edema. Intraocular pressure was 16 mm Hg and 14 mm Hg in the right and left eye respectively. B-scan showed normal right eye posterior segment. Patient was admitted, bee stinger was removed under local anesthesia and intense topical moxifloxacin and topical cycloplegia were started. Topical dexamethasone was only started the following day. She subsequently developed corneal ulcer over the trauma site which was then treated with additional topical antibiotics. Her final visual acuity recovered to 6/15 in the right eye with well defined corneal scar formation.

Conclusions: The management of corneal bee sting should be focused on controlling inflammation to prevent toxic or immunologic reactions to chemical mediators of the injected venom. There is no clear guideline on timing of initiation of topical steroid. However, management should be tailored individually to achieve the best outcome.

Dacryoadenitis with Multiple Ocular Abscesses in Disseminated Ocular Melioidosis: A Rare Presentation

First Author: Sylves ***PATRICK***
Co-Author(s): Caroline ***BINSON,*** *Hanida* ***HANAFI,*** *Ru Bin* ***SEAH***

Purpose: Melioidosis is caused by a gram-negative bacterium called Burkholderia pseudomallei. Here we describe our experience of managing a case of disseminated melioidosis with ocular melioidosis, with a rare manifestation of dacryoadenitis with left preseptal abscess and orbital cellulitis with abscess.

Methods: The case reported was that of a 50-year-old man, who presented with three weeks of left upper eyelid swelling associated with left eye pain, redness and reduced vision. He also had lethargy, fever and left knee pain and swelling. His Glasgow Coma Scale (GCS) was 15/15. The left eye visual acuity (VA) was 6/24 (unaided) and intraocular pressure (IOP) was 55 mm Hg. There was generalized erythematous upper eyelid swelling that was non-fluctuant and tender. The eyelid was fully ptotic. There was hypoglobus with limited extraocular muscle movement (EOM) in all gazes. The conjunctiva was inflamed and chemosed. Systemic examination showed redness and swelling in the left scalp and knee joint.

Results: Contrast-enhanced computed tomography (CECT) of the brain, orbit and paranasal sinuses showed multiple sites of abscesses at the left preseptum, orbit, frontal lobe, scalp and infratemporal region, with left lacrimal gland enlargement. Blood and pus cultures grew Burkholderia pseudomallei. He recovered well with good vision and cosmetic outcomes after undergoing a surgical incision and drainage and a course of long-term antibiotics.

Conclusions: Ocular melioidosis with multiple abscesses and dacryoadenitis is rare. Ophthalmologists need to be aware of the different ocular melioidosis manifestations so that the appropriate treatment can be commenced without undue delay.

Durian Crash Landing on You: Traumatic Vision Loss

First Author: Ainal Adlin ***NAFFI***
Co-Author(s): Jemaima ***CHE HAMZAH,*** *Jing* ***LEE,*** *Lim* ***SEE THENG***

Purpose: To report a penetrating ocular injury to bilateral eyes.

Methods: A case report.

Results: A 62-year-old woman presented with bilateral open-globe injury after a durian fell on her face during durian picking in her orchard. On presentation, bilateral vision was light perception. The right eye sustained a curvilinear corneal laceration with expulsed intraocular content due to suprachoroidal hemorrhage. Meanwhile, the left eye sustained sclerocorneal laceration with expulsed uvea and retina. On top of that, the right upper lid was lacerated involving the lid margin. As this was an injury caused by organic material, emergency primary toilet and suturing was done to bilateral eyes. Intramuscular injection of anti-tetanus toxoid and intravenous ciprofloxacin was started pre-operatively and intra-operative intravitreal ceftazidime and vancomycin were given as endophthalmitis prophylaxis. Post-operatively, the vision remained as light perception. There was no sign of endophthalmitis.

Conclusions: Traumatic globe injury due to durian is uncommon, but people would be prudent to put on protective gear while in a durian orchard to avoid such unprecedented accident. Prompt yet scrupulous action should be taken to save the globe and further possible complications.

Evolution of Lightning Maculopathy

First Author: Simanta ***KHADKA***
Co-Author(s): Raghunandan ***BYANJU,*** *Suchan* ***POON,*** *Sangita* ***PRADHAN,*** *Rinkal* ***SUWAL***

Purpose: To report two cases of lightning maculopathy and report the outcomes at final follow-up visits.

Methods: Detailed history of the event, anterior segment evaluation and dilated fundus evaluation done in these cases and followed up. Optical coherence tomography, a non-invasive technology was used in the evaluation of lighting induced maculopathy as well as its evolution through the course of time.

Results: Anatomical involvement was seen at different levels with presentation as uveitis, pupillary abnormality, maculopathy, and later development of lenticular opacification. The first patient had resolution of maculopathy with near normal restoration of foveal anatomy, however, decreased visual acuity was present due to retinal atrophy at the end of two years. The other patient was lost to follow-up at five months with presence of intraretinal foveal cyst.

Conclusions: The unpredictability of the flow of electric current through a human body results in different modalities of presentations of ocular injury. Though observation alone may suffice, visual prognosis in lightning induced maculopathy depends upon the degree of involvement of ocular structures. The presence of irreversible retinal damage in terms of retinal atrophy as well as optic nerve damage are the major determinant factors for poor visual outcome in the absence of significant anterior segment pathology.

Fulminant Microbial Keratitis in a Patient with Acquired Immunodeficiency Syndrome

*First Author: Noranida **ABD MANAN***
*Co-Author(s): Azlan **MUSA,** Mimiwati **ZAHARI***

Purpose: To report a case of unusually fulminant microbial keratitis in a patient with acquired immunodeficiency syndrome (AIDS).

Methods: Case report.

Results: A 53-year-old-man with underlying AIDS and severe thrombocytopenia presented with a corneal ulcer in his right eye following a foreign body that had entered his eye 3 days prior. On presentation, a 3.6 mm x 3.4 mm paracentral corneal infiltrate was present. The culture from corneal scraping was positive for Pseudomonas aeruginosa. He was treated with an intensive course of topical ceftazidime and fortified gentamicin with anti-fungal coverage. However, despite prompt and aggressive treatment, the corneal ulcer rapidly worsened with a large corneal perforation within only eight days of his treatment course. The visual acuity deteriorated from 6/36 to perception of light. Emergency evisceration was performed eventually to prevent further spreading although the platelet count was sub-optimal leading to excessive bleeding intra-operatively.

Conclusions: This case demonstrated a truly fulminating progression of pseudomonas keratitis suggesting possible relation of the anterior segment immunity to AIDS. Microbial keratitis in patients with AIDS should be treated aggressively in a multidisciplinary approach.

Gunderson Flap as an Alternative Reconstructive Option for Penetrating Corneal Injury in District Setting

*First Author: Mohd Hikmi **RAZALI***
*Co-Author(s): Nurhayati **ABDUL KADIR***

Purpose: To report a case of modified Gunderson flap as an alternative option for penetrating corneal injury in a district setting.

Methods: Case report.

Results: A 32-year-old man presented with right eye traumatic injury by oil palm tree branch. Slit lamp examination revealed paracentral corneal laceration wound with iris prolapsed. Primary corneal toilet and suturing (T&S) with iris repositioning was attempted but there was persistent wound leakage due to tissue loss. Hence, modified Gundersen flap was performed. Post operatively, BCVA for his right eye showed astounding improvement of 6/6 with no astigmatism.

Conclusions: Gunderson flap can be a good alternative for penetrating corneal injury in a facility with limited resources such as a district setting.

I am a Cat Person: Multifaceted Cat Scratch Disease

*First Author: Hong Nien **LEE***
*Co-Author(s): Juliana **JALALUDDIN***

Purpose: To highlight the multitudes of cat scratch disease presentation.

Methods: Case report.

Results: Case 1: A 22-year-old woman presented with left eye painless progressive worsening of vision over one month. She lives with multiple cats. Her left eye vision was hand movement and she had vitritis with neuroretinitis. Her blood investigation, connective tissue screening and infective screening such as toxoplasma serology, syphilis, mantoux tests were negative. She received a course of oral antibiotics and tapering regime of corticosteroids. On her subsequent visits, her condition improved. Case 2: A 27-year-old woman presented with discomfort and epiphora on her left eye and swollen left ear region for one week, which was preceded by conjunctivitis. She lives with five cats. Her left unaided vision was 6/9. She had left granulomatous follicular conjunctivitis with ipsilateral regional lymphadenopathy. Her blood investigation was normal. Infective screening such as toxoplasma, syphilis, leptospira serology and Mantoux tests were all negative. She received a course of systemic antibiotics. On her subsequent visits, her condition improved.

Conclusions: Ocular bartonellosis, or cat scratch disease, is caused by a gram negative hemotrophic bacillus, Bartonella Henselae. It presents as Parinaud oculoglandular syndrome or neuroretinitis. Transmission of Bartonella species is via trauma from a cat scratch or cat bite, or via transmission from the infected flea feces. In some districts, the available serologic tests are limited. High suspicion of the disease especially in those with exposure to cats, ocular examination findings and negative serologic tests of other common causative agents such as tuberculosis, syphilis, and toxoplasmosis are recommended.

Incidental Rare Intraocular Foreign Body Discovered after Penetrating Injury 30 Years Ago

*First Author: Shamus **BUTT***
*Co-Author(s): Mohamed **EL**-ASHRY*

Purpose: To report an unusual case of intraocular eyelash associated with penetrating eye trauma over 30 years ago.

Methods: Retrospective case report.

Results: A 60-year-old man presented with reduced visual acuity in the right eye (RE). Previous ophthalmic history included a penetrating injury by a metallic nail 30 years prior. Early nuclear sclerosis was detected in the RE, whilst fundoscopy cited no abnormalities in both eyes. Two years later, the preoperative assessment revealed a suspected intraocular foreign body, with no sensitivity to imaging. The patient underwent RE phacoemulsification with IOL, pars plana vitrectomy, foreign body removal and retinopexy. During vitrectomy, the cilium was identified and removed from within the vitreous body. Visual acuity improved and there were no post-operative complications.

Conclusions: There remains a paucity of data on the presence and impact of intravitreal cilia on orbital physiology. We present a fascinating case of an intraocular eyelash, suggesting that intraocular eyelashes can survive within the globe for decades without an associated inflammatory response. Further studies should ascertain the most sensitive imaging modalities for minute intraocular foreign bodies.

Intravenous Drug Use–Related Endophthalmitis in Taiwan

*First Author: Kuan-jen **CHEN***

Purpose: To investigate the demographic characteristics, microbial profiles, management, and visual outcomes associated with intravenous drug use (IVDU)-related endophthalmitis in Taiwan.

Methods: Medical records were reviewed from between January 1, 2009, to April 30, 2019. Participants were all patients with endogenous

endophthalmitis (EE) referred to a tertiary care ophthalmology practice distributed throughout Northern Taiwan. Patients with a history of IVDU, culture-proven results, and clinical evidence of EE were included.

Results: Eight patients (6 men) with IVDU-related EE were identified. Mean patient age was 36 ± 5 years (range, 36-55 years). Presented visual acuity ranged from counting fingers to no light perception. The most common pathogens were Klebsiella pneumoniae (n = 4, 50%), followed by Candida albicans (n = 3, 38%). Bilateral involvement was identified in 25% (total 2 eyes) of patients. Initial treatment included tap and injection as well as systemic antibiotics in all patients. Five eyes (each belonging to a different patient) underwent pars plana vitrectomy. Final visual acuity ranged from 20/32 to no light perception.

Conclusions: IVDU-related endophthalmitis was identified to be EE. K. pneumoniae and C. albicans are common pathogens of EE in Taiwan.

Ophthalmic Findings in Rhinoorbital Mucormycosis following SARS-CoV-2 Infection

*First Author: Rajwinder **KAUR***
*Co-Author(s): Balbir **KHAN***

Purpose: To report the cases of rhinoorbital mucormycosis following SARS-CoV-2 infection who presented or referred from the ear-nose-throat (ENT) department.

Methods: This is an institutional, retrospective, interventional study of all patients coming to the department of ophthalmology and referred from ENT department. They underwent all the examination which includes visual acuity, color vision, pupillary reaction, ocular movements, corneal sensation and fundus examination.

Results: Laboratory examination revealed mucor. Ophthalmic findings include total ophthalmoplegia, relative afferent pupillary defect. Central artery occlusion in all cases presented with no perception of light. Optical coherence tomography revealed some rare presentation of CRAO.

Conclusions: Rhinoorbital mucor mycosis has presented in this region as a severe vision threatening ophthalmic complication in post-COVID patients.

Optic Nerve Head Avulsion following Blunt Trauma: A Rare Presentation

*First Author: Shyam Sundar **DAS MOHAPATRA***

Purpose: To describe a case of optic nerve head avulsion following blunt trauma in a young male.

Methods: A 8-year-old male presented to the hospital after sustaining injury with a bamboo stick to his right eye. The patient had no perception of light (PL) in his right eye (OD) and visual acuity was 20/20 in left eye (OS). Grade 4 right afferent pupillary defect, normal intraocular pressure (IOP), periorbital ecchymosis, upper eyelid laceration, conjunctival laceration with subconjunctival hemorrhage and mild post-traumatic iritis were noted. Dilated funduscopy revealed avulsion of the right optic nerve head (ONH) with vitreous hemorrhage (VH) overlying the ONH and inferior quadrant and edematous retinal tissue. Ultrasound (USG) B scan and visual evoked potential (VEP) were performed, which confirmed avulsion of right ONH. The eyelid and conjunctival lacerations were sutured under general anesthesia.

Results: Two weeks later, there was still no PL in the patient's right eye.

Conclusions: ONH avulsion is a rare complication of blunt ocular trauma. Possible mechanism could be explosive rise in IOP causes blowing the ONH off the sclera into its dural sheath causing visual loss. ONH avulsion should be suspected in all cases with sudden severe visual loss and dense vitreous hemorrhage following blunt trauma. In spite of poor visual prognosis and absence of specific treatment, ONH avulsion poses with significant diagnostic challenge in the presence of VH. In such scenario, USG is a helpful tool in the diagnosis of ONH avulsion and a reasonably better alternative to expensive and less readily available neuroimaging studies.

Restoring Vision in the Only Seeing Eye Post Trauma

First Author: Ayushi ***SINHA***

Purpose: To share the surgical outcome of a case involving a one eyed patient with impacted juxtapapillary metallic intraocular foreign body (IOFB).

Methods: A 44-year-old male suffered trauma to his left eye while working at a stone quarry. His left eye vision was light perception with projection. And right eye vision was hand movements due to a similar trauma at his workplace 12 years back. IOFB was noted on B scan and CT orbit. Patient was taken up for wound exploration with lens extraction, pars plana vitrectomy and IOFB removal. Due to dense vitreous hemorrhage, air-interface vitrectomy was done for most of the surgery. IOFB was seen impacted nasal to the disc. Unable to retrieve the IOFB, silicone oil was filled in the eye and IOFB was removed via orbital approach as a second surgery. 1 month post-surgery, fibrosis and pucker at the impact site was seen dragging the macula and this caused a tractional retinal detachment at the posterior pole. Membrane peeling and ILM peeling with oil exchange were done to relieve the traction. The final surgery for the patient was oil removal with scleral fixation of intra-ocular lens (SFIOL).

Results: Patient's visual acuity remarkably improved to 20/60 after the final surgery. Retina was well attached throughout with stable SFIOL.

Conclusions: This case demonstrates how proper pre-operative planning, CT localization of IOFB, coupled with meticulous surgical efforts and thorough counseling of the patient and family can sometimes give exceptional results even in the most difficult cases.

Serology-Negative Toxoplasma Granuloma: Are They Really Rare Today?

First Author: Saurabh ***HARAL***
Co-Author(s): Dr V.S. ***GUPTA,*** *Dr Monika* ***KAPUR***

Purpose: To highlight the role of clinical suspicion in a case of serology-negative Toxoplasma granuloma.

Methods: A 25-year-old male presented with gradually progressive painless diminution of vision in the right eye. BCVA was 6/60 Snellen. Indirect ophthalmology showed an elevated lesion, about 2DD diameter, along the inferotemporal arcade, inferotemporal to macula with some evidence of perivasculitis along the arcade and overlying vitritis as well resultant macular edema. Macular OCT showed a retinochoroidal lesion suggestive of a unilateral posterior pole granuloma. Serum IgM and IgG Toxoplasma came back negative. Mantoux test was 30 x 30mm, ESR was 32mm at 1 hr but chest X-ray and HRCT chest were unremarkable. Serum BACTEC results returned negative. Also, serum ACE and calcium levels were within normal limits. Patient did not consent for vitreous tap for serological investigations. Hence on the basis of strong clinical suspicion, a diagnosis of Toxoplasma posterior pole granuloma was made. Patient was given combination of cotrimoxazole-pyrimethamine and supplemented with a posterior subtenon injection of triamcinolone after a week.

Results: Patient was monitored for improvement in visual acuity and resolution of retinochoroidal thickening. Macular OCT showed dramatic improvement in retinochoroidal thickening at each weekly follow-up. Treatment was continued for 10 weeks and there has been no recurrence after 6 months follow-up.

Conclusions: A high index of clinical suspicion is required to arrive at a diagnosis of Toxoplasma in cases of unilateral painless progressive diminution of vision, with a clinically evident retinal elevated lesion, showing a granuloma on imaging modalities, especially in serology-negative cases.

Subperiosteal Abscess as Rare Ocular Manifestation of Meliodosis

*First Author: Sue Anne **LOH***
*Co-Author(s): Norlelawati **BINTI ABU,** Adil **HUSSEIN,** Tan Pek **HWI***

Purpose: To report a rare case of meliodosis related ocular manifestation that presented with subperiosteal abscess.

Methods: Case report.

Results: A 68-year-old man with newly diagnosed diabetes mellitus presented with left eye (LE) proptosis for 1 week. His past surgical history includes a craniectomy for inverted papilloma with extension to frontal sinus complicated with intracranial bleed and a subsequent fistula debridement for frontal fistula with cerebrospinal fluid leak. His initial ocular examination of bilateral extraocular muscles (EOM), anterior segment and fundus were normal except for the presence of LE proptosis with mild lid swelling and mild cataractous changes. Visual acuity (VA) of right eye (RE) was 6/12 pinhole 6/9 whereas LE 6/18 pinhole same. Soon after, his LE vision diminished to hand movement with positive relative afferent pupillary defect, frozen eye and partial LE ptosis with no sign of infection or inflammation in the anterior and posterior segment of his LE. Computed tomography showed LE subperiosteal abscess and nasal swab culture grew Burkholderia pseudomallei. He was then comanaged with multidisciplinary teams and was treated with high dose of intravenous ceftazidime and sulfamethoxazole/trimethoprim along with incision and drainage of the abscess. He responded well over the long course of antibiotics as his proptosis reduced along with gradual improvement of his EOM and his best corrected VA is reverted to 6/9.

Conclusions: Ocular melioidosis can be a highly destructive disease that may potentiate blindness. Therefore, high clinical suspicion with early antibiotics treatment and surgical drainage of abscess were warranted to ensure an efficacious outcome.

To Save the Life or Save the Eye

*First Author: Gowtham **KIM***
*Co-Author(s): Sanjana **CHILUKURI,** Anniksha M **N,** Joshmitha M **S,** Stephen **SUDHAKAR***

Purpose: To report a unique presentation of unilateral sudden loss of vision following rhino-cerebro-orbital mucormycosis during the COVID-19 pandemic.

Methods: A 53-year-old male presented with complaints of swelling and pain over the left side of face, loss of vision and drooping of eyelid in left eye and deviation of angle of mouth for 1 week. Past history revealed that the patient had tested positive for COVID-19 15 days back and is a known case of diabetes mellitus. Ocular examination revealed complete ptosis, restricted ocular movements and loss of perception of light and central retinal artery occlusion in LE. Diagnostic nasal endoscopy revealed features of rhinosinusitis with pus crest in middle meatus. MRI orbit and paranasal sinuses was suggested.

Results: MRI was suggestive of angioinvasive fungal sinusitis likely to be mucormycosis with intracranial and intraorbital extension. Patient underwent LE exenteration with frontal craniotomy and abscess drainage after endoscopic nasal debridement. Histopathology was suggestive of mucormycosis characterized by fungal organisms with aseptate hyphae.

Conclusions: We present this case because it›s an interesting case of mucormycosis post COVID presenting as CRAO. The case was managed promptly to save the patient›s life.

Traumatic Endophthalmitis due to Intraocular Cilia following Penetrating Injury: Role of B-Scan Ultrasound in Diagnosis

*First Author: Harsh **SINGH***
*Co-Author(s): Annaji **KOTA,** Manavi **SINDAL,** S **SIVARANJANI***

Purpose: To present a rare case of traumatic endophthalmitis following penetrating injury due to invasion of cilia into posterior vitreous cavity.

Methods: To describe the clinical characteristics, B-scan ultrasonography (USG) features and management of retained cilia in posterior vitreous with associated endophthalmitis.

Results: A 44-year-old man presented with left eye penetrating trauma following 'in and out' iron-wire injury. He had undergone primary corneal tear repair with lens extraction 2 days prior. Visual acuity at presentation was 20/200 with anterior segment reaction and no view of fundus. USG revealed multiple low-moderate reflective dot and membranous echoes in vitreous, along with multiple high reflective curvilinear echoes having minimal reverberation and no back shadowing. Computed tomography failed to reveal any intraocular foreign body. Patient underwent pars plana vitrectomy during which multiple cilia were retrieved from the vitreous cavity. On careful examination postoperatively, it was noted that multiple cilia were broken among posterior rows of upper eyelid lashes. While the acute infection resolved, he experienced multiple episodes of recurrent low grade inflammation that resolved with topical steroids and cycloplegics. Following a period of quiescence, he underwent sutureless scleral fixation of intraocular lens after 2 months. He is maintaining a visual acuity of 20/30, with a quiet eye.

Conclusions: The diagnosis of intraocular cilia can be challenging, but B-scan ultrasonography is the imaging modality of choice. Though these eyes are prone to recurrent inflammation, the final visual prognosis can be good with judicious management.

General Ophthalmology

A Case of Acquired Focal Choroidal Excavation Associated with Ocular Trauma in Early Childhood

First Author: Motohisa ***OHNO***
Co-Author(s): Tae ***IGARASHI,*** *Koju* ***KAMOI,*** *Kyoko* ***OHNO****-MATSUI*

Purpose: Acquired focal choroidal excavation (FCE) is caused by several ocular diseases, including ocular inflammation, pathologic myopia, pachychoroid spectrum or hereditary retinal diseases. The mechanisms vary depending on the causative pathogenesis. In this study, we report on the process of FCE formation in an abused child with traumatic macular degeneration.

Methods: An Asian 12-year-old boy with history of child abuse presented to our clinic due to the deterioration of traumatic macular degeneration in his left eye. We underwent ocular multimodal imaging, electroretinogram, and systemic work-up for diagnosis.

Results: The best corrected visual acuity and intraocular pressure of his left eye were 20/200 and 10.6 mm Hg, respectively. On the left fundus photography, a well-defined macular degeneration was observed and relatively large FCE was detected on the SS-OCT. The previous consecutive SS-OCT images taken at the referral hospital showed sudden FCE formation triggered by the Bruch›s membrane rupture, under the condition where the inner nuclear layer was in direct contact with Bruch›s membrane due to the loss of outer nuclear layer and retinal pigment epithelium (RPE). Fundus photos at his age of 12 months showed bilateral multiple multi-layered retinal hemorrhages in the entire retina and vitreous hemorrhages, which were consistent with the ocular findings of shaken baby syndrome. Anti-toxoplasma antibody was negative by serum test and there was no evidence of dark choroid by fluorescein angiography.

Conclusions: Macular degeneration associated with ocular trauma in early childhood may lead to acquired FCE by Bruch›s membrane rupture

subsequent to the loss of outer retinal layer and RPE.

A Tale of Disc

*First Author: Shams **NOMAN***

Purpose: To document and describe different patterns of atypical discs and to identify their other ocular and systemic associations.

Methods: Patient particulars, history and complaints were recorded. Ophthalmic examinations were done including visual acuity, refraction, slit-lamp examination, pupillary reaction, tonometry, gonioscopy and funduscopy. The relevant investigations were done and documented. Similar relevant details were recorded on each follow-up.

Results: 30 patients were included in this case series. 13 patients were female, 12 were male. 5 patients were diagnosed as myelinated optic nerve head in both eyes; 5 patients had bilateral titled discs without refractive error; 4 patients had unilateral optic disc pit; 4 patients had bilateral optic disc drusen; 3 patients had bilateral disc coloboma; 2 patients had morning glory disc; 1 patient had optic nerve hypoplasia; 5 patients had macrodisc; and 1 patient was diagnosed with post-traumatic optic nerve head avulsion.

Conclusions: Proper ophthalmic examination and investigations are essential for the diagnosis of atypical disc and congenital anomalies of the optic disc. Documentation not only helps clinicians in their clinical practice but also helps in teaching, patient counseling and planning for rehabilitation.

Causes of Papilledema in the Pediatric Age Group: A 10-Year Hospital Based Study in Northeastern India

*First Author: Hiranmoyee **DAS***

Purpose: To study the various causes of papilledema in the pediatric age group.

Methods: 160 cases of papilledema from January 2011 to December 2020 were studied prospectively. Detailed history, C/F, neuroimaging mostly CT scan were done and followed up to 3 months.

Results: Cases were divided into 3 age groups: (0-3) yrs, (4-12) yrs and (13-18) yrs. 42.86% of cases were infection, 33.57% space occupying lesion (SOL), 10.71% otogenic intracranial complication, 8.57% pseudotumor cerebri and 4.29% hypertension. Among the infective group, there were 25.72% tuberculosis, 10.71% viral, 5.00% bacterial and 1.43% of fungal etiology. Among SOL there were 10.715% tumors, 10.715% tuberculoma, 5.71% intracranial hematoma, 3.57% brain abscess and 2.86% neurocysticercosis. Earliest regression was at the end of 1 month and maximum in infective group.

Conclusions: Important findings were 1.tuberculosis (meningitis and tuberculoma) due to urban overcrowding and rural poverty; 2. middle ear infection due to the higher altitude location of the region; 3. neurocysticercosis due to the habit of eating smoked pork. This geographic area is located 5000 feet above the sea level. Knowledge of common causes of papilledema will guide us in early diagnosis and management of cases with headache in this tribal dominated, underdeveloped area.

Choroidal Coloboma with Internal Limiting Membrane Folds: A Rare Association

*First Author: Rajwinder **KAUR***
*Co-Author(s): Balbir **KHAN***

Purpose: To report the uncommon association of internal limiting folds in retinochoroidal coloboma.

Methods: This is an institutional, retrospective study. Patient underwent all the examinations which includes visual acuity, color vision, pupillary reaction, ocular movements, corneal sensation and fundus examination. He underwent multimodal imaging.

Results: Posterior segment revealed retino-choroidal coloboma inferiorly with radiating internal limiting (ILM) folds inferiorly from the coloboma as shown in fundus picture. Autofluorescence revealed central hyperfluorescence and

peripheral hypofluorescence which is more hypofluorescent in the periphery as compared to the disc. Spectral domain optical coherence topography revealed ILM folds in macular cube scan along with typical colobomatous area.

Conclusions: The proposed mechanism could be traumatic focal or diffuse alteration at inner retinal layers as due to colobomatous area.

Clinical Characteristics and Outcomes of Pediatric Cataract in a Tertiary Center in Malaysia: A 10-Year Review

*First Author: Mohd Yazid **AIMAN MARDHIYYAH***
*Co-Author(s): Shatriah **ISMAIL,** Abd Bari **MUHD-SYAFI***

Purpose: Limited data is available from Asian countries regarding pediatric cataract. We aim to describe demographic data, clinical characteristics, clinical presentation and outcomes of pediatric cataract in a tertiary care center in Malaysia.

Methods: A retrospective study was performed on children diagnosed with pediatric cataract aged 17 years and below who underwent cataract surgery in between 2008 to 2018.

Results: A total of 35 pediatric patients fulfilling the diagnostic criteria for pediatric cataract were included in the study. The mean age was 11.82±5.22 years. Boys (82.86%) were more commonly affected than girls (17.14%). Most patients had unilateral eye involvement (62.86%). Congenital cataract was more common (54.28%) than acquired cataract (45.72%). Eight patients had ocular abnormalities (42.08%) and 12 patients had systemic association (63.12%). Majority of patients presented with reduced vision (60.00%). 26 eyes (54.08%) had vision worse than 6/60. Posterior capsular opacity was the most common cause of poor visual acuity at one-year post-operative (38.47%).

Conclusions: Young boys are more commonly diagnosed with pediatric cataract than young girls. Congenital cataract is more common than acquired cataract. Systemic association commonly seen in children with congenital cataract. A majority of the children has improved best corrected visual acuity post-surgical treatment.

Comparison of Intraocular Pressure Peak and Fluctuations among Filipino Patients with Normal Eyes and Glaucoma Suspects using Water Drinking Test and Diurnal Intraocular Pressure

*First Author: Anelisa **KOH***

Purpose: To compare the intraocular pressure (IOP) peaks and fluctuations using water drinking tests (WDT) and mean diurnal IOP among Filipino patients with normal eyes and glaucoma suspects.

Methods: This prospective study included normal and glaucoma suspect patients. Each patient underwent both WDT and mean diurnal examination on separate visits. For mean diurnal examination, IOP was recorded every 2 hours for 8 hours while in WDT, IOP was recorded prior to WDT, and post WDT at 5, 15, 30, 45, and 60 minutes. IOP peak was recorded as the highest IOP for both methods, and IOP fluctuation was recorded as highest IOP minus lowest IOP.

Results: With the comparison of diagnostic tests, in both normal eyes and glaucoma suspect groups, the peak IOP was caught at 15 minutes. Comparative analysis of both groups also showed that the peak IOP measurements were statistically higher for the WDT compared to mean diurnal IOP. Similarly, the WDT had a statistically higher mean IOP fluctuation score than the mean diurnal IOP method in both groups.

Conclusions: This study shows that WDT is a comparable diagnostic exam in predicting IOP fluctuations versus mean diurnal measurement. WDT is a promising diagnostic procedure for risk assessment in glaucoma.

Efficacy and Safety of Intravitreal Pegcetacoplan in Geographic Atrophy: Results from the Phase 3 DERBY and OAKS Trials

First Author: Jennifer ***ARNOLD***
Co-Author(s): Caleb ***BLISS,*** *Jeffrey* ***HEIER,*** *Ramiro* ***RIBEIRO,*** *Charles* ***WYKOFF***

Purpose: Currently, no approved therapies exist to slow the progression of geographic atrophy (GA). Intravitreal pegcetacoplan, a pegylated complement C3 inhibitor peptide, demonstrated significant reductions in the growth of GA lesions compared with sham treatment in a phase 2 trial. DERBY and OAKS are two 24-month, phase 3, randomized, double-masked, sham-controlled clinical trials comparing the efficacy and safety of monthly or every-other-month intravitreal pegcetacoplan to sham in patients with GA secondary to age-related macular degeneration.

Methods: Enrolled patients are ≥60 years old, have best-corrected visual acuity ≥24 letters, and GA area between 2.5 and 17.5 mm2 or one focal lesion ≥1.25 mm2 if multifocal GA at baseline. The primary endpoint for both studies is change in GA lesion size via fundus autofluorescence from baseline to month 12; secondary endpoints include change from baseline in visual function. Safety measures include incidences of ocular and systemic adverse events.

Results: DERBY and OAKS enrolled N=621 and N=638 patients, respectively. Baseline characteristics were well-matched across the groups. Enrolment was completed in June 2020 (DERBY) and July 2020 (OAKS). Twelve-month efficacy and safety data will be presented.

Conclusions: Pegcetacoplan is the only targeted C3 inhibitor being evaluated in phase 3 trials to control lesion growth in GA.

Endoscopic Orbital Decompression via Transcaruncular Approach for Compressive Optic Neuropathy

First Author: Alexander Gerard Nino ***GUNGAB***

Purpose: To demonstrate the advantages and surgical outcomes of endoscopic orbital decompression via transcaruncular approach for compressive optic neuropathy.

Methods: This is a 61-year-old male, known hyperthyroid, who underwent endoscopic bony decompression of the right orbital apex via transcaruncular approach with removal of the posteromedial ethmoid and posteromedial inferior orbital walls. Patient presented with a 1-month history of progressive blurring of vision, right with moderate proptosis. On orbital CT scan, noted enlargement of the medial and inferior recti muscles. Visual field analysis pre-operatively revealed generalized depression of the right eye. Main outcome measures were improvement in visual acuity and visual field, reduction of proptosis and no post-operative diplopia.

Results: Pre-operative visual acuity of the right eye was 20/400 improved to 20/40 with improvement in Ishihara color vision test score 29 days post-operatively. Visual field analysis showed marked improvement of generalized visual field defect. The proptosis of the right eye had decreased from 19mm to 16mm. No post-operative diplopia noted. Orbital CT scan post operatively revealed no inferomedial shift of orbital structures. There was prolapse of fat into the posteromedial inferior and posteromedial (ethmoid) wall of the orbit, right.

Conclusions: Endoscopic decompression via transcaruncular approach was successful in treatment of compressive optic neuropathy secondary to thyroid-related orbitopathy. It leaves no external scar or disruption of the medial canthus. Decompression of the orbital apex including the ethmoid posteromedial wall and posteromedial inferior orbital wall spares the anteromedial and anteroinferior orbital wall that are typically removed in a standard inferomedial decompression.

Hemichiasmal Scotoma in Pituitary Macroadenoma

*First Author: Ker Dee **LIM***
*Co-Author(s): Juliana **JALALUDDIN,** Hong Nien **LEE***

Purpose: To report the uncommon visual field presentation of pituitary macroadenoma.

Methods: Case report.

Results: Two patients aged 12 and 33 presented with complaints of bilateral progressive painless blurring of vision. Otherwise, there was no other ocular nor systemic complaints. Visual acuity showed unilateral blindness. One of the optic disc was pale and normal in the fellow eye. Humphrey visual field revealed a temporal hemianopia in the better eye. The contrast enhanced computerized tomography of brain and orbit showed a large sellar/suprasellar mass compressed on the optic chiasma.

Conclusions: Hemichiasmal scotoma presentation is possible in chiasmal syndrome. Pituitary adenoma is the most common of chiasma syndrome tumor, followed by meningiomas, craniopharyngiomas and aneurysms that cause extrinsic compression of optic chiasma. The extent of visual field loss is associated with the tumor's volume and its direction of displacement.

Observational Study of Ocular Manifestations of Rheumatoid Arthritis in a Tertiary Care Hospital in East India

*First Author: Udbuddha **DUTTA***

Purpose: 1. To evaluate the magnitude of ocular manifestations in patients suffering from rheumatoid arthritis; 2.To establish a statistical significance of duration of disease to age of patients; 3. To establish a statistical significance of duration of disease to frequency of ocular manifestations.

Methods: Study design: Cross sectional observational study. Sample size: 144. Duration of study: 18 months. Case control was not required in this study. Investigations: Slit lamp biomicroscopy with 90 D Volk lens was done for anterior and posterior segment examination. Gonioscopy, applanation tonometry, automated perimetry and indirect ophthalmoscopy were done. Dry eye evaluation was done. Statistical analysis: SPSS version 20 was used with a p value of less than 0.05 taken as significant.

Results: Out of 144 patients, females (118) dominated. Ocular manifestations were seen in 53 (36.8%) patients, bilateral in 35 (66%) patients and multiple in 32 (60.4%) patients. Dry eye was the most common ocular manifestation (30.5%). The duration of disease was statistically significant (p=0.001) with respect to ocular manifestations and also age groups (p=0.000).

Conclusions: Dry eye was the most common ocular manifestation. The duration of disease was statistically significant with respect to ocular manifestations. The duration of disease was statistically significant when co related with age groups.

Orbital Apex Syndrome due to Sinoorbitocerebral Mucormycosis in Post COVID Patient: A Case Report

*First Author: Renu **POUDEL***

Purpose: To highlight the occurrence of mucormycosis in COVID patients and the needs of research to be carried out to determine the cause for the better prevention and management of these cases, especially in developing countries like ours.

Methods: A 65-year-old male with uncontrolled diabetes presented to our emergency department with complaints of left eye ptosis along with headache and facial pain. He had a past history of COVID pneumonia and was treated with oral steroid and oxygen therapy in India. His uncorrected visual acuity was 6/36 in RE and NPL in left eye, with left eye complete ptosis, ophthalmoplegia, RAPD along with complete loss of sensation in left periorbital region. On fundus examination there was CRAO in the left eye along with pale optic disc. On examination of nasal mucosa black eschar was noted. Nasal swab revealed few hyaline septate fungal hyphae. On contrast CT, there was pansinusitis with bony erosion with soft

tissue density in left superior orbital fissure and small hypodense area in right frontal region.

Results: He was started on IV amphotericin B but after the prognosis was explained, unfortunately patient left against medical advice.

Conclusions: Further research is necessary to determine the cause of mucormycosis in COVID patients so that preventative measures can be taken. Prophylactic treatment protocols need to be established, along with rational use of corticosteroids and cleaning of source of oxygen. There should also be a high index of suspicion for COVID patients with ocular problems so that there is no delay in treatment.

Quantitative Evaluations of Posterior Staphylomas in Highly Myopic Eyes by Ultra-Widefield Optical Coherence Tomography

*First Author: Noriko **NAKAO***
*Co-Author(s): Tae **IGARASHI,** Kyoko **OHNO**-MATSUI, Kosei **SHINOHARA,** Hiroyuki **TAKAHASHI***

Purpose: To measure the shape of posterior staphylomas using ultra-widefield optical coherence tomographic (UWF-OCT) images and to identify the factors contributing to the shape and grade of the staphylomas in eyes with pathologic myopia.

Methods: This was an observational case series study. Highly myopic patients who were ≥40 years old with the wide or narrow type of macular staphylomas were studied. High myopia was defined as a myopic refractive error (spherical equivalent) greater than -8.0 diopters (D) or an axial length >26.5 mm. The maximum diameter and depth of the staphylomas were measured in the 12 radial scans of UWF-OCT images by the ImageJ software and were compared between the two types of staphylomas.

Results: We studied 197 eyes of 138 patients with a mean age of 64.7 ± 10.4 years and mean axial length of 30.0 ± 1.9 mm. The axial length was significantly longer in the eyes with narrow type than the wide type (P=0.036). Multiple regression analysis showed that the age had the highest significant correlation with the maximum depth (P=0.002) and the maximum depth/maximum diameter ratio (P<0.001). The axial length was significantly correlated with the maximum diameter (P=0.018), depth (P=0.001), and the depth/diameter ratio of the narrow type (P<0.001).

Conclusions: The significant correlations of the age and axial length with the wide and narrow type of posterior staphylomas indicate that the factors for their formations may be distinctly different. Quantitative analyses using UWF-OCT images should be helpful in determining the shape of staphylomas in an objective way.

Sinonasal Lymphoma Presenting as Cavernous Sinus Syndrome: A Case Report and Review of Literature

*First Author: Noranida **ABD MANAN***
*Co-Author(s): May-may **CHOO,** Irina **EFFENDI**-TENANG, Mimiwati **ZAHARI***

Purpose: To report an aggressive case of sinonasal lymphoma presenting as cavernous sinus syndrome.

Methods: Case report and review of literature.

Results: A 37-year-old man presented with a one-week history of diplopia. He was under investigation by otorhinolaryngology for left sinonasal malignancy. The left eye vision was 6/12 with negative relative afferent pupillary defect. The left pupil was mid-dilated and unresponsive to light. Extraocular movements of the left eye were restricted in all directions of gaze with limited abduction of the right eye. The trans-nasal biopsy revealed extranodal natural killer/T-cell lymphoma. Further imaging showed a large enhancing nasopharyngeal mass with intracranial extension to the cavernous sinuses and local infiltration together with intracranial abscesses. Patient was started on empirical intravenous antibiotics and supportive treatment. While awaiting institution of lymphoma chemotherapy, the patient unfortunately succumbed to the disease.

Conclusions: The involvement of cavernous sinus in sinonasal lymphoma represents an advanced stage. A high index of suspicion in patients presenting with cavernous sinus

syndrome must be emphasized as this can be the first sign of lymphoma.

The Effect of Timolol 0.5% Usage without and with Benzalkonium Chloride on Increasing Ocular Surface Index Score

*First Author: Muhammad **SYAUQIE***
*Co-Author(s): Hendriati **JEFRIANTO***

Purpose: To determine the increase of OSDI score due to the administration of timolol 0.5% without and with BAK (benzalkonium chloride).

Methods: Comparative analytic study of observational design, carried out in the Department of Ophthalmology, Dr. M. Djamil Hospital Padang, from September 2018 to June 2019. Patients were divided into timolol 0.5% group without BAK and with BAK and continued with OSDI questionnaires interview.

Results: A total of 22 patients were obtained (each group involved 11 patients), with more female patients in both groups. The mean age of the 0.5% timolol group without BAK was 37.91 ± 17.93 years, and of the 0.5% timolol group with BAK was 42.09 ± 13.09 years. Statistical test results showed that the increase in OSDI scores was significant in both groups. Although this increase in score was more significant in the 0.5% timolol group with BAK, the value was not statistically significant compared to the 0.5% timolol group without BAK.

Conclusions: The use of timolol 0.5% without and with BAK will cause dry eye symptoms, shown by an increase in OSDI score. The use of timolol 0.5% with BAK will cause more severe symptoms than timolol 0.5% without BAK but not statistically significant compared to with BAK.

Unilateral Oculomotor Nerve Palsy: A Rare Complication of Dengue Fever

*First Author: Sue Anne **LOH***
*Co-Author(s): Wan Mohd Hafidz **BIN WAN ABDUL RAHMAN,** Norlelawati **BINTI ABU,** Adil **HUSSEIN***

Purpose: To report a case of isolated unilateral oculomotor nerve palsy which is a rare cranial mononeuropathy complication of dengue fever.

Methods: Case report.

Results: A 50-year-old hypertensive man with serologically confirmed dengue fever in febrile phase presented with sudden onset of left eyelid drooping and left eye (LE) outward deviation on day 8 of his illness. Ocular examination revealed his right eye (RE) visual acuity was 6/9 whereas LE was 6/36 pinhole same with binocular diplopia at all gazes. Complete LE ptosis and restriction of all LE movements except for abduction were noted with proven deficit on Hess chart. Left eye pupil was 8mm dilated with negative reverse afferent pupillary defect (RAPD). Otherwise, bilateral eye anterior segment, intraocular pressure and fundus were normal. Urgent contrasted brain imaging was conducted and revealed to be normal. He was treated supportively with intravenous fluids and antipyretics whereas his oculomotor nerve palsy was managed expectantly without pharmacotherapy. Patient's oculomotor nerve palsy was sill persistent upon discharge at day 16 of illness but showed progressive signs of improvement during monthly reviews. In due course, he had complete resolution of symptoms with good visual recovery of 6/9 at 3 months post discharge.

Conclusions: Dengue related cranial mononeuropathy may be considered as a differential diagnosis in cases of acquired oculomotor palsy with fever especially in a tropical country with endemic dengue infections. Visual prognosis is still favorable with judicious monitoring and even without pharmacotherapy.

Intraocular Inflammation, Uveitis & Scleritis

A Novel Case Report of Frosted Branch Angiitis in a COVID-19 and Human Immunodeficiency Virus Infected Patient: Coincidence or Causal Association?

*First Author: Yong Zheng **WAI***
*Co-Author(s): Jia Cherng **CHONG,** Tsu Hong **LIM***

Purpose: Frosted branch angiitis (FBA) is an uncommon ocular sign with multiple causes.

Rarely it is related to COVID-19 infection. We hereby report a rare case of frosted branch angiitis found in a COVID-19 patient with underlying human immunodeficiency virus infection.

Methods: A case report of a young man with underlying acquired immunodeficiency syndrome receiving highly active antiretroviral therapy. He was infected by COVID-19 one month prior and presented to the ophthalmology clinic with a blurring of vision for the past two months.

Results: Right eye fundus examination showed extensive perivascular sheathing of both the artery and vein suggestive of FBA. Further investigation revealed nasal swabs for COVID-19 polymerase chain reaction (PCR) and serum cytomegalovirus (CMV) antibody were positive. He was treated with intravenous ganciclovir in a COVID-19 ward.

Conclusions: Whether FBA is related to COVID-19 infection remained unanswered. This case showed that FBA could present in a patient with COVID-19 and HIV co-infection. Further studies are needed to provide more information on whether COVID-19 infection is associated with FBA or this is a mere coincidence.

Acute Retinal Necrosis as a Presenting Ophthalmic Manifestation in COVID-19 Recovered Patients

*First Author: Mudit **TYAGI***

Purpose: Infection by the SARS-CoV2 virus results in an immune dysregulated state which can predispose to reactivation of the herpes viruses. This report describes the development of acute retinal necrosis (ARN) in three patients who had recovered from SARS-CoV2 infection.

Methods: Observational report of three consecutive patients who presented with ARN after having recovered from SARS-CoV-2 infection.

Results: Case 1 was a 5-year-old child with extensive peripheral necrotising retinitis. Case 2 was a 61-year-old man with bilateral retinal detachment with sieve like breaks and optic atrophy. Both patients had recovered from SARS- CoV-2 infection 1 month prior. PCR from vitreous sample of both patients was positive for herpes simplex virus. Case 3 was an old case of ARN who was in remission from 2017. However, the patient had a reactivation of ARN 1 month after recovering from SARS-CoV-2 infection. Case 1 and 3 were treated with oral valacyclovir. Case 2 underwent surgery in both eyes for retinal detachment.

Conclusions: Immune dysregulation after COVID-19 infection can result in reactivation of herpes virus and may lead to development of ARN.

Adjunct Intravitreal Penicillin G Injection for Ocular Syphilis

*First Author: Moses Job **DUMAPIG***
*Co-Author(s): Maria Cecilia **ARENAL***

Purpose: To report an off-label successful adjunctive utilization of penicillin G intravitreal injection for the treatment of assumed syphilitic uveitis.

Methods: This is a case report of a 36-year-old Filipino male, who presented with progressive bilateral cloudy vision accompanied with floaters for 3 months. Ocular examination revealed intermediate uveitis. A Treponema pallidum agglutination assay test (TPPA) revealed a positive result and rapid plasma regain (RPR) of 1:1024. Patient was treated with penicillin G IV for 14 days but no improvement of vision. An adjunctive bilateral intravitreal injection of penicillin G and dexamethasone was done.

Results: Assay of the vitreous sample taken immediately prior to the injection revealed positive titers for Treponema and reactive cytomegalovirus IgG. Treatment led to rapid improvement of vision with no known adverse reaction experienced by the patient.

Conclusions: Intravenous penicillin G for 10-14 days is the gold standard treatment for syphilitic uveitis, but visual improvement is noted at 4 weeks at the earliest. We report the first case of adjunctive intravitreal antibiotic therapy of

penicillin G in a patient with syphilitic uveitis. It was observed that after treatment, ocular symptoms had resolved earlier than the 4-week time period. Syphilitic uveitis is a blinding condition if not treated early and properly, thus a combination of systemic and intravitreal antibiotics may be considered.

An Atypical Presentation of Endogenous Endophthalmitis Masquerading as Behcet Disease: A Diagnostic Dilemma

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Purpose: Behcet disease and endogenous endophthalmitis (EE) have multi-system involvement with an overlapping non-specific clinical profile of panuveitis; with no confirmatory laboratory investigations, an ophthalmologist should be cautious while making a diagnosis as it would determine the further visual prognosis of the patient and can even have life threatening complications.

Methods: A 24-year-old male presented with complaints of redness in right eye (OD) with dimness of vision for last 10 days, with associated prodrome of mild fever, along with left hip pain with mucocutaneous lesions over the inner surface of the lips, hard palate and glans penis. On examination he had hand movement vision (OD), with panuveitis and dense vitreous exudates. He was clinically diagnosed with Behcet disease and was started on systemic corticosteroids. He had a febrile episode and blood culture showed presence of Sphinogomonas paucimobilis. Ultrasonography of the abdomen showed presence of subclinical cystitis, a sequel of a urinary tract infection he was treated for recently.

Results: He was now diagnosed as EE, and treatment with intravitreal antibiotic-steroids with systemic antibiotics yielded favorable results with his vision recovering to 6/24 (OD). Fundus examination after reduction of the vitreous haze along with optical coherence tomography (OCT) and OCT-angiography (OCTA) did not show any evidence of vasculitis and findings were in favor of EE. The mucocutaneous lesions were diagnosed as fixed drug eruptions to NSAIDS.

Conclusions: EE is an ocular emergency which often masquerades as other etiologies of panuveitis, and its prompt diagnosis and treatment is imperative for a good visual prognosis.

Bilateral Necrotizing Retinitis in a Patient with Dermatomyositis under Immunomodulatory Therapy

First Author: Anthony ***LIN***

Purpose: To report a case of bilateral necrotizing retinitis under immunomodulatory therapy and review the associated literature.

Methods: Case report.

Results: A 67-year-old Asian male with history of dermatomyositis complained of progressive blurred vision of both eyes for 2 weeks. The patient had received oral corticosteroid and immunomodulatory therapy with azathioprine for a long time. Oral immunomodulatory therapy with hydroxychloroquine and mycophenolic acid was added about 1 month before onset of visual symptoms. The patient noted marked deterioration of vision about 1 week after addition of the above medications. Ophthalmic examination disclosed best corrected visual acuity 0.3 for the right eye and 0.05 for the left eye. Dilated fundus examination revealed whitish exudative lesion at posterior pole in both eyes, including a lesion of 3-4 times of disc size at lateral inferior arcade in the right eye, and two lesions of 0.5 and 1 disc size at the macula in the left eye. The patient was admitted under the impression of acute necrotizing retinitis.

Conclusions: There have been several reports of opportunistic retinitis in non-HIV infected immunosuppressed patients. The presence of painless visual loss, uveitis, vitritis, retinitis and retinal lesions including vasculitis, hemorrhage, and coalescent retinal infiltrates should promptly explore potential viral retinitis. CMV retinitis is rare in non-HIV infected patients,

while patients with chronic use of systemic corticosteroids and immunosuppressant therapy are at higher risk.

Bilateral Panuveitis with Meningitis: A Case Report

First Author: Juhy ***CHERIAN***
Co-Author(s): Hannah ***RANJEE,*** *Renuka* ***SRINIVASAN***

Purpose: To report a case of panuveitis associated with meningitis successfully treated with antibiotics followed with steroids.

Methods: A 57-year-old male with no known comorbidities presented to ER with fever for 10 days and altered sensorium for one day.

Results: On day 3 of admission the patient developed redness in both eyes associated with mild pain and photophobia. Ocular examination revealed BCVA of 6/36 in both eyes. Anterior segment of both eyes revealed signs of moderate uveitis with circumcorneal congestion, fine keratic precipitates and 2+cells and 4+flare with fibrin membrane. 3 mm sluggishly reacting pupil, posterior synechiae with immature cataract was noted in both eyes. Posterior segment examination revealed multiple, pale yellow raised chorioretinal lesions seen superotemporal to macula in the right eye and inferonasal to macula in the left eye with bilateral optic disc edema. OCT revealed retinitis in the macular region perifoveal area. He was diagnosed as bilateral panuveitis, associated with meningitis. Anti toxoplasma antibody, VDRL were negative. Topical steroids and cycloplegics were prescribed and in view of the bilateral posterior segment manifestations he was also started on oral steroids. Patient was reviewed after a week and his BCVA was 6/18 and 6/9 in right and left eye respectively, anterior segment was quiet and retinitis lesions had reduced in size.

Conclusions: Panuveitis is a rare association of meningitis. This case emphasizes the need for routine ocular examination in all neurological cases, even when asymptomatic. Early diagnosis and cautious initiation of treatment with steroids after adequate suppression of infection helps in obtaining good visual recovery.

Biological Potential and Therapeutic Effectiveness of Eupatorin in Anti-Inflammatory Disorder: Medicinal Uses and Pharmacological Importance

First Author: Dinesh ***PATEL***

Purpose: Flavonoidal class chemicals are colorful components found to be present in the plant and their derived product is mainly in the form of secondary metabolites. Flavonoidal compounds are present in the fruits, seeds, vegetables and whole plants. Eupatorin is a flavonoidal class phytochemical found to be present in the Salvia mirzayanii.

Methods: To search for better phytochemicals for the treatment of human disorders, here in the present investigation numerous scientific research data has been collected and analyzed from the various literature databases. Therapeutic effectiveness of eupatorin against various types of inflammatory disorders has been searched through literature database analysis of various scientific research works. Anti-inflammatory activity of eupatorin in medicine has been investigated through literature data analysis of different scientific research works.

Results: Literature data analysis of various research works revealed the biological importance of eupatorin in medicine for effectiveness against various forms of inflammatory disorders. Literature database analysis revealed that eupatorin inhibited iNOS and COX-2 expression and the production of NO and PGE in a dose-dependent manner and indicates that eupatorin has significant anti-inflammatory activity and could be utilized for the development of novel anti-inflammatory agents. Literature data analysis also revealed that eupatorin from Salvia connivens was found to be effective in acute TPA-induced mouse ear edema.

Conclusions: Literature data analysis revealed the therapeutic benefits of eupatorin in

medicine for the treatment of various forms of inflammatory disorders.

Case Report of Post-Typhoid Neuroretinitis: A Rare Cause of Visual Morbidity

First Author: Charmaine ***MALABANAN***
Co-Author(s): Redentor ***GONZALES***

Purpose: To report a rare case of post-typhoid neuroretinitis in a 55-year-old female.

Methods: Case report.

Results: A 55-year-old female with typhoid fever presented with a sudden onset, painless blurring of vision of the left eye. There was no history of trauma and past ocular history was unremarkable. Past medical history was also unremarkable. Blurring of vision started two weeks prior. Visual acuity was logMAR 0.0 OD and logMAR 2 OS. Grade 1 relative afferent pupillary defect with dyschromatopsia was noted in the left eye. Anterior segment was unremarkable. Fundus examination of the left eye revealed disc edema and a macular star exudate. Areas of retinitis at the peripapillary area and distal third of the supero-temporal arcade were noted. Baseline work-up was done which was found to be negative for HIV, syphilis, and positive for typhoid fever. Patient was given prednisolone (1mg/kg/day) and was gradually tapered for 8 weeks with regular monitoring. At 6 months follow-up, vision of the left eye improved to logMAR 0.3. Fundus exam revealed marked resolution of disc edema with residual exudates at the macula and retinitis at the distal third of the supero-temporal arcade.

Conclusions: Post-typhoid neuroretinitis presents as a significant cause of visual impairment. Due to its rarity, immediate diagnosis and treatment are frequently delayed. A high index of suspicion is prudent for prompt intervention and better visual outcome.

Case report: Unilateral Herpes Zoster Anterior Uveitis after Contralateral Cataract Surgery

First Author: Siti Nur Amira ***ABU KASSIM***
Co-Author(s): Wan Haslina ***HALIM,*** *Ong* ***MING YEAN,***
Othmaliza ***OTHMAN,*** *Meng Hsien* ***YONG***

Purpose: To describe a case of unilateral herpes zoster (HZ) anterior uveitis after cataract surgery on the contralateral eye.

Methods: Case report.

Results: A 73-year-old man with a history of bilateral HZ ophthalmicus 30 years ago underwent an uneventful left eye cataract surgery. Preoperatively, there was no clinical evidence of recurrent herpetic eye infection. Postoperatively he was started with oral aciclovir prophylactic dose and routine postoperative topical steroid/antibiotic. Seven weeks after the surgery, he presented with five days of right eye redness and blurred vision. Clinically, his right eye vision dropped to 6/21 with anterior uveitis, keratic precipitates and reduced corneal sensation. Right eye intraocular pressure and posterior segment were normal. Left eye examinations were unremarkable. Diagnosis of right eye HZ anterior uveitis was confirmed with VZV positive PCR viral study of the aqueous humor. He responded well to topical dexamethasone and oral aciclovir (800mg 5x/day) on a ten-week tapering dose. We postulated that the patient developed bilateral HZ uveitis due to surgical stress, but the inflammation of the operated eye was suppressed by topical steroids, which was meant to reduce postoperative inflammation. Another hypothesis for contralateral infection (Von Szily theory) is that the activated herpes virus from the operated eye may travel via neural pathway to the opposite nerve.

Conclusions: Despite perioperative prophylaxis of oral aciclovir and long quiescent period, reactivation of HZ infection may occur in either the operated or fellow eye after cataract surgery. Timely diagnosis, accurate investigation and focused treatment shall resolve the reactivation.

Clinical Profile and Visual Prognosis of Patients with Presumed Ocular Tuberculosis

First Author: John Philip ***UY***
Co-Author(s): Jessica Marie ***ABAÑO***

Purpose: To characterize the clinical profile of patients with presumed tuberculous uveitis (TBU) and determine the prognostic factors associated with poor visual outcome.

Methods: This study was a retrospective evaluation of 44 patients with presumed TBU from January 2010 to October 2018.

Results: Sixty-eight eyes of 44 patients with mean age of 42.1 ± 15.7 years and predominantly female (65.9%) cohort were included in the analysis. Seventy-five percent of the patients showed normal chest radiograph but all had positive tuberculin skin test. The mean presenting BCVA and final BCVA (logMAR) were 0.72 ± 0.75 and 0.45 ± 0.72, respectively, with a significant difference ($p = 0.0068$). The most common anatomical category involved was intermediate uveitis (29.5%) and panuveitis (29.5%). The mean duration of treatment was 7.6 ± 3.4 months. All responded well with anti-tuberculous treatment (ATT) but patients with poor presenting VA (OR 32.13; 95% CI 2.40 to 429.18; $p = 0.0087$) or panuveitis (OR 6.44; 95% CI 1.01 to 41.19; $p = 0.0049$) were likely to have severe visual impairment as outcome. Macular edema (23.5%) was the most frequently observed complication.

Conclusions: The current study shows the heterogenous presentation of presumed TBU. Standard ATT will yield good response to level of ocular inflammation. However, patients with poor presenting VA or panuveitis had poorer visual outcome.

Life for Sight

First Author: Joseph ***DANASAMY***
Co-Author(s): Marium ***AHMAD,*** *Tajunisah* ***IQBAL,***
Pooi Wah ***LOTT,*** *Amir* ***SAMSUDIN***

Purpose: To describe a rare presentation of Streptokinase-induced uveitis following acute thrombolysis therapy.

Methods: Case report.

Results: A 59-year-old man presented with an acute anterior myocardial infarction. He was promptly treated with a standard dose of intravenous Streptokinase infusion. Eight hours after the infusion, he began to experience discomfort, redness, tearing and blurring of vision in his left eye. Examination showed severe anterior uveitis of the left eye with visual acuity of 6/60, a hypopyon with grade 4 anterior chamber cells and posterior synechiae (PS) seen at 9 o'clock position. He was investigated for acute anterior uveitis (AAU) and started on intensive topical steroids in tapering dose. Three days later the AAU showed signs of resolution. Fundus examination showed presence of cotton wool spots in both eyes. There was no macula edema on retina imaging. A week later the patient regained normal vision in both eyes with complete resolution of all ocular signs and symptoms.

Conclusions: Although rare, ocular reactions to Streptokinase can occur. Acute anterior uveitis with hypopyon is a serious ocular condition that needs to be managed promptly. Non-ophthalmologists should be aware of this condition when patients present with acute red eyes after a recently treated myocardial infarction.

Multimodal Imaging of Multiple Evanescent White Dot Syndrome in a 12-Year-Old Girl

First Author: Te-an ***WANG***

Purpose: To propose a rare case of multiple evanescent white dot syndrome (MEWDS) in a pediatric patient. Presentation of pediatric MEWDS in multimodal imaging was demonstrated.

Methods: This observational study illustrated the presentation of pediatric MEWDS during one-year follow-up. Multimodal imaging including fundus photography, fluorescein angiography, indocyanine green angiography (ICGA), and spectral-domain optical coherence tomography (SD-OCT) were applied. MEWDS in children were reviewed from literature.

Results: A 12-year-old girl presented with sudden blurred vision in the right eye for 5 days. Review of systems revealed unremarkable results except for a recent upper airway infection. Visual acuity was 20/50 in the right eye and 20/20 in the left eye. Fundus examination of the right eye revealed multiple white spots in the posterior pole and pigmentation at nasal peripheral retina. Disruption of the ellipsoid zone on OCT images was colocalized with the lesions detected through fundus photography and ICGA. At a 7-week follow-up, visual acuity in the right eye had improved to 20/20. At one-year follow-up, white spots had been resolved, but pigmentation at nasal peripheral retina remained stable. MEWDS is infrequently reported in children. The prognosis in affected pediatric patients is excellent, with recovery of vision within 1-8 weeks. Our case is the youngest individual with MEWDS in Asia reported in the literature.

Conclusions: Multimodal imaging could assist in the diagnosis of MEWDS. MEWDS should be considered in the differential diagnosis of inflammatory chorioretinopathies in children.

Multimodal Imaging of a Case of Bilateral Lupus Neuroretinopathy, Vasculitis and Choroidopathy

*First Author: Divya **YADAV***
*Co-Author(s): Murugan **BALA,** Nikita **SONAWANE***

Purpose: To present multimodal imaging of a case of fundus manifestations of systemic lupus erythematosus (SLE).

Methods: A 20-year-old female, known case of SLE and associated lupus nephritis grade 3 for the last 3 years, presented with diminution of vision in left eye. Best corrected visual acuity was 6/60 and 1/2/60 in OD and OS respectively. Anterior segment was normal in both eyes. Fundus examination showed disc edema, flame shaped and few blot hemorrhages in all quadrants, multiple cotton wool spots, sheathed and occluded arterioles. These findings were prominently seen on fundus autofluorescence. Fundus fluorescein angiography revealed markedly faint choroidal flush, occluded arterioles, staining and patchy leakage of veins, gross capillary non perfusion areas at posterior pole, more extensive in left eye, with enlarged foveal avascular zone in OD and complete absence of macular perfusion in OS and disc leakage in both eyes. Optical coherence tomography showed thickening and opacification of inner retinal layers. Patient was referred to rheumatologist to increase systemic therapy as presence of lupus retinopathy is a marker of active systemic disease.

Results: Fundus picture improved on follow up in terms of resolving hemorrhages and disc edema, OS vision improved from 1/2/60 to 1/60.

Conclusions: We report a case presenting with remarkable fundus manifestations of SLE neuroretinopathy, choroidopathy with vasculitis, highlighting the role of the ophthalmologist to diagnose ongoing active disease in absence of systemic signs and need to increase systemic therapy.

Necrotizing Scleritis with Secondary Exudative Retinal Detachment associated with Ocular Tuberculosis: A Case Report

*First Author: Diane **CO***
*Co-Author(s): Jessica Marie **ABAÑO***

Purpose: The objective of this case report is to present a case of necrotizing scleritis with secondary exudative retinal detachment in a patient with tuberculosis.

Methods: Case report.

Results: This is a case of a 61-year-old Filipino female who presented with severe unilateral eye pain, swelling and blurring of vision. On initial examination, left eye had a best corrected visual acuity of 20/200, a notably violaceous sclera with dilated episcleral vessels and a whitish nodular scleral lesion located temporally with purulent discharge. Funduscopy revealed an inferior bullous retinal detachment in the left eye. She also had limitation in ocular motility presenting as limited abduction of the left eye. Concurrent with her ocular symptoms, she also had joint pain and bullous cutaneous lesions

on her lower extremities. Initial impression was infectious vs inflammatory scleritis with exudative retinal detachment. Subsequent systemic investigation revealed extrapulmonary tuberculosis and orbital MRI was suggestive of scleritis. Additional blood work-up pointed to a noninfectious etiology. The patient had a good response to anti-tubercular treatment as well as systemic steroids and immunosuppresive therapy. A few months post-steroid treatment, patient noted gradual resolution of left eye pain and resolution of inferior bullous retinal detachment in the left eye.

Conclusions: The importance of a high index of suspicion and multi-subspecialty management is emphasized in this case.

Orbital Infarction Syndrome after Functional Endoscopic Sinus Surgery

*First Author: Ellen **YU**-KEH*
*Co-Author(s): Fm **QUILING***

Purpose: Functional endoscopic sinus surgery (FESS) is a type of surgery performed for paranasal sinus disorders to remove obstructing tissue and allow drainage in the osteomeatal complex. Minor and major ophthalmic complications can arise from this procedure. We present a case of orbital infarction syndrome post-FESS.

Methods: An eighteen-year-old male who underwent FESS on both nasal cavities due to chronic rhinosinusitis subsequently developed orbital infarction syndrome in one eye.

Results: FESS was uneventful and did not go beyond the middle turbinate and maxillary sinus. The ethmoid bulla was not violated but pure epinephrine nasal pack in the left nasal cavity was utilized. Twelve hours post-FESS, the patient was referred to the general clinic for unilateral vision loss of the left eye. Progressive periorbital swelling was noted with conjunctival chemosis, complete ophthalmoplegia, and anterior chamber inflammation with increased intraocular pressure. Ocular ultrasound revealed choroidal effusion with vitreous hemorrhage. Orbital infarction syndrome was suspected; steroid therapy combined with sublingual nitroglycerin was the mainstay management. Improvement of clinical signs was observed but vision did not recover.

Conclusions: Orbital infarction syndrome may occur post-FESS. It should be suspected when there is vision loss after surgery, even after an uneventful surgery.

Relationship between Uveitis and Thyroid Disease: A 13-Year Nationwide Population-based Cohort Study in Taiwan

*First Author: Chun-ju **LIN***
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Purpose: To investigate whether patients with thyroid disease are at increased risk of uveitis.

Methods: Data was collected from the Taiwan National Health Insurance system and included patients newly diagnosed with thyroid disease from 2000 to 2012. The endpoint of interest was a diagnosis of uveitis.

Results: In analyzing 21,396 patients with thyroid disease, yielding 85,584 matched comparisons, patients with thyroid disease were shown to have a significantly higher cumulative incidence of uveitis when compared to the control cohort with Kaplan-Meier analysis. This result was further confirmed by Cox regression analysis. The increased risk was persistent in both genders. The association between thyroid disease and uveitis was stronger in patients without diabetes or hypertension.

Conclusions: Patients with thyroid disease were found to have a higher risk for uveitis. For certain age groups or patients without diabetes or hypertension, the role of thyroid disease might be more crucial for uveitis development.

Severe Anterior Uveitis as a Rare Presentation of Ocular Sporotrichosis

*First Author: Dalal **MAHGOUB***
*Co-Author(s): Sarah Murniati **CHE MAT NOR,** Zunaina **EMBONG,** Qi **NGOO,** Nik Nurfarhana **NIK MOHD NOOR***

Purpose: To report a case of ocular sporotrichosis which presented as severe anterior uveitis in a tropics area, Malaysia.

Methods: A case report.

Results: A 53-year-old Malay woman presented with one-week history of sudden onset right eye redness, photophobia, right eye pain and blurry of vision. This was her second episode. The first episode was less severe and resolved with topical eyedrops. She had cats at home with no history of cat bites. On examination, right eye vision was 6/18 and improved to 6/9 with pinhole. There was presence of multifocal area of granulomatous conjunctival lesions with severe anterior chamber cells, fibrin and streak of hypopyon. There were no mutton fat keratic precipitates or iris nodules seen. Pupil was irregular with posterior synechiae. Fundus was normal with no vitritis, retinitis or choroiditis. Blood investigations for infective causes and connective tissue screening were negative. Conjunctival swab for culture and sensitivity yielded no growth. Patient was started on topical steroid, topical antibiotics and topical atropine but there was no improvement. In view of granulomatous conjunctival lesions and history of contact with cat, the patient was empirically treated as ocular sporotrichosis with oral itraconazole. After 2 weeks on medications, the right eye improved significantly with 6/6 vision, white conjunctiva with regression of granulomatous conjunctival lesions and resolution of anterior chamber inflammation.

Conclusions: Ocular sporotrichosis is common in tropical areas, thus a high index of suspicion should be maintained even if cultures were negative.

Successful Non-Invasive Management of Highly Motile Intravitreal Worm in Epiretinal Plane

*First Author: Divya **YADAV***
*Co-Author(s): Harsh **SINGH,** Nikita **SONAWANE***

Purpose: To describe a case of non-invasive management of a posterior segment worm, continuously wriggling in three dimensional epiretinal space.

Methods: A 37-year-old-man presented with perception of wriggling movements in left eye with 20/20 vision. Fundus revealed highly motile worm in epiretinal space. Location and plane of movements were confirmed with optical coherence tomography (OCT), which also showed attachment of an end of worm intraretinally (presumed head with hooklets). Multiple attempts of direct laser photocoagulation over the head region failed due to its incessant rapid movements, especially in antero-posterior axis. The patient was started on oral albendazole 400mg OD. Failed attempts with peribulbar and retrobulbar lignocaine were made to immobilize the worm for 2 consecutive days. With no immediate results, patient was planned for pars plana vitrectomy. On the following day, i.e after 2 days of anti-helminthics and periocular lignocaine, there was remarkable reduction in motility, the worm was now thicker and swollen and could finally be killed with direct laser photocoagulation. Further follow-up with OCT demonstrated dissolving dead remains followed by complete resolution of inflammation.

Results: The worm was destroyed with a combination of anti-helminthic, periocular lignocaine and Nd-Yag laser, followed by steroids to control inflammation.

Conclusions: The main challenge was inability to focus and deliver laser shot due to incessant movements of the worm in multiple planes. To the best of our knowledge, this is the first case report of live intravitreal (epiretinal) worm treated with a non-invasive approach.

Sushi Lovers, Beware!

*First Author: Adeline **LOW***
*Co-Author(s): Tajunisah **IQBAL,** Azida Juana **KADIR***

Purpose: We report a case of unilateral ocular toxoplasmosis presenting as panuveitis in a patient who regularly consumed raw fish as sushi.

Methods: An immunocompetent 70-year-old, Chinese male presented with right eye painless, progressive blurring of vision for 2 months. He had a deep affinity for sashimi, a Japanese delicacy consisting of fresh raw fish. He did not have pets and denied any contact with cats. Vision on presentation was

OD 1/60 and OU 6/6. Examination of right eye revealed anterior chamber cell activity and early cataractous lens. Fundus view was hazy due to significant vitritis, giving «headlight in the fog» appearance. A yellowish-white lesion was seen superotemporally with surrounding vasculitis. Left eye was unremarkable. Blood investigation showed raised white cell count (eosinophil and lymphocyte predominant) and raised serum Toxoplasma IgG level (59.79 IU/ml). Toxoplasma IgM was not detected. Patient was treated with a course of topical and oral steroids, cycloplegic drops and oral sulfamethoxazole and trimethoprim. He responded well to treatment with resolution of the vitritis and recovery of vision.

Results: Hygienic food preparation with adequate cooking of meat and meat products should also apply to raw fish, which must be cooked to a temperature of at least 66°C to inactivate parasites. Alternatively, T. gondii can also be inactivated with deep freezing of raw fish at −21°C for 1 day (for unsporulated oocyst) or 28 days (for sporulated oocysts).

Conclusions: Public education and counseling of risk factors can reduce the incidence and risk of acquiring T. gondii infection.

Vision Threatening Intraocular Involvement of COVID-19

*First Author: Kamrul **HASAN***
*Co-Author(s): Murad **HASAN,** Billal **HOSSAIN,** Mizan **MOLLAH,** Tanvir **AHMED***

Purpose: To describe vision threatening intraocular involvement of COVID-19.

Methods: This retrospective, interventional, non-comparative study was done from July 2020 to March 2021. Patients were referred to ophthalmology department due to redness, pain and loss of vision. With proper safety precautions, along with history, clinical evaluation was done with slit lamp, indirect ophthalmoscope and Bscan ultrasonography to confirm intraocular involvement.

Results: Among referred 243 cases, 32 cases were found with vision threatening intraocular involvement. 28 patients (60.00%) were male and 4 (40.00%) were female. Mean age was 37.3 years (range 23-56 years). 25 patients (78.14%) were cases of anterior uveitis, 5 patients (15.62%) were cases of secondary glaucoma along with uveitis, one case (03.12%) had vitreous opacity with tractional retinal detachment and another one (03.12%) was a case of endophthalmitis. There were exudates at the contralateral eye of the tractional retinal detachment patient. In the endopthalmitis case, there was acute retinal necrosis in retinal periphery with necrosis in macular region. All vessels were occluded along with pale optic disc. Other eye had features of anterior uveitis.

Conclusions: Ocular surface disorder, especially conjunctivitis, is the most common known ocular involvement of COVID-19. But intraocular involvement also may happen. Intraocular involvement may lead to blindness of the eye.

Ocular Imaging

Anaglyph Glasses and Virtual Reality Headsets for Watching 3D Ophthalmic Content

*First Author: John **AKKARA***
*Co-Author(s): Anju **KURIAKOSE***

Purpose: To evaluate the various methods of watching 3D ophthalmology content and their affordability, quality, usability and effectiveness.

Methods: The authors tested various methods of 3D viewing including 3DTV, red-blue anaglyph, stereo viewer, cross and parallel eye viewing, mirror viewing and virtual reality headsets including Google Cardboard. Some ophthalmic 3D content was made by the authors using special 3D cameras, some using special smartphone apps and some using specialized computer software. The advantages and disadvantages, affordability, quality and usability was evaluated and described.

Results: We made 3D photos and videos using smartphones and 3D cameras. We tested expensive 3DTV, medium cost red-blue anaglyph method and inexpensive virtual reality

headsets and several other methods to watch 3D surgical videos and 3D ophthalmic photos. The best 3D effect was seen in 3DTV followed by Google Cardboard followed by anaglyph glasses. The cost of 3DTV was the highest followed by Google Cardboard followed by anaglyph red-blue glasses being the cheapest. Ease of use was best for anaglyph glasses followed by 3DTV followed by Google Cardboard. For those wearing spectacles, all three methods proved cumbersome. Anaglyph glasses supported prescription glasses and a modified Google Cardboard supported smaller prescription glasses as well as certain types of 3DTV glasses.

Conclusions: The advantages of 3D videos and photos in ophthalmology and the ease of viewing such 3D content is apparent. We hope to add value to ophthalmology teaching programs with the use of this innovative teaching method which has become easily available due to recent advances in low cost technologies.

Clinical Characteristics of Eyes Showing a Discrete Margin of Different Retinal Reflectivity

*First Author: Sohee **JEON***

Purpose: To evaluate the clinical characteristics of discrete margins of different retinal reflectivity (DMDRR) in ultra-widefield fundus photography (UWF-FP).

Methods: This DMDRR comprises a discrete border, with differing patterns of reflectivity on either side. Spectral-domain optical coherence tomography (SD-OCT) was performed on both the macula and the margin. The incidence of epiretinal membrane (ERM) and peripheral retinal pathologies of patients with a DMDRR (n=36) were compared with a control group (n=41).

Results: An ellipsoid zone (EZ) defect at the DMDRR was detected in 34 eyes (92.2%), and vitreous traction was detected in 20 eyes (55.6%). A significantly higher proportion of eyes in the DMDRR group had an ERM, retinal hole and cystic retinal tuft compared with the control group (P = 0.022, P = 0.010, and P < 0.001, respectively).

Conclusions: The DMDRR indicates EZ disruption that may originate from vitreous traction. Meticulous observation for vitreoretinal interface diseases is mandatory for these patients.

Disrupted Modular Architecture of Retinal Layers in Diabetic Patients without Retinopathy

*First Author: Pratyusha **GANNE***
*Co-Author(s): Nagesha **CHOKKAHALLI,** Ganne **CHAITANYA,** Manikanta **DAMAGATLA,** Shaista **NAJEEB***

Purpose: Retina is a complex neural network with inter-layer interactions contributing to its functional integrity. The aim of this study was to identify earliest network markers of retinal changes in diabetic eyes without retinopathy (DWOR).

Methods: Macular scans (using Spectralis SD-OCT) were obtained in 78 DWOR eyes and 308 eyes from healthy controls (HC). Individual retinal layer thickness (RNFL, GCL, IPL, INL, OPL, ONL and RPE) in 9 ETDRS sectors was estimated using auto-segmentation software with manual correction. Retinal networks in HC and DWOR were calculated as inter-layer covariance matrices using cross-subject correlation of retinal layer thickness. Louvain's modularity, a measure that quantifies the degree to which retinal networks may be subdivided into clearly delineated layers, was estimated in an iterative process (n=50) to quantify the disruption of retinal architecture. The modularity Q was compared between controls (Qhc) and DWOR (Qdwor) using t-test.

Results: The mean age was 46.2±13.1 years (HC) and 50.8 ± 8.6 years (DWOR) (p=0.06). The inner retinal layers (GCL/IPL) showed age-related thinning in all ETDRS sectors except in central subfield in HC versus in the inferior, temporal and nasal sectors of outer ring in DWOR. There was an increase in modularity among DWOR compared to HC (Qhc=0.47, Qdwor=0.51, p=1.6 x 10-8). This implies that

the retinal layers are disrupted much before clinically evident retinopathy.

Conclusions: Retinal changes manifest at a network level with inter-layer interactions which cannot be easily detected by individual layer thickness estimates alone. We provide the primer to developing a concept of network level understanding of retinal layer functions.

Factors Influencing Superficial Retinal Vessel Densities in Adults Aged 50 and Above: A Prospective Cross-Sectional Population-Based Study

*First Author: Yan Kiu **LI***

Purpose: To assess the average values and ocular and systemic factors influencing superficial retinal vessel densities in adults aged 50 and above.

Methods: This was a prospective cross-sectional study gathering data from an optical coherence tomography angiography (OCTA) eye screening program introduced in Hong Kong in May 2019 for citizens aged 50 and above. Data was retrieved from May 2019 to December 2020, including a total of 1626 healthy eyes from 1626 subjects.

Results: The mean age of the subjects included was 61.89 ± 7.97, with 540 (33.2%) being males. Mean superficial vessel density (MSVD) was 16.92 ± 2.43mm-1, with the mean inner and outer ring vessel densities being 16.71 ± 2.86mm-1 and 17.34 ± 2.38mm-1 respectively. When stratifying the results by age and gender, with age grouped by decades, significant differences were observed with age ($p<0.001$), although no significant differences were observed with gender. Multivariate analysis revealed increased age (standardized β=-0.28 [95% confidence interval (CI) -0.34, -0.22]), reduced best corrected visual acuity (BCVA) (β=-0.24 [95% CI -0.29, -0.18]), spherical equivalent (SE) (β=0.17 [95% CI 0.12, 0.22]) and cube average thickness (CAT) (β=0.12 [95% CI 0.072, 0.17]) as independently significant risk factors for reductions in MSVD ($p<0.001$).

Conclusions: MSVD was 16.92 ± 2.43mm-1 in adults aged 50 and above. Increased age, myopia and reduced macular thickness are significantly associated with reductions in MSVD. Individuals with these risk factors should carefully monitor their retinal microvasculature, with ophthalmologists considering these factors and values in clinical practice.

Injection-Free Fundus Fluorescein Angiography using Widefield Imaging Technique

*First Author: Kanwaljeet Harjot **MADAN***

Purpose: The current study was conducted to assess the safety of low-dosage fluorescein dye when given orally using ultra widefield imaging in different retinal pathologies.

Methods: 677 eyes of 377 patients were included in the study which was conducted from January 2019 to January 2021. 20% fluorescein dye was given in the dose of 20 mg/kg body weight mixed with 30mL of orange juice. Fundus pictures were taken 3-4 minutes after ingestion of dye and were continued till 15-20 minutes for late frames. All the patients were fasting for 2 hours before the procedure. Patients were observed for an hour after the dose was administered to monitor for any adverse effects.

Results: 677 eyes of 377 patients were included in the study. There were 226 males and 151 females. Average age was 56.2 years. 283 eyes were pseudophakic. 394 eyes were phakic. The first images were visible as early as 5 minutes after the patient ingested oral fluorescein and as late as 30 minutes after ingestion. The recirculation phase was visible no later than 15 minutes after ingestion. 7 eyes showed bad fundus images. 39 eyes showed average pictures. Rest of the 638 eyes showed good fundus images. All patients tolerated the procedure well. 4 patients had skin allergy. 1 patient had vomiting.

Conclusions: Our study suggests that oral fluorescein angiography is a safe, non-invasive and well tolerated procedure with high sensitivity. It can be safely used in children.

Optical Coherence Tomography Angiography Analysis of Changes in the Foveal Avascular Zone in Eyes with Diabetic Macular Edema Treated with Intravitreal Anti-Vascular Endothelial Growth Factor

First Author: Albert John ***BROMEO***
Co-Author(s): Arcinue ***CHEY,*** *Myron Carlo* ***GOMEZ,*** *Sweet Jorlene* ***LERIT,*** *Patricia* ***QUILENDRINO,*** *Amadeo Jr* ***VELOSO***

Purpose: To evaluate the changes in the foveal avascular zone (FAZ) area, perimeter, and circularity in eyes with diabetic macular edema (DME) treated with intravitreal anti-vascular endothelial growth factor (VEGF) therapy.

Methods: A prospective, noncomparative, observational study was done. A total of 52 eyes from 32 patients with DME treated with intravitreal anti-VEGF were included. Optical coherence tomography angiography (OCTA) images were obtained and the FAZ area, perimeter, and circularity in both the level of the superficial (SCP) and deep retinal capillary plexuses (DCP) were calculated at baseline and after 1, 3, and 6 months following the course of intravitreal anti-VEGF therapy. The central retinal thickness (CRT) and BCVA were also measured.

Results: The mean number of intravitreal anti-VEGF injections received during the observation period was 4.6 ± 0.82 (range, 3-6). The FAZ area, perimeter, and circularity were not statistically different at all observation points in both the SCP ($p = 0.88$, $p = 0.81$, $p = 0.19$, respectively) and the DCP ($p = 0.82$, $p = 0.91$, $p = 0.67$, respectively). There was still a statistically significant decrease in CRT ($p = 0.013$) at all observation points as well as a statistically significant increase in BCVA beginning at month 3 ($p = 0.003$).

Conclusions: The FAZ area, perimeter, and circularity in the SCP and DCP remained statistically unchanged during the first 6 months of intravitreal anti-VEGF therapy in eyes with DME. While there is no significant change in the FAZ, treatment of DME still results in decreased CRT and increased BCVA.

Optical Coherence Tomography Angiography: A Rescue Tool in a Case of Solitary Peripapillary Pigment Epithelial Detachment

First Author: Ashwini ***PATIL***
Co-Author(s): Sachin ***MAHULI***

Purpose: 55-year-old South Asian female presented to the outpatient department with complaints of seeing black shadow in the right eye for 3 days. She was a known case of hypertension and on treatment with blood thinners. She also had an episode of of transient ischemic attack 4 years ago. Her vision was 6/6 Snellen, N6 in both eyes. Right eye examination revealed solitary peripapillary pigment epithelial detachment (PED) and neurosensory detachment, with no signs of inflammation noted. Rest of the fundus examination was within normal limits.

Methods: Spectral domain optical coherence tomography (SD-OCT) confirmed the above clinical entity and showed underlying pachychoroid features. Since fitness for invasive angiography procedure was denied by her treating physician, we did OCT-A, which showed vascular activity in the area of PED and polyp was noted at the notched area of PED which was corresponding to vascular activity in avascular plexus. Hence diagnosis of pachychoroid related peripapillary polyp with branching vascular network (BVN) was made and advised 3 loading doses of intravitreal brolucizumab injection.

Results: 1 month after intravitreal brolucizumab injection OCT confirmed resolution of PED and considerable regression in neurosensory detachment. En face OCT in the same area showed siegrist streaks. OCT-A showed regression of vascular activity in the avascular plexus along with decreased vascularity in siegrist area of choroid.

Conclusions: OCT-A is a noninvasive indispensable tool in patients where invasive angiography procedure is contraindicated. It helps in analyzing the cause for abnormal vasculature and also helps in monitoring the response to the treatment.

Prevalence and Clinical Characteristics of Epiretinal Mass in Eyes without Pre-Existing Retinal Conditions

*First Author: Sohee **JEON***

Purpose: To evaluate the clinical characteristics of epiretinal mass (EM) in eyes without pre-existing retinal conditions.

Methods: The prevalence and the characteristics of eyes showing EM on spectral-domain optical coherence tomography (SD-OCT) examination were reviewed.

Results: From 2,221 eyes undergoing SD-OCT, 34 eyes (1.5%) were found to have EM. The EM was detected after the onset of posterior vitreous detachment (PVD); 32 eyes out of the 34 (94.1%) showed PVD, while two eyes (5.9%) showed diffuse vitreomacular adhesion at the time of EM detection. The EM was most commonly located at the superior macula, followed by the nasal macula. Of the 17 eyes with SD-OCT images obtained at the time of disappearance of the EM, EMs from 12 eyes (70.6%) had diminished completely, while EMs from five eyes (29.4%) had resulted in low grade epiretinal membranes (ERMs). The interval between the EM appearance and disappearance was 10–12 months.

Conclusions: In eyes without pre-existing retinal conditions, EM may develop after PVD and may represent denatured vitreous cortex with a cellular component. These lesions usually resolve spontaneously, but may be associated with a low grade ERM.

Proliferative Diabetic Retinopathy Detection: Comparison of Clinical Examination, Optomap Photographs and Fluorescein Angiography

*First Author: Rohit **AGRAWAL***
*Co-Author(s): Chaitra **JAYADEV,** Ram **PULIPAKA***

Purpose: To analyze the clinical retinal examination findings and Optomap ultrawide field retinal imaging for the detection of proliferative diabetic retinopathy (DR) as compared to fluorescein angiography (FA).

Methods: In this retrospective cross-sectional study, five hundred and twenty-three patients diagnosed with DR on retinal examination underwent FA and Optomap imaging. FA and Optomap images were graded by masked graders and the diagnosis was labelled either as PDR or non-proliferative DR. Sensitivity and specificity was calculated comparing the diagnosis obtained from the dilated retinal examination and the Optomap images against the FA image findings.

Results: Gradable quality FA and Optomap images with a clinical diagnosis mentioned in the medical record for that particular visit were available in 980 (right eye – 656; 67%; left eye – 324; 33%) eyes of 496 patients. There were 332 (67%) males and 164 (33%) females with a mean age of 60.3 ± 9.51 years (range: 32–81 years). Sensitivity of clinical examination and Optomap images in accurately identifying PDR was 63.5% and 43.5% respectively. Specificity of clinical examination and Optomap images in accurately identifying PDR was 88.5% and 76.2% respectively. On comparison of the Optomap imaging findings against the clinical examination findings, the sensitivity and specificity were 47.7% and 75.1% respectively.

Conclusions: Both clinical fundus evaluation and Optomap imaging were relatively inferior to FA in the detection of PDR, which hence remains the choice of imaging modality giving scope for wider application.

Using 3D-MRI Imaging to Quantitatively Analyze the Shape of Eyeballs with High Myopia and to Investigate Relationships between Myopic Traction Maculopathy and Posterior Staphyloma

*First Author: Xi **CHEN***

Purpose: To quantitatively analyze the shape of eyes with high myopia using high-resolution three-dimensional (3D) magnetic resonance imaging (MRI) and investigate relationships between myopic traction maculopathy (MTM) and the morphological changes of posterior staphyloma (PS).

Methods: All participants underwent a comprehensive ophthalmic examination. MTM was divided into different types by optical coherence tomography, and ocular shapes were categorized by MRI.

Results: A total of 105 patients (105 eyes) were studied, with a mean age of 60.4 ± 13.3 years, and mean AL of 28.71 ± 2.78 mm. For eyes scanned, spheroidal shape was observed in 35 eyes (33.3%), ellipsoidal shape was observed in 11 eyes (10.5%), conical shape was observed in 17 eyes (16.2%), nasally distorted shaped was observed in 18 eyes (17.1%), temporally distorted shape was observed in 16 eyes (15.2%), and barrel shape was observed in 8 eyes (7.7%). In the eyes without PS, MTM accounted for 23.8%, while with PS the proportion of MTM in eyes increased to 53.8%. 22.9% of the spheroidal shape with MTM, which was the lowest. The proportion of MTM in elliptical, conical, barrel, nasal torsion, and temporal torsion shapes were gradually increased. 45.5% of the nasal torsion shape with MTM, and the incidence of MH and MRS increased significantly. 83.3% of the temporally distorted shape with MTM and MRS were found in 50%.

Conclusions: Quantitative analysis of eyeball morphology based on 3D MRI can help us to explore a simple, safe and accurate diagnosis and treatment evaluation and prediction system for guiding clinical work.

Ocular Oncology & Pathology

A Case of Neglected, Recurrent Adenoid Cystic Carcinoma of Parotid Gland

First Author: Adeline ***LOW***
Co-Author(s): May-may ***CHOO,*** *Azida Juana* ***KADIR***

Purpose: We report a case of a 61-year-old woman, with left parotid gland adenoid cystic carcinoma (ACC) diagnosed 16 years ago, who had rapid increase in facial swelling of 4 months' duration, associated with left eye blindness.

Methods: Patient had three previous excisions of parotid mass and completed 60 cycles (3600 Gy) of radiotherapy with complete remission. This recurrence was noted two years ago but she opted for homeopathic treatment until current presentation. On presentation, the left vision was light perception with grade 1 relative afferent pupillary defect. There was a massive fungating mass over the parotid region. The palpebral aperture was tight with conjunctival chemosis and complete restriction of extraocular movements. Fundus examination revealed a huge mass inferotemporally indenting inwards with overlying chorioretinal atrophy. A large cotton wool spot was present above the macula. An ophthalmic diagnosis of orbital infiltration, left radiation retinopathy, neuropathy and likely maculopathy was made. Left orbital exenteration was initially suggested. Magnetic resonance imaging and positron emission tomography scans revealed a left parotid tumor with extensive local tumor infiltration, intra-orbital and intracranial extension, submental metastatic node and multiple lung lesions. Due to extensive metastasis, the patient was offered palliative treatment after multidisciplinary team conference. Histopathology slide showed ACC arranged in typical solid or cribriform patterns with increased mitotic activity.

Results: ACC is a slow growing, invasive cancer with a high recurrence rate. It contributes to 1% of malignant tumors in oro-maxillofacial region.

Conclusions: This case illustrates the aggressive nature of this malignancy and importance of early intervention.

Clinical Presentations of Radiation Retinopathy secondary to Plaque Brachytherapy for Choroidal Melanoma

First Author: Sashwanthi ***MOHAN***
Co-Author(s): Vikas ***KHETAN***

Purpose: To study the clinical presentation and management of radiation retinopathy secondary to plaque brachytherapy for choroidal melanoma in a tertiary eye care hospital in South India.

Methods: Retrospective case study.

Results: Seventy patients received plaque therapy for choroidal melanoma between 2004-2021. Twenty-nine of these patients (41.4%) developed radiation retinopathy. The average time taken to develop radiation retinopathy was 25 (+/-10.75) months. The average follow-up from the time of detection of retinopathy to the final visit was 38.9 months (range 0-124). The average total radiation dose was 76.78 (+/-11.62) Gy. Of the twenty-nine patients, eight patients (27.5%) had proliferative retinopathy at presentation and four of them underwent laser photocoagulation. Twenty-one patients (72.4%) also had radiation maculopathy of which 14 (66.66%) patients received intravitreal anti-VEGF injection and one patient received Ozurdex injection. Thirteen patients with radiation maculopathy had a minimum follow up of more than 6 months (range 6-107 months) after receiving intravitreal injection and their visual outcomes were evaluated. A mean of 2.5 (range 1-6) injections were given. The mean logMAR visual acuity in these patients at the time of development of radiation maculopathy was 1.3523 (SD = 1.0434) which became 1.4554 (SD = 1.3487) post treatment (p=0.6029). This can probably be attributed to the lack of timely follow-up in between the injections.

Conclusions: Prompt recognition of early signs of radiation retinopathy and appropriate management is important. Regular follow-up should be stressed as this is important to prevent recurrences and further loss of visual acuity.

Diagnosing Paraneoplastic Optic Neuropathy with Anti-CV2/CRMP-5 Antibody

First Author: Jin Yi ***YAP***
Co-Author(s): Nurul Ain ***MASNON,*** *Wan Hazabbah* ***WAN HITAM***

Purpose: The diagnosis of paraneoplastic optic neuropathy can be challenging by looking only at the clinical features and usual laboratory investigations. With the help of anti-CV2/CRMP-5 antibody, we can arrive at the diagnosis sooner and prompt further investigations to locate the primary source of malignancy.

Methods: Case report.

Results: We describe a case of a 45-year-old healthy woman who presented with seizure and encephalitis; followed by an acute visual loss in both eyes for one week. Her visual acuity was no perception of light in the right eye and hand movement in the left eye. There was a generalized restriction of extraocular ocular muscle movements in both eyes. Fundoscopy showed bilateral pale optic disc. Paraneoplastic antigen autoimmune profile showed positive anti-CV2/CRMP-5 antibody. CT-thorax revealed the presence of right apical lung mass; confirmed to be adenocarcinoma through biopsy. She was scheduled for lung lobectomy and chemotherapy.

Conclusions: In conclusion, unexplained atypical optic neuropathy associated with other neurological associations should raise the suspicions of paraneoplastic optic neuropathy, after infective and autoimmune etiologies have been ruled out. Extensive workup, including tumor and paraneoplastic markers and radiology investigations, may help in detecting the primary site of malignancy or metastasis. Early-stage cancer may be curable. However, paraneoplastic can be a manifestation of advanced disease, such has been demonstrated in our case. The prognosis in such cases is guarded, which can be fatal most of the time.

IRIS associated KS

First Author: Gaytry ***SELVARAJAH***

Purpose: To report a rare case of Kaposi›s sarcoma.

Methods: Case report.

Results: A 26-year-old man diagnosed with HIV on highly active antiretroviral therapy (HAART) presented with six months history of bilateral progressive, painless eyelid swelling. There was no history of trauma. His visual acuity was 6/6 in both eyes and he had no other visual symptoms. On examination he had multiple reddish nodular hemangioma-like lesions over the conjunctival side of the eyelids. There was similar reddish plaque-like lesion on the upper

gingiva and soft palate. There was no proptosis or ptosis noted and his extra ocular movements were full. He had multiple enlarged lymph nodes in the pre- and post-auricular areas, right upper cervical region, axilla, supraclavicular and superficial inguinal regions. He subsequently underwent incisional biopsy of the left lower lid mass. The histopathology report showed proliferation of irregular jagged poorly defined vascular channels with interlacing bundles of spindle cells that were positive for vascular markers CD31 and CD34 consistent with Kaposi›s sarcoma (KS). Despite having a high CD4 count of more than 700, the lesion on the right inferior fornix continued to grow. In summary, he had developed progressive KS, which we identified as immune reconstitution inflammatory syndrome (IRIS) associated KS. This was treated with intravenous doxorubicin and bleomycin (planned for 6 cycles) by the infectious diseases team.

Conclusions: To report on a rare case of IRIS-KS in a South East Asian man who is HIV positive treated with high dose HAART.

Minimally Invasive Subretinal Biopsy for Primary Vitreoretinal Lymphoma

First Author: Mohit ***DOGRA***
Co-Author(s): Sahil ***JAIN,*** *Gaurav* ***PRAKASH,*** *Manish* ***ROHILLA,*** *Ramandeep* ***SINGH***

Purpose: Primary vitreoretinal lymphoma (PVRL) is the commonest masquerade seen in elderly patients and needs vitreous biopsy for confirmation of diagnosis. However, false negative results following diagnostic vitrectomy are frequently seen. We evaluated the role of minimally invasive subretinal biopsy as the primary surgery in suspected cases of PVRL.

Methods: This retrospective case series included all patients who had undergone 25 gauge pars plana vitrectomy with vitreous (diluted and undiluted) and subretinal biopsy as a primary procedure in eyes suspected of having PVRL. Following vitreous sampling and posterior hyaloid removal, subretinal aspiration of visible lymphoma cells through a retinotomy was done followed by endolaser and gas tamponade. From January 2020 to January 2021, clinical records of these patients were retrieved and clinical, demographic and surgical data was noted.

Results: 7 eyes of 7 patients (5 males) with mean age 66 years (range 55-77 years) were included. Duration between date of presentation and vitrectomy was less than 15 days in all patients except 1 who presented with features of necrotizing retinitis. Cytology of vitreous was diagnostic of PVRL in 2 patients (28.57%) while subretinal aspirate detected lymphoma cells in all cases (100%). None of the patients experienced any intra or post-operative complications.

Conclusions: Minimally invasive subretinal biopsy as part of primary vitrectomy increased the yield and positivity rate of detecting lymphoma cells as compared to vitreous biopsy alone in suspected cases of PVRL. This reduces the chances for repeat vitrectomy while circumventing the need for full-thickness retinal biopsy and its associated complications.

Outcomes of Tandem Intravitreal Chemotherapy for Refractory Vitreous Seeds in Retinoblastoma

First Author: Gaurav ***GARG***
Co-Author(s): Mohammed Moinul ***HOQUE,*** *Santosh* ***HONAVAR,*** *Vijay Anand* ***PALKONDA,*** *Mrittika* ***SEN***

Purpose: Efficacy and safety of tandem intravitreal chemotherapy (topotecan + melphalan) for refractory (eyes which had failed monotherapy) vitreous seeds in retinoblastoma.

Methods: Retrospective interventional case series including 20 eyes of 20 patients, who underwent tandem intravitreal chemotherapy (topotecan 30µg in 0.05ml + melphalan 20µg in 0.05ml). The mean number of intravitreal injections was 3.5±1.9 (range 1-7). Regression of vitreous seeds and eye salvage were the primary outcome measures.

Results: The mean age at presentation was 42.6±31.1 months. Mean follow-up was 26.2±18.7 months. Vitreous seed regression was noted in 17 (85%) eyes with 100% eye salvage. Recurrence of vitreous seeds occurred in 3 eyes, of which 2 were associated with local

tumor recurrence. Retinal pigment epithelial alterations were seen in 4 eyes.

Conclusions: Tandem intravitreal chemotherapy is highly effective and safe, with impressive regression for refractory vitreous seeds in retinoblastoma.

Regional Anesthesia as a Method for Potentiation in Ophthalmoncology

*First Author: Danil **ZEMTSOV***
*Co-Author(s): Zemtsova **NADEZHDA,** Kovrizhnykh **NIKOLAY***

Purpose: To give an overview of the data on the effectiveness of regional anesthesia as one of the methods of oncosuppression.

Methods: To consider and draw attention to the influence of regional anesthesia and analgesia on the immune component of the stress response, as one of the possible ways to improve the results of surgical interventions in oncology.

Results: General anesthesia with the use of inhalation anesthetics and the surgery itself suppress the antitumor function of CD3 +, CD8 + T-lymphocytes, which are cytotoxic. Immunity disorders and the release of proinflammatory cytokines are observed to a lesser extent with regional anesthesia and analgesia compared with the systemic use of narcotic analgesics and anesthetics.

Conclusions: The incidence of malignant neoplasms of the eye is constantly growing in Russia. So, back in 2000, the indicator was equal to 0.45 cases per 100 thousand of the population, and by 2019 this figure had grown to 0.79 cases per 100 thousand, or 1150 cases per year. Despite the existence of many approaches to the correction of individual links of the surgical stress response, one of the most promising and real possibilities of its complex limitation is the use of anesthesia and analgesia techniques, which make it possible to reduce intraoperative doses of inhalation anesthetics and narcotic analgesics with immunosuppressive properties. Unfortunately, data on studies of such approaches in ophthalmoanesthesiology and ophthalmoncology do not exist at all.

Retinal and Choroidal Metastasis with Paraneoplastic Optic Neuropathy in the Background of Metastatic Lung Carcinoma

*First Author: Cheau Wei **CHIN***
*Co-Author(s): Kiet-phang **LING,** Francesca Martina **VENDARGON***

Purpose: Paraneoplastic optic neuropathy (PON) is a rare phenomenon that is associated with lung carcinoma. In addition, retinal metastasis is extremely rare, accounting for <1% of intraocular metastasis. We report a rare case of synchronous metastases from lung carcinoma to the choroid of the right eye and the retina of the left eye complicated with presumed PON.

Methods: Case report.

Results: A 39-year-old Nepalese man presented with a progressive drop in vision in his left eye for 2 months without prior history of cancer. His vision was 6/9 and 6/45 in right and left eye, respectively. His left eye optic nerve function tests were positive, and fundus examination showed a choroidal mass in the right eye and a retinal mass with a swollen optic disc in the left eye. Clinically he was also under medical team investigation for fever, shortness of breath, and vomiting. He was suspected to have paraneoplastic syndrome as evidenced by anemia, hyponatremia, raised LDH, and hypercoagulable status resulting in inferior vena cava thrombosis. Otherwise, infective screening and autoimmune screening were unremarkable. Serological testing for PON was not performed due to cost. Brain imaging ruled out the presence of space-occupying lesion and infiltration of the optic nerve, while thorax and abdomen imaging revealed multiple lesions over his lungs and liver, suggestive of metastatic lung carcinoma.

Conclusions: This is probably the first report that describes the co-existence of paraneoplastic optic neuropathy and retinal metastasis. The presence of intraocular

mass and optic disc swelling should prompt investigations for systemic malignancies.

Sight Threatening Extraocular Cysticercous Cysts

*First Author: Hiranmoyee **DAS***

Purpose: In ophthalmic manifestation of cysticercosis, cysts are located either inside the eyeball (intraocular) or in the ocular adnexa (extraocular). Though intraocular cysts are usually associated with impairment of vision, here we are reporting 3 cases of vision threatening extraocular cysticercous cysts.

Methods: Case presentation.

Results: Case1: 20-year-old male with painless progressive loss of vision and mild proptosis in RE for 2 weeks. USG orbit revealed a unilocular cyst with central solid structure showing indulating movements in the right optic nerve shaft. Case 2: 22-year-old male with mild proptosis and blurred vision RE for 1 month. MRI revealed cysticercous 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 papilledema. CT brain revealed a cyst in the cerebral aqueduct with dilation of all the ventricles.

Conclusions: The incidence of cysticercosis is very high Northeastern India due to consumption of smoked pork. High index of suspicion is required for the diagnosis of ocular cysticercosis because of the endemic nature of this infestation in this geographic location.

Visual Prognosis Based Staging for Retinal Capillary Hemangioma

*First Author: Gaurav **GARG***
*Co-Author(s): Paul **FINGER***

Purpose: To analyze the literature to determine the visual prognosis of eyes affected by retinal angiomatosis of Von-Hippel Lindau disease (VHL).

Methods: Study Type: Retrospective literature analysis. Medline and PubMed searches were performed for publications on retinal capillary hemangioma (CRH). Data were collected on patient age of presentation, CRH laterality, location, treatment, and progression. Statistical analyses using Pearson Chi-square test, likelihood ratio, and Fischer's exact tests were performed for the effect of these characteristics on visual acuity outcomes.

Results: Vision outcomes need to be based on current technology to be clinically relevant. Therefore, only significant publications from 1960 to 2019 were included. Of these, 5 clinical case series were included, a total of 427 cases. Of these 69.4% (58%-94.1%) cases were unilateral CRH, 30.6% (5.9%-42%) were bilateral, 18.1% (10.9–23.5%) were juxtapapillary in location. Major factors affecting visual acuity were age at onset ($p=0.03$), location ($p<0.0001$) and multifocality ($p=0.0005$). Of interest, CRH-related vision loss was independent of the presence of VHL disease ($p=0.157$).

Conclusions: In this study, age at onset, location and multifocality of CRH were the most important predictors of vision loss, which were used to create a vision-outcome-based classification system. This information can be used to counsel patients and for informed consent.

Vitreous Floaters, a Deadly Masquerader

*First Author: Pei Fang **NEOH***

Purpose: To illustrate a rare presentation of ocular metastases secondary to lung adenocarcinoma.

Methods: A case report.

Results: A 67-year-old man complained of left eye (LE) painless, sudden reduced vision for 3 days. Prior to this, he had progressive blurred vision for 6 months, preceded by floaters. He had been unwell for 6 months with unexplained loss of appetite and weight. He had no fever. He had past visits to ophthalmologists since onset of LE floaters and was diagnosed as LE asteroid hyalosis. LE visual acuity (VA) was hand movement with a relative afferent pupillary defect, right eye (RE) VA was 6/12.

LE fundoscopy revealed vitreous opacities mimicking asteroid hyalosis with extensive exudative retinal detachment. RE ocular examination was unremarkable. Multiple painless papules were noted over the scalp and neck. The right lung had coarse crepitations with reduced breath sounds. Computerized tomography showed a right lung nodular mass and pleural effusion with bone, peritoneal and adrenal metastases. Skin biopsy of the papules confirmed a diagnosis of adenocarcinoma diffusely positive for EMA, Ber-EP4, CEA and CK7, with no transformation zone from native adnexal structures suggestive of metastatic lesions. The diagnosis was LE ocular metastases secondary to right lung adenocarcinoma and he was comanaged with medical and oncology team. However, patient succumbed after 1 month of treatment.

Conclusions: Ocular neoplastic masquerader can be in any form and severity. Early recognition and thorough systemic examination can be sight and life saving.

Ophthalmic Epidemiology

Association between -2578 C/A Vascular Endothelial Growth Factor Polymorphisms and Neovascular Age-Related Macular Degeneration in Indonesia

*First Author: Supanji **SUPANJI***

Purpose: To investigate the -2578 C/A polymorphism in vascular endothelial growth factor (VEGF) gene of neovascular age-related macular degeneration (nAMD) in Indonesia.

Methods: Patients and controls were recruited from three tertiary hospitals by ophthalmologists. Genomic DNA was isolated from whole blood sample of 100 nAMD and 100 age-matched controls. The VEGF gene fragment was amplified using PCR methods before digested by Bgl II restriction enzymes. Statistical analysis was done using STATA software.

Results: The number of patients with A allele was higher than controls with A alleles. There was a statistically significant different between patients and controls in an Indonesian population.

Conclusions: There was an association between VEGF gene polymorphism and nAMD in Indonesian populations.

Consanguinity in Retinal Dystrophies, Impact and Implications: A Single Center Study

*First Author: Sherina **THOMAS***

Purpose: To study the impact and outcomes of consanguinity on retinal dystrophies in South India, a single center study.

Methods: This is a retrospective observational case study of 1200 patients between 2016 and 2019 with various retinal dystrophies. A detailed history and pedigree analyses followed by comprehensive eye examination and imaging was done.

Results: Out of 1200 patients which included 9 different types of dystrophies, consanguinity was seen in 802 patients (66%). Mean age was 33.27 years with 67.3% males and 32.7% females. High incidence of multiple consanguineous marriages was noted in families of these 802 probands. Prediction for incidence of retinal dystrophies ranged between 25-75% in patients who underwent pre-natal genetic testing.

Conclusions: Incidence of consanguinity was high in retinal dystrophies which adversely affected progenies. This study proves to be useful in creating awareness about inheritance of retinal dystrophies in a South Indian population and reiterates the importance of genetic counseling and prenatal counseling to bring down the morbidity.

Epidemiology of Mutations in the 65 kDa Retinal Pigment Epithelium Gene-Mediated Inherited Retinal Dystrophy: A Systematic Literature Review

*First Author: Juliana **SALLUM***
*Co-Author(s): Dominik **FISCHER,** Vinay Preet **KAUR,** Claudio **SPERA,** Daniel **VIRIATO,** Judit **BANHAZI***

Purpose: Inherited retinal dystrophies (IRDs) comprise a wide range of phenotypically

and genetically heterogeneous group of rare diseases resulting from over 270 genetic mutations and are generally characterized by progressive loss of vision. Among these, biallelic mutations in the RPE65 gene are often associated with Leber's congenital amaurosis 2 (LCA2) and retinitis pigmentosa 20 (RP20). This study aims to understand the epidemiology landscape of RPE65 gene-mediated IRD through a systematic review of the literature.

Methods: A review of global medical literature was conducted by following the Cochrane handbook for systematic reviews. The electronic databases (Embase, Medline, Cochrane, etc.) were searched until June 2021 to retrieve studies reporting the epidemiology of RP or LCA, and the proportion of RPE65 gene mutations.

Results: From the screening of 1066 citations, 100 studies were identified with relevant epidemiology data. The estimated global prevalence of LCA and RP ranged between 1.20 to 2.37 and 11.09 to 26.43 per 100,000, respectively. The proportion of RPE65 mutations in LCA cases varied from 1.26% to 22.22% across the world, and 1.26% to ~16% in both the Asian and the Americas regions. The proportion of RPE65-RP ranged between 0.23% to 4.27% across the European and Americas region. The proportions of RPE65-IRDs across the world ranged between 1% (China, US, UK and Israel) to 14% (Germany).

Conclusions: Patients with RPE65-mediated IRDs were reported from across the world but robust epidemiological data was limited. There was a high heterogeneity in reporting of the data, highlighting the need to generate better evidence for assessing disease epidemiology.

Etiologic Profiling and Visual Outcomes of Dense Vitreous Hemorrhage among Non-Diabetics Treated with Pars Plana Vitrectomy

First Author: Narciso Jr ***ATIENZA***
Co-Author(s): Jose Ernesto ***ROCES***

Purpose: The aim of this study is to determine the visual outcomes and demographic characteristics of the non-diabetic causes of dense vitreous hemorrhage (VH) treated with pars plana vitrectomy.

Methods: Retrospective chart review was done on 120 eyes with non-diabetic, dense vitreous hemorrhage treated with pars plana vitrectomy (PPV), performed by a single surgeon in Cardinal Santos Medical Center and Legazpi Eye Center from January 2013 to January 2018. The primary outcome of this study was improvement of visual acuity (VA) after 1 year post-operatively, defined as equal or more than 2 lines of improvement in VA. The secondary outcomes are obtained, which included sex, age, and phakic status. The diagnoses are based on codes based on the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM).

Results: Vitreous hemorrhage secondary to vascular diseases had an overall improvement in VA of 86% after PPV (n=73). Etiologic causes are retinovascular occlusion (n=36) at 42.8%, choroidal neovascularization (CNV) at 35.7%, tractional retinal detachment (n=1) at 1.1%, and retinal macroanuerysm (n=1) at 1.1%. Other etiologies: posterior vitreous separation (n=3), Eales disease (n=1), retinal angioma (n=1), and toxocariasis (n=1).

Conclusions: Branched retinal vein occlusion (BRVO) was the most common cause of non-diabetic dense vitreous hemorrhage. It was also demonstrated that visual acuity significantly improved after pars plans vitrectomy in BRVO at 42.8%, followed by CNV from PCV or NAMD at 35.7% and CRVO at 5.9%.

Identifying Undetected Prevalent Disease: The First Pass Effect in Diabetic Retinopathy Screening Programs

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Purpose: To compare referable diabetic retinopathy (refDR) rates identified on rapid assessment of avoidable blindness and DR (RAAB+DR) with community-based DR screening program (DRSP) in the same population.

Methods: RAAB+DR was performed following standard methodology using random compact segment sampling with ultrawide field imaging (UWFI) to assess DR and diabetic macular edema (DME). DRSP was performed using validated methodology of 5-field-50-degree mydriatic imaging that has substantial agreement for DR/DME (Kw=0.79/0.81) compared to Early Treatment Diabetic Retinopathy Study (ETDRS) photography. RAAB+DR was performed in preparation for implementation of DRSP. DRSP is ongoing and data represents 10.6% of screening target. RefDR was defined as moderate nonproliferative DR (NPDR) or worse, DME or ungradable.

Results: Evaluating the same target population, 1,609 individuals were evaluated in RAAB+DR, with 341 (21.2%) people with diabetes (PwDM). DR severity was 239 (70.1%) no DR, 38 (11.1%) mild NPDR, 35 (10.3%) moderate, 10 (2.9%) severe, 19 (5.6%) proliferative DR (PDR), 34 (7.4%) DME and 9 (2.4%) ungradable. DRSP evaluated 562 PwDM. Distribution of DR severity was 335 (59.6%) no DR, 92 (16.4%) mild NPDR, 51 (9.1%) moderate, 39 (6.9%) severe, 33 (5.87%) PDR, 30 (5.4%) DME and 31 (5.5%) ungradable. RefDR was identified in 86 (18.7%) of the RAAB+DR cohort and 169 (30.1%) in DRSP.

Conclusions: In the initial stage of screening there will be a significant first-pass effect, detecting higher levels of previously undetected prevalent disease. Hence, planning for DRSP needs to account for this initially large demand for eyecare services. In this cohort, there was a 61% increase in refDR rate that needs to be accommodated in the existing healthcare system.

Incidence, Risk Factors and Treatment Outcomes of Type 1 Retinopathy of Prematurity in a Neonatal Intensive Care Unit at a Tertiary Care Center in India

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Purpose: To report the incidence and risk factors for any retinopathy of prematurity (ROP) and type 1 ROP and treatment outcomes of type 1 ROP at a tertiary care center serving a mainly rural population in south India.

Methods: Infants born at our hospital with gestation age (GA) of < 34 weeks or birth weight (BW) < 2000g were screened for ROP and treated if they developed type 1 ROP. Incidence of any stage and type 1 ROP were calculated. Several variables were evaluated by univariate and multivariate analyses for their significance in developing any ROP and type 1 ROP. Results of treatment for type 1 ROP are reported.

Results: Out of 263 infants screened, 64 (24.3%) developed any ROP and 15 (5.7%) type 1 ROP. All the eyes with type 1 ROP showed complete regression after treatment. Multivariate analysis showed that 1) infants with GA of 31-34 weeks had significantly less any ROP (P=0.002) and type 1 ROP (p=0.020) versus infants of GA ≤30w; 2) infants with BW ≥1501g had less any ROP (P=0.025) and less type 1 ROP (P=0.018) versus infants with BW ≤1250g; 3) infants with BW 1251g to 1500g had less type 1 ROP versus infants with BW ≤1250g (P=0.042); and 4) females had significantly less type 1 ROP (P= 0.012) versus male infants.

Conclusions: The incidence of any ROP and type 1 ROP were relatively low in our study. Type 1 ROP regressed completely in all eyes after treatment. GA, BW and gender were significant factors for any ROP and type 1 ROP.

Prevalence and Risk Factors of Oculocardiac Reflex in Vitrectomy with Retrobulbar Anesthesia: A Six Year Retrospective Chart Review

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LEE, *Abigail* ***DE CASTRO****-SOLAMO*

Purpose: Oculocardiac reflex (OCR) is described as a sudden onset of decrease in heart rate of 10% to 20% from the baseline with intraorbital manipulation. OCR is well-known in ophthalmology and anesthesiology literature; it has been estimated to range from 14% to 90%.

Recent reports, however, show that the reflex may also occur in a variety of adult surgeries.

Methods: All vitrectomy cases done by a single surgeon and single anesthesiologist in Cardinal Santos Medical Center from January 2012 to December 2017 were included. Patient demographics, body mass index (BMI), past medical history, maintenance medications, personal and social history, operation done, laterality, ASA score (American Society of Anesthesiologists Physical Status Classification System), and intraoperative anesthesia records were recorded and analyzed using binomial logistic regression.

Results: Anesthesia records of 461 retina cases from January 2012 to December 2017 were gathered and deemed complete for analysis. 212 patients were enrolled in the study. Results show that OCR had a prevalence of 18.4% (n=39). No significant relationship was noted between OCR and age, sex, BMI, hypertension, diabetes mellitus, previous eye surgery, ASA score, and smoking with their p-values above 0.05. However, alcoholic beverage drinkers had 2 times more risk of developing OCR intraoperatively when compared to non-alcoholic drinkers (p=0.03, CI=95%).

Conclusions: Patients undergoing vitrectomy with retrobulbar anesthesia have a low risk of developing OCR. Alcoholic beverage drinker patients have a significantly higher chance to develop OCR, hence close monitoring and anticipation in these patients are needed to avoid fatal complications intraoperatively.

Prevalence of Ophthalmic Diagnoses in Pregnant Patients: A Nationwide Inpatient Sample Analysis

First Author: Rushi ***PATEL***
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Purpose: Physiological adaptations during pregnancy can result in benign, pathologic, or exacerbation of existing ocular conditions. We aim to characterize the prevalence of ocular disorders in inpatient pregnant patients.

Methods: The Nationwide Inpatient Sample (NIS), the largest publicly available inpatient care database in the United States, was selected for all pregnant patients aged 12-55 that had an ophthalmic diagnosis from 2002-2014. The International Classification of Disease, 9th revision (ICD-9) diagnostic codes were used to define presence of and group ocular diagnoses. Disease prevalence and patient demographics were evaluated.

Results: There were 90,467 cases queried, the plurality of which were white (41.8%). The patient population had a median age of 28 years, a median length of hospital stay of 3 days, and median number of medical diagnoses of 8. Patients most frequently presented with complaints of visual disturbances (29.6%), diagnosis of retinal disorder (20.7%), or issue of blindness and low vision (11.5%). Of the aforementioned diagnostic groupings, the most common subdivisions were other specified visual disturbances (14.4%), diabetic retinopathy (13.6%), and profound monocular impairment (4.0%). 17.9% of patients were concurrently diagnosed with preeclampsia, eclampsia, or HELLP syndrome. Other systemic comorbidities included chronic blood loss anemia (15.6%), diabetes with chronic complications (14.3%), deficiency anemia (11.9%), and hypertension (11.2%).

Conclusions: Visual disturbances are the most common ophthalmologic complaint in admitted pregnant patients. The development of retinal disorders, namely diabetic retinopathy, is also a prevalent complication indicating pregnant women should continue to be monitored for the development of diabetic complications during pregnancy.

Pediatric Retina

A Study of Prevalence and Risk Factors of Retinopathy of Prematurity

First Author: Sucheta ***KAUL***
Co-Author(s): Renu ***MAGDUM,*** *Divya* ***MOTWANI,***
Mayur ***PATIL,*** *Kunj* ***NAIK***

Purpose: Retinopathy of prematurity (ROP) being a disease of the immature retinal blood vessels of premature newborns, by toxicity of oxygen, has seen a surge with recent advances causing improvement in rates of survival of neonates. Low gestational age, low birth weight and increased oxygen supplementation after birth play an important role in this condition. The study aimed to determine the prevalence and risk factors of ROP.

Methods: A prospective study was conducted in a tertiary center in western India from September 2018 to August 2020. 60 babies were screened with birth weight less than 1500 grams and gestational age less than 32 weeks. After obtaining consent, history was taken from parents and fundus examination of babies was done. The grading of stages and zones was done in positive cases. Data was entered in Excel and tests of statistical significance were used.

Results: The prevalence of ROP was 28%. Maximum cases of ROP were in zone III (70%). Only 7% of mothers had completed more than 28 weeks of gestation. The mean birth weight was 1.36 kilograms. 71% of the ROP positive babies were delivered by normal vaginal delivery. 100% of babies diagnosed with ROP had been subjected to oxygen supplementation. 47% of babies developed sepsis whereas 76% of babies developed respiratory distress syndrome.

Conclusions: ROP is a preventable cause of blindness in childhood. Early screening by an ophthalmologist is important to prevent this. The burden of ROP is bound to rise due to improvement in the field of neonatology if screening protocols are not implemented stringently.

Aicardi Syndrome with Persistent Fetal Vasculature and Secondary Glaucoma: A Case Report

First Author: Kim Paolo ***LORENZO***
Co-Author(s): Darby ***SANTIAGO***

Purpose: Aicardi syndrome is a rare neurodevelopmental disease characterized by infantile spasms, corpus callosum agenesis, and chorioretinal lacunae. We report a case of Aicardi syndrome with persistent fetal vasculature with secondary glaucoma in the right eye and chorioretinal lacunae in the left eye.

Methods: This is a case of a 1-year-old Filipino female, born full term, who initially presented with seizures. She had no dazzle on both eyes, with right beating nystagmus and esotropia. The right eye's pupil was corectopic and nonreactive to light while the left eye's pupil was briskly reactive to light with reverse relative afferent pupillary defect. The right eye had flat anterior chamber with posterior synechiae, average intraocular pressure of 35 mm Hg, and no view of the posterior segment. For the left eye, indirect ophthalmoscopy findings were chorioretinal lacunae, patches of chorioretinal atrophy, and preretinal hemorrhages.

Results: On ocular ultrasound of the right eye, there was a high amplitude band echo from the optic nerve head up to the posterior lens capsule. The axial length was 14.15 mm. The primary consideration was persistent fetal vasculature, but retinal detachment cannot be ruled out based on the ocular ultrasound findings. On cranial magnetic resonance imaging, there was corpus callosum agenesis.

Conclusions: We described a case of Aicardi syndrome with persistent fetal vasculature with secondary glaucoma in the right eye and chorioretinal lacunae in the left eye. Management of this rare disease can be challenging and requires a multidisciplinary approach in order to give the best possible quality of life for the patient.

Clinical Presentation and Outcome of Unilateral Retinoblastoma Patients in a Suburban Tertiary Center

First Author: Ain Nasyrah ***AHMAD SUKARI***
Co-Author(s): Shatriah ***ISMAIL,*** *Ariffin* ***NASIR***

Purpose: To study the demographic profile, clinical characteristics, and outcome of unilateral retinoblastoma patients.

Methods: This was a retrospective record review of unilateral retinoblastoma patients in a suburban tertiary center in Kelantan, Malaysia between January 2009 and December 2019.

Results: The study included 12 patients with a mean age of 25.5 months ± 14.38 months. All parents reported white eye reflex during presentation (100%). The most common clinical findings at presentation were leukocoria in all 12 patients (100%), followed by secondary glaucoma in five patients (41.7%), retinal detachment in five patients (41.7%) and proptosis in three patients (25%). Intraocular disease was seen in 11 patients (91.7%) and extraocular disease was seen in one patient (8.3%). Six patients had intraocular disease stage E (50%) and one patient had extraocular disease stage 4 (8.3%). 11 patients underwent chemotherapy (91.7%) and 10 patients had enucleation done (83.3%). There were no local recurrences or any second neoplasm reported in all patients; however there was one death reported (8.3%) with a survival time of 48 months. The mean survival time was 116 months ± 49.96.

Conclusions: Majority of unilateral retinoblastoma patients had unilateral disease and had good survival outcome. Death was reported in the only patient with extraocular disease. This shows that extension of disease is an important factor for better outcome.

Clinical Profile and Treatment Outcomes of Infants with Exudative Retinal Detachment as the Presenting Feature in Retinopathy of Prematurity

First Author: Komal ***AGARWAL***
Co-Author(s): Subhadra ***JALALI,*** *Sushma* ***JAYANNA***

Purpose: To describe the clinical profile and treatment outcomes of infants with retinopathy of prematurity (ROP) presenting with exudative retinal detachment.

Methods: Retrospective interventional case series. Preterm infants diagnosed with ROP having exudative retinal detachment (ERD) at presentation were included. All demographic details, clinical findings and treatment given were noted. Anatomical outcome was categorized as good, fair and poor. Refractive outcome was categorized into mild, moderate and severe according to spherical equivalent at last visit.

Results: 15 eyes (8 patients) were included. Mean GA was 31.3 weeks and birth weight was 1462.6 g. All infants had history of respiratory distress syndrome. All eyes presented with APROP. Yellowish white patches of retinal edema in avascular retina were seen in all eyes. 86.6% of eyes had vascular sclerosis. 99.3% of eyes had subretinal exudates. 13 eyes were treated with intravitreal bevacizumab, 2 eyes required only laser photocoagulation. Anatomical outcome was good in all eyes. 40% of eyes had mild refractive error.

Conclusions: ERD in ROP is rare. Use of oxygen can be a contributory factor. Vascular sclerosis is consistent with hyperoxia induced retinopathy models. Retinal edema and subretinal exudates point towards disrupted inner and outer blood retinal barrier. Treatment outcomes are good when diagnosed and treated in time.

Extramacular Retinal Hole in a Preterm Infant following Spontaneously Regressed Retinopathy of Prematurity

First Author: Rohit ***AGRAWAL***
Co-Author(s): Anand ***VINEKAR***

Purpose: Retinal holes in infants are rare. Macular holes secondary to retinal hemorrhages caused in shaken baby syndrome (SBS) have been reported in older infants. However, extramacular retinal holes after spontaneously regressed retinal hemorrhages have not been reported.

Methods: A male preterm infant born second in a twin delivery at 890 grams and 31 weeks of gestation underwent retinopathy of prematurity (ROP) screening and was detected to have stage 1 ROP in both eyes with retinal and vitreous hemorrhages in the left eye. Perinatally, the baby had intraventricular hemorrhage (IVH), neonatal jaundice, respiratory distress and was ventilated for fourteen days in the neonatal unit. Over the subsequent seven weeks (PMA 35-41 weeks) the hemorrhages gradually resolved and the ROP progressed to stage 2 ROP before resolving spontaneously. In the left eye, there was a retinal hole observed at the edge of zone 1. Hand-held spectral domain optical coherence tomography confirmed its full-thickness extent and B-scan ultrasound confirmed a partial posterior vitreous detachment.

Results: Barrage laser photocoagulation was performed for the retinal hole using 532nm Nd:Yag green laser under topical anesthesia which subsequently healed.

Conclusions: We hypothesize that vitreous and retinal hemorrhages which were associated with IVH in this infant may be associated with posterior vitreous detachment which may have contributed to the formation of the retinal hole. Timely detection and treatment of such holes may prevent complications including retinal detachment in the future.

Fundus Albipunctatus with a Novel RDH5 Gene Mutation

First Author: Madhusmita ***MAHAPATRA***
Co-Author(s): Dr Ankit ***AHIR,*** *Harsha* ***BHATTACHARJEE,*** *Nilutparna* ***DEORI***

Purpose: To report a case of fundus albipunctatus in an Indian girl child born out of consanguineous marriage with a novel homozygous nonsense variation in exon 4 of the RDH5 gene (chr12:g.55723941C>T; Depth: 121x) that resulted in a stop codon and premature truncation of the protein at codon 209 (p.Arg209Ter; ENST00000257895.10).

Methods: DNA extracted from blood was used to perform targeted gene capture using a custom capture kit. The libraries were sequenced to mean >80-100X coverage on Illumina sequencing platform. The sequences obtained were aligned to human reference genome (GRCh38.p13) using Sentieon aligner and analyzed using Sentieon for removing duplicates, recalibration and re-alignment of indels. Clinically relevant mutations were annotated using published variants in literature and a set of diseases databases: ClinVar, OMIM, GWAS, HGMD (v2020.2) and SwissVar. Common variants were filtered based on allele frequency in 1000Genome Phase 3, gnomAD (v2.1), EVS, dbSNP (v151), 1000 Japanese Genome and our internal Indian population database.

Results: A homozygous nonsense variation in exon 4 of the RDH5 gene (chr12:g.55723941C>T; Depth: 121x) that resulted in a stop codon and premature truncation of the protein at codon 209 (p.Arg209Ter; ENST00000257895.10) was detected. The observed variation the p.Arg209Ter variant has not been reported in the 1000 genome databases and has a minor allele frequency of 0.003%, 0.003% in the gnomAD.

Conclusions: This is the first reported case of a child with fundus albipunctatus who had RDH5 variant in Assam.

Impact of the COVID-19 Pandemic on Retinopathy of Prematurity Practice

First Author: Tariq ***ALI***
Co-Author(s): Nuzhat ***CHOUDHURY,*** *Ferdous Akhter Jolly* ***JOLLY***

Purpose: The severe acute respiratory syndrome coronavirus 2019 (SARS-Cov-19) associated lockdown led to cessation of public transport and routine outpatient department (OPD) services. However, retinopathy of prematurity (ROP) requires urgent treatment and has been listed as an essential medical service during the COVID-19 pandemic. We discuss the impact of the COVID-19 pandemic on ROP services experienced at our center.

Methods: Retrospectively we reviewed the data of patients who visited our institute in 2019, 2020 and in the first 6 moths of 2021. Since March 8, 2020 there were several occasions of lockdown declared by the government. We tried to sort out the impact of COVID-19 on ROP screening and treatment in this COVID-19 era and also compared the incidence with normal time period in 2019.

Results: 122 babies were screened in 2019 and 48 babies in 2020. From April to August 2020, no baby came for screening. 32 babies were screened in the first 6 months of 2021. There was significant decrease in number of screenings in 2019 and 2020 (p=0.001) and also between the first 6 months of 2019 and 2021 (64 vs 32; p=0.001). Treatable ROP (type 1 ROP) was 12 in 2019, 8 in 2020 and 6 in the first six months of 2021. There was no significant difference in type 1 ROP before or after outbreak of COVID-19 (p>0.05).

Conclusions: Our experience suggests the need of tele-medicine services for ROP screening so that no baby goes unscreened in the coming years. It also shows the similar incidence of type 1 ROP irrespective of lockdown situation.

Laser Photocoagulation for the Treatment of Bilateral Late-Onset Retinopathy of Prematurity-Related Retinal Detachment in an Adult Male: A Case Report

First Author: I Chia ***LIANG***
Co-Author(s): Yun-hsiang ***CHANG,*** *Kathy Ming* ***FENG,*** *Ting Yi* ***LIN***

Purpose: To report a case of bilateral late tractional retinal detachment related to retinopathy of prematurity (ROP) and the short-term prognosis after laser photocoagulation treatment.

Methods: Case report and literature review.

Results: A 36-year-old man presented with a chief complaint of floaters in his left eye. The fundus examination showed demarcation lines over the temporal side in both eyes with tractional retinal detachment and retinal breaks anterior to the lines. He revealed a history of preterm birth at a gestational age of 32 weeks with supplementary oxygen use. A diagnosis of bilateral ROP-related late complication of delayed combined tractional and rhegmatogenous retinal detachment was made accordingly. Peripheral laser photocoagulation along the demarcation lines for confining the detachment area in both eyes was performed with a stable condition during follow up.

Conclusions: Regressed ROP-associated retinal detachment can occur at any time during life. Laser photocoagulation may be a good treatment option while the retinal detachment area is relatively peripheral and macula is still on. Special care and follow-up may be necessary for these patients.

Outcomes of 27-Gauge Lens Sparing Vitrectomy for Stage 4 Retinopathy of Prematurity

First Author: Deeksha ***KATOCH***
Co-Author(s): Mangat ***DOGRA,*** *Ramandeep* ***SINGH,*** *Simar Rajan* ***SINGH***

Purpose: To report the safety and efficacy of 27-gauge LSV in management of stage 4 ROP.

Methods: All eyes with stage 4 ROP that underwent 27-gauge LSV between September

2019-September 2020 were included. Pre-operative characteristics like tunica vasculosa lentis (TVL), vascular activity, extent of fibrovascular proliferation (FVP) were noted. Intra-operative events like lens touch, bleeding, retinal breaks, and operative times were noted. Successful anatomical outcome was defined as re-attachment of the posterior pole at 3-months following surgery.

Results: Forty-four eyes (31 infants) were included. 27 eyes (61.4%) had stage 4A ROP, TVL was present in 2 (4.5%), majority (18) had 3 – 6 clock hours of FVP, 42 eyes had laser prior to surgery. Anti VEGF was given pre-operatively in 7 eyes (15.9%) and 11 (25%) had received it as primary treatment. The mean vitrectomy time was 18.25 minutes. Sutures were required in 13 eyes (29.5%). Favorable anatomical outcome was obtained in 73.17% eyes at a mean follow up of 8.4 months. Factors contributing to unfavorable outcome were gestational age <28 week (p = 0.024), laser done elsewhere (p = 0.041), ectropion uveae (p = 0.017) and Stage 4B ROP (p = 0.004). Complications encountered were intra-operative lens touch (2 eyes), post-operative loose blood (13 eyes, all of these had no prior anti-VEGF injection), cataract (3 eyes), glaucoma (2 eyes) and posterior hyaloid contracture (3 eyes).

Conclusions: Gestational age<28 weeks, ectropion uvea, stage 4B, inadequate laser and no prior Anti-VEGF injection can affect success rates following 27-gauge LSV for stage 4 ROP.

Outcomes of ROP Screening in the Treatment of Patients with Retinopathy of Prematurity at the National Center for Maternal and Children Health, Mongolia

*First Author: Tsengelmaa **CHULUUNBAT***

Purpose: To investigate the outcomes of ROP screening of retinopathy of prematurity (ROP).

Methods: This was a prospective study of premature infants screened ROP from April 13, 2020 to April 28, 2020 and from June 8, 2020 to June 22, 2020 and a prospective cohort study of premature infants with treatment-requiring ROP who received intravitreal injections and laser surgery. Demographic factors, diagnosis and clinical course were recorded. Indirect ophthalmoscopy and retinal imaging was performed using RetCam (Natus Medical, Pleasanton, CA) and images were taken. Each eye was evaluated by the pediatric ophthalmologist and aimag's ophthalmologist for the presence or absence of ROP, zone of vascularization, stage, plus disease, and aggressive posterior ROP (AP-ROP). The diagnosis and classification of ROP for this current study were determined by examination using indirect ophthalmoscopy, and treatment plans were determined according to the International Classification for ROP and the Early Treatment for ROP Study (ET-ROP).

Results: A total of 90 premature infants with BW ≤ 2000 g and/or GA ≤ 34 weeks were screened for ROP during the study period. 8 (8.8%) of the 90 infants screened required treatment. The 8 infants who received ROP treatment had a mean GA of 28.5 ± 1.7 weeks, mean BW of 1237.5 ± 125.42g, mean PMA of 36 weeks and mean follow-up time of 2 months.

Conclusions: After treatment, resolution of ROP was noted in approximately 100% of the patients who had treatment-requiring ROP.

Rewriting the Scribbles of Proliferative Retinopathy in Incontinentia Pigmenti

*First Author: S **SIVARANJANI***

Purpose: We herein report an unusual case of a incontinentia pigmenti with proliferative retinopathy.

Methods: We report a case of a 3-month-old female who presented for retina examination with multiple black colored lesions throughout the body except face and scalp. The patient was diagnosed as incontinentia pigmenti with grade 3 skin lesions. The patient was on sodium fusidate ointment over skin twice a day since 3 days of birth. Her neurological examination was normal. In both eyes anterior segment examination was normal with brisk pupillary reaction. Fundus examination in right eye revealed avascular retina temporally with tufts of neovascularization found at the edges of the

avascular retina. Left eye retina was normal. Foveolar reflex was normal in both eyes. Retinal laser photocoagulation was done in right eye to the avascular retina from neovascular tufts to ora.

Results: After two weeks of retinal laser photocoagulation in right eye, there was regression of the new vessels and complete regression of new vessels was noted on one month follow up. The pathogenesis is early acquired involvement of peripheral retinal arterioles leads to vaso-occlusion, retinal ischemia and new vessels growth.

Conclusions: Incontinentia pigmenti is an uncommon disorder affecting females. It is associated with ocular, dental, skeletal, and central nervous system abnormalities. Ocular abnormalities are found in 35% of cases. If left untreated, this event sequence results in retinal detachment leading to blindness in nearly 50% of affected cases. Early screening and laser treatment have been shown to possibly prevent such evolution.

Risk of Retinopathy of Prematurity in Small for Gestational Age and Appropriate for Gestational Age Infants

First Author: Neha ***ADLAKHA***
Co-Author(s): Manpreet ***KAUR***

Purpose: To compare the prevalence of retinopathy of prematurity (ROP) in small for gestational age (SGA) infants compared with appropriate for gestational age (AGA) infants.

Methods: This prospective study was undertaken in the Department of Ophthalmology in a tertiary care center. The study included 280 infants who were screened for ROP. The SGA group (n=165) was selected from the database on the basis of birth weight below the 10th percentile for gestational age, whereas the appropriate for gestational age (AGA) group (n=115) included infants with birth weight between 10th and 90th centile for gestational age. The presence of any stage of ROP (1–5) and treated ROP was compared between the SGA and AGA infants using x2 test.

Results: A total of 280 infants underwent retinopathy of prematurity screening. Average gestational age of SGA infants (33.45 weeks) was comparable to average gestational age of AGA (33.93 weeks) infants. Average birth weight of SGA infants was 1.41 kg while that of AGA infants was 1.91 kg. The overall prevalence of ROP was found to be 29%. ROP prevalence was found to be more in SGA infants (53.80%) as compared to AGA infants (15.38%) born at gestational age 28-40 weeks and difference was found to be statistically significant in all groups of gestational ages.

Conclusions: This study showed that being small for gestational age was a significant risk factor for the onset of retinopathy of prematurity.

Threshold Retinopathy of Prematurity in Cytomegalovirus-Infected Infant: A Case Report

First Author: Siti Nur Amira ***ABU KASSIM***
Co-Author(s): Safinaz ***MOHD KHIALDIN,*** *Othmaliza* ***OTHMAN***

Purpose: To describe a threshold retinopathy of prematurity in a cytomegalovirus (CMV)-infected premature infant.

Methods: Case report.

Results: The relationship between the development of retinopathy of prematurity (ROP) and CMV infection is not well understood. We report a case of threshold ROP in a CMV-infected premature infant. A female infant born via normal delivery at 30 weeks gestational age with a birth weight of 1.65kg was diagnosed to have bilateral stage 3 ROP zone 2 with plus disease. She was treated with pan-retinal laser photocoagulation 48 hours after the diagnosis. As the infant had low risk factors to develop ROP, further investigations were performed to exclude other risk factors. Laboratory reports revealed CMV antigens in the infant's urine and CMV's immunoglobulin G (IgG) in the mother's blood. Antiviral treatment was not commenced as the infant had no other systemic manifestation. Subsequently, the ROP regressed after one session of laser treatment.

This case supports few other reports associating CMV-infected infants with severe ROP. Thus a suspicion of CMV infection or CMV-infected mothers should alert the clinicians of the possibility of severe ROP developing in premature infants.

Conclusions: Concurrent CMV infection in the infant or mothers may be associated with development of severe ROP in premature infants.

Retina (Medical)

A Global Non-Interventional Study Investigating Real-World Proactive Dosing Regimens with Intravitreal Aflibercept in Patients with Neovascular Age-Related Macular Degeneration: Interim Analysis of First 12-Month Completers from XTEND

First Author: Andrew ***CHANG***
Co-Author(s): Clare ***BAILEY,*** *Varun* ***CHAUDHARY,*** *Jean-francois* ***KOROBELNIK,*** *Paul* ***MITCHELL,*** *Ramin* ***TADAYONI***

Purpose: The ongoing XTEND (NCT03939767) study examines outcomes of real-world proactive intravitreal aflibercept (IVT-AFL) treatment regimens during routine clinical practice in neovascular age-related macular degeneration (nAMD). This prespecified interim analysis was conducted after ≥500 patients had a month 12 (M12) visual acuity assessment (data cut: February 4, 2021).

Methods: XTEND enrolled treatment-naïve patients with nAMD in whom IVT-AFL was initiated in one of two proactive regimens (label-specified): minimum treatment intervals following three initial monthly injections of 8 weeks (w) (European Medicines Agency [EMA]-aligned label), or 4w (without EMA-aligned label). Primary endpoint was to describe the effectiveness of flexible proactive treatment approaches by evaluating mean change in best-corrected visual acuity (BCVA) from baseline at M12. Statistics are descriptive.

Results: Of 1563 patients enrolled, 742 (mean age 79 years; 63% female; enrolled May 2019–March 2020) were included here. Because of the COVID-19 pandemic, planned treatment interval extensions were not performed in all countries. Mean±SD change from baseline to M12 in BCVA was +5.1±16.5 letters (baseline: 55.6±18.6) and in CRT was ⍰109±127µm (baseline: 372±123), with no differences between patients according to label regimen. By M12, mean number of IVT-AFL injections was 7.8±2.1, and the last completed treatment interval was ≥8w in 73% of patients (44% ≥10w; 24% ≥12w; 8% ≥16w). No new safety concerns were identified; two cases of endophthalmitis were reported.

Conclusions: Despite the COVID-19 pandemic, patients with treatment-naïve nAMD achieved robust vision gains over the first year. Improvements in both BCVA and CRT were similar with both the EMA-aligned label and without.

A Harrowing Case of Ocular Herpes

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Co-Author(s): Ee Ling ***ANG,*** *Rhuen Chiou* ***CHOW,*** *Karen Kah Luen* ***KHOO,*** *Azhany* ***YAAKUB***

Purpose: To report a case of bilateral eye HSV herpetic retinopathies.

Methods: Retrospective case report.

Results: A 52-year-old immunocompetent male with underlying hypertension presented with painless vision loss over his left eye for 2 weeks and right eye blurring of vision. The right eye visual acuity was 6/18 while there was no perception of light (NPL) in all 4 quadrants of the left eye. Fundus examination revealed scattered blot intraretinal hemorrhages, perivasculitis and vascular sheathing peripherally in the right eye. The left eye showed generalized pale retina with cherry red spot, swollen optic disc, peripapillary retinal hemorrhages, and attenuated vessels at all 4 quadrants suggestive of a combination of CRAO and CRVO with inferior serous retinal detachment. Bilateral eye aqueous sent for polymerase chain reaction returned positive for herpes simplex virus-1, clinching the diagnosis of bilateral eye herpetic retinopathy

with right eye occlusive vasculitis and left eye combined CRAO with CRVO and retinal detachment. He was treated with intravenous methylprednisolone and intravenous acyclovir followed by oral prednisolone and intravenous foscarnet. Pan-retinal photocoagulation was performed on the right eye as the retina appeared ischemic, with multiple areas of capillary fallout demonstrated by fundus fluorescein angiography. The right eye subsequently developed inferior retinal detachment requiring vitreo-retinal surgery. His left eye was treated conservatively. Although HSV infection subsided with treatment, it rendered the patient legally blind with right eye vision of 1/60 and NPL over the left eye.

Conclusions: Herpetic retinopathies are potentially blinding conditions in which prompt detection and treatment are warranted to preserve useful vision.

A Qualitative Survey to Assess the Patients' Journey from Diagnosis to Management of Neovascular Age-Related Macular Degeneration: Perspective from Indian Ophthalmologists and Retinologists

*First Author: Maulik **BHAVSAR***
*Co-Author(s): Nitin **MAKSANE***

Purpose: Nationwide, cross-sectional survey to understand Indian healthcare-professionals' (HCPs') perspective on patients' journey from neovascular age-related macular degeneration (nAMD) diagnosis to management.

Methods: This questionnaire-based, telephonic survey was conducted among 40 HCPs (retinologists=20, ophthalmologists=20), who manage patients with nAMD and administer intravitreal anti-vascular endothelial growth factor (anti-VEGF) injections in private settings. Data were analyzed for common themes/trends.

Results: Retinologists encounter relatively higher number of new nAMD patients/month than ophthalmologists. Over half of these patients have prior consultations with optometrist/general-physician/diabetologist/cardiologist/ophthalmologist and finally consult a retinologist. Retinologists also encounter patients coming for 2nd opinion, who have been to other retinologists. Since first nAMD symptoms, many patients spend few weeks to ~3 months before consulting HCP. Patients' lack of disease awareness and unwillingness to get tested are the common diagnostic challenges faced by HCPs. Post nAMD diagnosis, HCPs introduce anti-VEGF therapy as the only treatment for majority of patients and emphasize the need for long-term treatment. Typical patient profile readily accepting anti-VEGFs as per HCPs: patient with bilateral nAMD, from higher socioeconomic class affording treatment/has insurance, with controlled/no comorbidities, who stays near hospital/clinic for easier follow-ups, who is educated/aware of the condition. Reasons for anti-VEGF refusals, besides its cost, include barriers across treatment pathway (fear of intravitreal injection, frequent hospital/clinic visits, traveling from smaller towns to metros) leading to drop-out.

Conclusions: HCPs suggested following efforts to overcome the aforesaid challenges: improving treatment affordability, disease awareness among people ≥50 years old through public-awareness campaigns, structured programs at primary-care physician level, and routine eye checkups in these individuals.

A Qualitative Survey to Assess the Patients' Journey from Diagnosis to Management of Proliferative Diabetic Retinopathy: Perspective from Indian Ophthalmologists and Retina Specialists

*First Author: Utkarsh **SHAH***
*Co-Author(s): Nitin **MAKSANE***

Purpose: Nationwide, cross-sectional survey to understand Indian physicians' perspective on journey of patients with proliferative diabetic retinopathy (PDR) from diagnosis to management.

Methods: Questionnaire-based, telephonic survey was conducted among 13 physicians (retina specialists=7, ophthalmologists=6),

who manage PDR patients and administer intravitreal anti-vascular endothelial growth factor (anti–VEGF) injections monthly in private settings across India.

Results: Majority of the new PDR patients are >50 years; predominantly males with existing co-morbidities (diabetes, hypertension and heart disorders). Retina specialist see twice the number of new PDR patients/month than ophthalmologists. Most patients have prior consultations with optometrist/general physician/diabetologist/ophthalmologist and finally consult a retina specialist. Retina specialists also encounter patients coming for second opinion. Patients are mostly accompanied by a family member on their visit. Physicians stratify PDR based on the risk-based classification; severity of neovascularization; vitreous hemorrhage status and involvement of macula. Majority of the PDR patients undergo laser/photocoagulation therapy. Anti–VEGF therapy is recommended in patients with clinically significant macular edema, vitreous hemorrhage, or persistent neovascularization. Majority of the patients accept anti–VEGF therapy, and initiate anti–VEGF therapy within a month of diagnosis. Reasons for anti–VEGF treatment refusal among patients were non-responsiveness to treatment, fear of intravitreal injections, and frequent hospital visits.

Conclusions: Physicians suggest refining the referral system, enhanced disease awareness and routine eye checkup among patients with diabetes to ensure early diagnosis of PDR. Survey underlines low treatment adherence in PDR patients and emphasize on patient awareness and use of long-acting anti–VEGF agents to reduce frequency of visits, thereby improving treatment adherence.

A Rare Case of Combined Branch Retinal Vein Occlusion and Branch Retinal Artery Occlusion

First Author: Gianina Louise ***GARCIA***
Co-Author(s): Noriell Jonathan ***MAMACLAY***

Purpose: To present a rare case of combined retinal vascular occlusion affecting both arterial and venous system. There are different permutations for combined retinal vascular occlusions with branch retinal vein occlusion (BRVO) and branch retinal artery occlusion (BRAO) being the least common.

Methods: A case report.

Results: A 58-year-old female came in with a 4 day history of sudden blurring of vision of the right eye described as loss of inferior vision. On examination, the patient had a best corrected visual acuity of 20/400 for the right eye and 20/20 for the left eye. Anterior segment was unremarkable. Ocular motility and intraocular pressures were normal. Funduscopic examination of the right eye and baseline fundus photo revealed hyperemic and indistinct optic nerve. There were areas of retinal whitening in the superior hemiretinal area with noted flame shaped hemorrhages around the peripapillary area. Fluorescein angiography showed delayed filling in the superior hemiretinal area and blocked fluorescence. There is a generalized decrease in the area due to retinal edema. No capillary nonperfusion noted. OCT showed inner retinal edema on superior hemiretinal with involvement of foveal area. No treatment was indicated at the time of consult and only warranted observation. However systemic work-ups were requested and follow up is needed in order to monitor development of neovascularizations and macular edema.

Conclusions: Combined BRAO and BRVO is rare with a unique underlying mechanism and associated with systemic diseases. Close follow up is needed in order to watch out for complications which warrant prompt treatment.

A Treatment-Agnostic Analysis of the Long-Term Impact of IRF and SRF on Vision and Anatomy in nAMD in the HAWK and HARRIER Studies

First Author: Augustinus ***LAUDE***
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Purpose: To assess the effect of retinal fluid-free status (both intraretinal fluid [IRF] and

subretinal fluid [SRF], IRF, and SRF) after initial loading phase on best-corrected visual acuity (BCVA) and central subfield thickness (CSFT) outcomes in neovascular age-related macular degeneration (nAMD) patients treated with anti-vascular endothelial growth factor therapy.

Methods: Pooled data from the brolucizumab 6 mg and aflibercept 2 mg arms of HAWK (NCT02307682) and HARRIER (NCT02434328) studies were included in this post hoc analysis. Patients were assigned to one of 5 categories based on the number of fluid-free visits between weeks 12–96: category 1 ('never dry', 0 fluid-free visits) to category 5 ('always dry', 22 fluid-free visits).

Results: At week 96, the least square mean (95% CI) difference in BCVA between category 5 and category 1 was 8.1 (4.4, 11.9), 12.9 (8.3, 17.5) and 6.6 (1.9, 11.3) Early Treatment Diabetic Retinopathy Study (ETDRS) letters, respectively, for the IRF and SRF, IRF, and SRF free analyses. Greater CSFT reduction and less CSFT variability over time were observed in the drier categories. SRF and IRF were both found to be independently deleterious to vision.

Conclusions: Absence of retinal fluid at more visits has a positive association with visual and anatomic outcomes in nAMD patients, regardless of fluid type.

Amazingly Good Glycemic Control but Inconsistent Diabetic Retinopathy: How Lame is This?

First Author: Shaibaan ***MULLA***
Co-Author(s): Dr V.S. ***GUPTA,*** *Dr Monika* ***KAPUR***

Purpose: Prevalence of diabetic retinopathy in diagnosed diabetics with good glycemic control.

Methods: 1000 patients attending the Speciality Diabetes Clinic at our tertiary health care institute were screened for any evidence of diabetic retinopathy. Relevant history was obtained regarding the onset, duration, progress, control, monitoring, management, compliance of diabetes. Patients were then stratified according to the severity of diabetic retinopathy according to the International Classification of Diabetes.

Results: Severity of diabetic retinopathy increases with duration of diabetes despite good glycemic control. Also, patients on insulin tend have more severe stages of diabetic retinopathy despite good glycemic control.

Conclusions: A thorough history taking, full dilated fundus examination and risk stratification is of utmost importance while dealing with diabetic patients despite having good glycemic control as much as patient compliance and regular follow-up.

Association of Serum Homocysteine Level with Retinal Vein Occlusion: A Comparative Cross Sectional Study

First Author: Md ***AHMED***
Co-Author(s): Abrar ***AHMED,*** *Mir* ***ASHRAFUL,*** *Shammi* ***ISLAM,*** *Azzam* ***MOHAMED,*** *Abir* ***SAJJ***

Purpose: To evaluate the association of serum homocysteine level with retinal vein occlusion.

Methods: This comparative cross sectional study was conducted in a tertiary eye center from March 2017 to August 2019. A total of 46 subjects were selected with age ranging from 35-75. Among them, 23 subjects with RVO were considered as the study group and 23 aged and sex matched subjects without RVO were considered as control group for comparison. The study parameters were serum homocysteine level, folate and vitamin B12. These parameters were estimated in the biochemistry department. Data was collected in pre-designed structured questionnaire form by the researcher. The data was analyzed by computer based statistical software SPSS version 25. Results were expressed as mean (±SD), frequency and percentage. Unpaired Students "t" test, Chi square test and Pearson's correlation coefficient (r) test were done as applicable. P value <0.05 was accepted as level of significance.

Results: In the present study, serum homocysteine level was significantly higher in study group than that of control group. Serum

folate and vitamin B12 levels were significantly lower in study group than that of control group.

Conclusions: After analyzing the results of the present study it can be concluded that serum homocysteine level was significantly increased in RVO patients.

Bacillary Layer Detachment in Non-Inflammatory Retinal Vascular Diseases

First Author: Raj ***HIRAWAT***
Co-Author(s): Nagesha ***CK,*** *Pratyusha* ***GANNE,*** *Rashi* ***TAORI***

Purpose: To report a case series of bacillary layer detachment (BLD) in eyes with retinal vascular diseases in the absence of inflammatory component or choroidal pathologies.

Methods: A 45-year-old male was evaluated for sudden drop in right eye vision (counting fingers). He had no medical complaints. Fundus examination showed features of central retinal vein occlusion with gross macular edema. Optical coherence tomography (OCT) revealed central macular thickness (CMT) of 1520µ and BLD. Another 32-year-old woman who had received blood transfusion for a periporteal bleed presented with loss of vision in right eye post-transfusion. Fundus examintion showed features of combined anemic retinopathy with central retinal vein occlusion. OCT macula revealed CMT of 1100µ with BLD.

Results: Both cases showed gradual resolution of edema with restoration of BLD during follow-up. The underlying choroidal thickness was 220µ and 240µ respectively. None had vitreous cells or anterior chamber reaction. No systemic risk factors were detected in the first case and the second case had severe anemia (Hb 6gm%).

Conclusions: BLD has been described in inflammatory choroidal pathologies using high-definition OCT. In contrast, both our cases had a non-inflammatory retinal vascular disease with BLD.

Bilateral Eales Disease

First Author: Kanmani ***MANI***

Purpose: To report a case of bilateral Eales disease in a young man.

Methods: Case report.

Results: Eales disease is an idiopathic occlusive perivasculitis of the bilateral peripheral retina that affects mostly healthy young men with unclear etiology. A British ophthalmologist called Henry Eales first described it in 1880. We report a case in which a 20-year old Indian man with no known co-morbidities presented with one week history of right blurred vision and floaters. He had no history of ocular trauma or previous tuberculosis infection. An ophthalmologic examination showed a visual acuity of 6/12 in the right eye and 6/6 in the left eye, a normal anterior segment in both eyes, and the intraocular pressure was 14 mm Hg bilaterally. On fundus inspection, the right eye showed new vessels at extreme nasal and temporal peripheral retina with vitreous hemorrhage, and non-perfused vessels, with collaterals in left temporal peripheral retina. Laboratory tests were all normal including chest X-ray and tuberculin skin test. Fluorescein angiography showed right superotemporal vascular leakage with capillary fallout. Based on the findings he was diagnosed with Eales disease. He was treated with right eye intravitreal Eylea injections, bilateral pan retinal photocoagulations, topical steroid and Nevanac.

Conclusions: Eales disease can mimic other retinal vaso-occlusive diseases. Hence, prompt diagnosis and early treatment carries a good prognosis.

Branch Retinal Artery Occlusion following Typhoid Fever

First Author: Krishnendu ***NANDI***

Purpose: To report a hitherto unreported case of branch retinal artery occlusion following typhoid fever in a young male patient.

Methods: We present a case of 28-year-old male who presented with sudden onset blurring of the inferior visual field in the left eye for the last 3 days. On examination branch retinal artery occlusion noted in left eye; right eye within normal limits. He had a history of typhoid fever 2 weeks back. Detailed history taking, blood investigations ruled out mimicking infections like dengue, tuberculosis, syphilis, as well as collagen vascular diseases. Any cardiological abnormality and hypercoagulable state also has been ruled out.

Results: He has been treated with ocular massage, paracentesis, intravenous mannitol injection and topical intraocular pressure reducing agent. Vision improves from 6/36 to 6/6 in the left eye by 2 days.

Conclusions: Ophthalmic manifestations of typhoid fever are rare but diverse. To our best knowledge this is the first case reporting of branch retinal artery occlusion after typhoid fever. So, ophthalmologists should therefore be aware of the fact that mild degree of vascular inflammation following mild intensity typhoid fever can give rise to this dreaded ophthalmic complication and with early and proper intervention vision can be restored.

Branch Retinal Artery Occlusion in Seronegative Rheumatoid Arthritis following Remission

First Author: Syarifah Nur Humaira ***SYED MOHD KHOMSAH***

Purpose: To report a case of branch retinal artery occlusion in a seronegative rheumatoid arthritis patient following remission.

Methods: Case report.

Results: A 51-year-old with underlying seronegative rheumatoid arthritis diagnosed in 2015 was on tab methotrexate for 2 years, was stopped due to sensorineural hearing loss in 2017 presented with sudden onset, painless left inferotemporal visual field defect. She denied any history of floaters, flashes or recent trauma. She also denied any joint pain and currently was not on any antirheumatic drugs. On ocular examination, she has visual acuity of 6/6 bilaterally with normal optic nerve function tests. Anterior segment was normal with intraocular pressure of 14 bilaterally. On fundus examination she has left superotemporal branch retinal artery occlusion with multiple cotton wool spots and intraretinal hemorrhage. Optic disc and macula appears normal bilaterally. Fundus fluorescein angiography done showed filling defect over the superotemporal arcade with no leaking. Her blood pressure was 150/86. Fasting serum lipid was within normal limits. Erythrocyte sedimentation rate was not elevated. Connective tissue screening and infective screening revealed negative results.

Conclusions: Rheumatoid arthritis (RA) is a systemic inflammatory disease that is occasionally associated with extra-articular complications, including ocular manifestations. The most common ocular complication is keratoconjunctivitis sicca. Other conditions (e.g., episcleritis, scleritis, and peripheral ulcerative keratitis) are known to be associated with systemic inflammation in patients with RA. Optic neuritis, anterior optic neuropathy, and retinal vasculitis associated with RA are rarely reported. Retinal artery occlusion is a rare complication of RA.

CRAO in an Asymptomatic COVID Positive Pregnant Woman

First Author: Sameera ***V V***

Purpose: We report a case of central retinal artery occlusion (CRAO) in an asymptomatic COVID positive pregnant woman.

Methods: A 23-year-old pregnant Primipara woman presented with sudden decreased vision in her right eye. She had a pale retina with cherry red spot in macula consistent with CRAO. Ocular massage, AC paracentesis were tried on the first visit followed by topical IOP lowering agents. Thrombolytics were contraindicated as she was at 24 weeks gestation. An extensive workup was performed to determine any other hypercoagulable state other than pregnancy. All test results were within normal limits except for her SARS COVID test (positive). She was totally asymptomatic

for COVID infection. D dimer levels were later tested which was at borderline levels. Her visual acuity improved from finger counting 1 meter to 20/200 over 2 months.

Results: This case suggests that CRAO can occur in asymptomatic COVID patients. The pregnancy and COVID-19 associated coagulopathy acted as a double edged sword resulting in microvascular thrombosis.

Conclusions: CRAO can occur in asymptomatic COVID patients as well. Caution should be maintained in pregnant women.

Case Report: Branch Retinal Vein Occlusion Post mRNA SARS-CoV-2 (COVID-19) Vaccination

*First Author: Jing **LEE***
*Co-Author(s): Safinaz **MOHD KHIALDIN,** Wan Haslina **WAN ABDUL HALIM,** Meng Hsien **YONG***

Purpose: To report a case of inferotemporal branch retinal vein occlusion (BRVO) after mRNA SARS-CoV-2 vaccination.

Methods: Case report.

Results: A 41-year-old woman with no known medical illness presented with right eye central scotoma for 2 weeks. She initially presented with transient fever, myalgia, and hypertension for first two days post second dose vaccination. The ocular symptom then developed on the third day onwards. The right eye visual acuity was reduced to 6/18. There were flame-shaped hemorrhages and cotton wool spots along the inferotemporal branch retinal vessels, with presence of cystoid macular edema (CME). Otherwise, there was no evidence of uveitis or optic neuropathy, and the left eye was normal. Systemic examination and laboratory investigations were all unremarkable except for mildly raised erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) up to 46mm/hr and 1.0 mg/dl respectively. Diagnosis of right eye inferotemporal BRVO with CME was made. In view of the absence of risk factors and unremarkable investigations, this BRVO incident was possibly secondary to COVID-19 vaccination immune response with the clear temporal relationship. Monthly intravitreal ranibizumab was given for total of 3 doses. Subsequently, her vision improved to 6/6 with resolved CME.

Conclusions: This case illustrated a clear temporal and possible causal relationship of COVID-19 vaccination with BRVO. Post vaccination transient hypertension maybe one of the causative factors. The immunological response to the vaccine may also contribute to the venous occlusive event in this case.

Case Report: Hypertensive Choroidopathy Secondary to Pre-Eclampsia: Fundus Characteristics and Spectral-Domain Optical Coherence Tomography Findings

*First Author: Thanchanok **DHEERADILOK***
*Co-Author(s): Atchara **AMPHORNPHRUET***

Purpose: To report a case of hypertensive choroidopathy secondary to pre-eclampsia and provide the fundoscopic finding and spectral-domain optical coherence tomography (SD-OCT).

Methods: We report a case of a 39-year-old pregnant woman with history of hypertension was diagnosed with pre-eclampsia at 36th week of gestation and her pregnancy was terminated by caesarean section. 72 hours later, she was sent to evaluate visual systems due to progressive bilateral visual impairment.

Results: Her visual acuity was 20/80 in the right eye and 20/30 in the left eye. The anterior segments were normal. Fundoscopic examination revealed multiple yellowish and hypopigmented lesion (Elschnig spots) at posterior pole of both eyes, mild arterial narrowing without cotton wool spot or retinal hemorrhage. Spectral-domain OCT (SD-OCT) showed disorganization of outer retinal layers, disruption of ellipsoid zone with multiple pigmentary epithelial detachments (PED) and increased choroidal thickness in right eyes.

Conclusions: This is the first case report of hypertensive choroidopathy secondary to pre-eclampsia in Thailand. The SD-OCT which is non-invasive modality can be helpful for diagnosis of hypertensive choroidopathy.

Central Macular Thickness after Phacoemulsification: Non Diabetics versus Controlled Diabetics

First Author: Khaja ***MOINUDDIN***
Co-Author(s): Dr V.S. ***GUPTA***

Purpose: To assess the quantitative changes of macula in diabetic and non-diabetic eyes after uncomplicated cataract surgery.

Methods: In this prospective interventional study being performed in a tertiary healthcare hospital, a total of 660 eyes were divided into two groups. Group 1 included 330 eyes from healthy subjects and group 2 included 330 eyes from well-controlled diabetic subjects with no diabetic retinopathy planned for phacoemulsification with foldable IOL implantation by the same surgeon under similar settings. Optical coherence tomography (Heidelberg Spectralis SD-OCT) was used to assess preoperative and postoperative central macular thickness (CMT) at weeks 1 and 6.

Results: The mean CMT in group 1 preoperatively, at postoperative week 1, and at post-operative week 6 was 257.03 ± 20.904, 262.82 ± 17.010, and 265.15 ± 20.078 µm, respectively. The corresponding values in group 2 were 255.36 ± 17.852, 259.15 ± 16.644, and 266.09 ±18.844 µm, respectively. There was no significant difference in the mean CMT values between the two groups on any of the three occasions when the CMT was measured (P = 0.374 and P = 0.313 at weeks 1 and 6, respectively).

Conclusions: There was no statistically significant difference in CMT between normal subjects and diabetic subjects without diabetic retinopathy preoperatively and in early postoperative period after uncomplicated phacoemulsification surgery.

Characteristics of Retinal Pigment Clumps in Type 2 Macular Telangiectasia

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Co-Author(s): Jay ***CHHABLANI,*** *Nikitha* ***GURRAM,***
Ramesh ***VENKATESH,*** *Naresh Kumar* ***YADAV***

Purpose: To assess the relationship of retinal pigment clump (RPC) size and its location with visual acuity and retinal neovascularization in eyes with type 2 macular telangiectasia (MacTel).

Methods: In this cross-sectional study, eyes diagnosed with type 2 MacTel showing RPC were included. Area occupied by pigment was measured on the multicolor image using the area tool on the Spectralis, Heidelberg machine. Pigment location within retinal layers was noted with OCT. Analysis was performed to identify factors associated with poor vision and proliferative disease.

Results: Sixty-two eyes of 42 patients diagnosed with type 2 MacTel and RPC were included. The mean age was 64.31 ± 10.19 years. There were 13 (31%) males and 29 (69%) females in the study. 74% of patients were diabetics and the mean logMAR visual acuity of the participants was 0.619 ± 0.359. Univariate and multivariate binary logistic regression analysis identified female gender (p=0.026), increasing RPC size (p=0.008) and its presence above the outer plexiform layer (p=0.006) to be associated with poor vision and proliferative disease in type 2 MacTel.

Conclusions: Our data identified female gender, larger pigment size and its location above the OPL to be associated with poor vision and proliferative disease. This data may be useful for further improving the current system for staging disease severity in type 2 MacTel.

Choroid Vascularity Index with Stress in Patients with Central Serous Chorioretinopathy via Optical Coherence Tomography

*First Author: Anindya **SAMANTA***

Purpose: To investigate with optical coherence tomography (OCT) the difference of choroid vascularity index (CVI) with stress in patients with central serous chorioretinopathy (CSCR).

Methods: This study was on 30 patients with CSCR and 10 age matched controls. All patients underwent handgrip isometric exercise (HG) to simulate sympathetic response secondary to stress. Resting and stress phase OCTs were acquired. The analysis of CVI, total dark region divided by total area of choroid, was calculated and compared.

Results: The mean and the standard deviation of CVI for pre- and post-HG for control patients were 0.415 ± 0.041 and 0.306 ± 0.046 (t-test for paired samples $p<0.001$). The mean and average CVI for pre- and post-HG for patients with CSCR was 0.427 ± 0.054 and 0.413 ± 0.055 (t-test for paired samples $p<0.14$). T-test for CVI for pre-HG for patients with CSCR and control was $p<0.50$. T-test for post-HG for patients with CSCR and control was $p<0.001$.

Conclusions: CVI is significantly reduced in healthy patients but not CSCR patients after HG. This is possibly secondary to a functional inefficiency of the sympathetic nervous system of the diseased choroid.

Choroidal and Retinal Thickness Variations in Anemia and Anemic Retinopathy

*First Author: Ram **PULIPAKA***
*Co-Author(s): Chaitra **JAYADEV,** Jophy **PHILIPS***

Purpose: Clinical relevance and background: Anemia is the most common hematological disorder noted in the people of the Indian subcontinent. Hemodynamic changes following anemia on the retina and choroid are not frequently studied. The aim of the study was to analyze the subfoveal retinal (CRT) and choroidal (SFCT) thickness changes in patients with anemia.

Methods: This retrospective, comparative study included patients who were diagnosed with primary anemia and had a fundus examination by a retinal specialist. Patients were divided into 3 groups: Group 1: Patients with anemic retinopathy; Group 2: Patients with anemia without retinopathy; Group 3: Normal healthy controls.

Results: 197 eyes of 197 subjects (group 1 – 38 eyes, group 2 – 90 eyes, group 3 – 69 eyes) met the inclusion criteria. Mean CRT was 269 ± 117µm, 258 ± 99.7µm and 201 ± 19.2µm and SFCT was 303 ± 68.4µm, 303 ± 50.1µm and 275 ± 38.9µm in groups 1, 2 and 3 respectively. Low hemoglobin correlated negatively with retinal ($r = -0.362$; $p < 0.001$) and choroidal ($r = -0.294$; $p < 0.001$) thickening and reduced visual acuity ($r = -0.157$; $p = 0.03$).

Conclusions: Patients with anemia have a thicker retina and choroid compared to normal healthy controls.

Clinical Characteristics of Highly Myopic Patients With Asymmetric Myopic Atrophic Maculopathy–Analysis Using Multimodal Imaging

*First Author: Yun **HSIA***
*Co-Author(s): Muh-shy **CHEN,** Tzyy-chang **HO,** Chien-jung **HUANG,** Kuo-chi **HUNG,** Shih-wen **WANG***

Purpose: To evaluate the factors associated with asymmetric myopic atrophic maculopathy (MAM) in highly myopic patients.

Methods: We enrolled highly myopic patients with asymmetric MAM according to the atrophy, traction, and neovascularization (ATN) classification. The results of color fundus photography, optical coherence tomography (OCT), OCT angiography, and corneal visualization Scheimpflug technology (Corvis ST tonometry) were reviewed. The association between inter-eye differences in clinical features and MAM grading was analyzed using logistic regression analysis.

Results: Among the 72 eyes of 36 patients 61.0 ± 9.3 years of age, 9, 33, 17, and 13 eyes had A1, A2, A3, and A4, respectively. The mean axial length was 30.44 ± 1.92 mm, and

there was no significant difference between eyes with less severe and more severe MAM. The inter-eye differences in MAM grading were associated with the inter-eye differences in the presence of Bruch's membrane defects (P = 0.014), ellipsoid zone disruption (P = 0.013), vessel density of the deep retinal layer (P = 0.022), foveal avascular zone circularity (P = 0.012), foveal avascular zone area (P = 0.049), flow area of the choriocapillaris (P = 0.013), vessel diameter (P = 0.045), and fractal dimension (P = 0.015). No Corvis ST parameter was statistically significant. A higher difference in the choriocapillaris flow area (P = 0.013; adjusted odds ratio = 1.10 [1.02–1.18]) remained associated with higher inter-eye differences in MAM grading in the multivariable regression.

Conclusions: A smaller choriocapillaris flow area was associated with more severe MAM, suggesting that vascular factors play pivotal roles in MAM.

Clinical Profile of Pachychoroid Spectrum Disease Presenting to a Tertiary Care Center in Northeast India

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Purpose: To evaluate the imaging features, demographic features of OCT/ICGA in patients with the pachychoroid disease spectrum.

Methods: History, examination, fundus photo, FFA, OCT, ICG, OCTA.

Results: Total patients: 170; mean age: 41-60 years; majority: males; laterality: right eye. More than 50% of the subjects had retinal pigment epithelium (RPE) and central serous chorioretinopathy (CSCR) while moderate value was obtained on polypoidal choroidal vasculopathy (PCV) followed by pachychoroid pigment epitheliopathy (PPE), pachychoroid neovasculopathy (PCN), and peripapillary pachychoroid syndrome (PPS) while very least value was found on focal choroidal excavation (FCE). Serous macular detachment (SMD) and pigment epithelial detachment (PED) specially notched PED was found in a majority in the studied subjects. Very few branching vascular network (BVN) and PED in fellow eyes. Haller/Sattler layer dilatation was obtained in majority. ICG branching vascular network (BVN) followed by choroidal hyperpermeability and peripapillary choroidal hyperpermeability. Filling defects in early hypo and hyper fluorescence in the late phase were found. Besides ICGA, another multimodal imaging technique is optical coherence tomography angiography (OCTA). Type seen: variably visualized type I neovascularization with flow signal in aneurysm and moderately showed no evidence of neovascularization. Lower value for tangled network of type I neovascularization through OCTA. Treatment: anti-VEGF, oral eplerenone, laser, observation. Treatment outcome: good.

Conclusions: The use of imaging modalities in this part of the country gave encouraging results to understand the pathogenesis, treatment, and prognosis of this disease.

Comparison of Central Macular Thickness at 3 Months Post Treatment between those with and without Honey Supplement in Diabetic Macular Edema

First Author: Mohd Khairy ***ZAINAL ABIDIN***
Co-Author(s): Raihan ***ABDUL RAHIM,*** *Embong* ***Z***

Purpose: To compare central macular thickness (CMT) at 3 months post laser treatment between those with and without honey supplement in diabetic macular edema (DME).

Methods: A prospective randomized controlled study was conducted between April 2013 and August 2015. Patients with clinically significant macular edema (CSME) was selected and was randomized by using randomized envelope technique into 2 groups; laser without honey group and laser with honey group. Patients in laser with honey group received 20-gram of Tualang honey per day for 3 months. All patients were evaluated for CMT pre-treatment and at 3 months post treatment. CMT was measured using Heidelberg Spectralis OCT.

Results: A total of 52 patients were recruited into this study. There were 26 patients in laser group without honey and 26 patients in laser group with honey. There was no significant difference of mean CMT (p=0881) at 3 months post laser treatment between those with and without honey supplement. There was no side effect of honey noted in patient consumed Tualang honey.

Conclusions: Tualang honey used as adjunct with standard focal/grid laser has no additional improvement in CMT compared to laser alone.

Comparisons of Biomarkers between Epiretinal Membrane and Myopic Traction Maculopathy – The Effects of Internal Limiting Membrane Incompliance and Posterior Staphyloma

*First Author: Shih-wen **WANG***
*Co-Author(s): Tzyy-chang **HO***

Purpose: We aim to compare intraretinal structural and vascular changes between epiretinal membrane (ERM) and myopic traction maculopathy (MTM) eyes.

Methods: We conducted an observational retrospective study on treatment-naïve ERM and MTM eyes. Biomarkers using optical coherence tomography angiography (OCTA) were performed on a 3 x 3-mm macular region centered on the fovea.

Results: There were 27 MTM eyes and 32 ERM eyes. In MTM group, the spherical equivalent was more myopic and the axial length was longer (-12.09 diopters ± 6.45 vs -0.77 diopters ± 2.48, p<0.001, and 29.41 mm ± 1.54 vs 25.32 mm ± 2.79, p<0.001). The MTM eyes had larger outer retinal volumes (5.88 mm3 ± 1.76 vs 4.77 mm3 ± 0.6, p=0.003) and smaller inner retinal volumes (2.58 mm3 ± 0.35 vs 3.23 mm3 ± 0.53, p<0.001). The MTM eyes had larger area and perimeter of foveal avascular zones (0.29 mm2 ± 0.1 vs 0.16 mm2 ± 0.12, p<0.001, and 2.15 mm ± 0.4 vs 1.62 mm ± 0.58, p<0.001), greater circularity of foveal avascular zones (p<0.001) and smaller foveal vessel density in superficial layer (24.65 % ± 5.74 vs 32.73 % ± 10.29, p<0.001).

Conclusions: Our data suggests that the larger avascular zones in MTM eyes may be caused by internal limiting membrane (ILM) incompliance. The anteroposterior traction forces from staphyloma in MTM eyes may lead to larger outer retinal volumes. In ERM eyes, the traction forces confined in the superficial retina causing larger inner retinal volumes and foveal acircularity. Our results highlighted the intraretinal changes caused by ILM traction and staphyloma in MTM eyes comparing to ERM eyes.

Correlation of Lipid Profile and C Reactive Protein with Grading of Diabetic Retinopathy in Patients with Type II Diabetes Mellitus

*First Author: Neha **ADLAKHA***
*Co-Author(s): Devender Kumar **SHAKYA***

Purpose: To study the correlation of C-reactive protein (CRP) and lipid profile with severity of diabetic retinopathy (DR) in patients with type II diabetes.

Methods: This prospective, cross sectional study consisted of three hundred patients with DR (classified by using Early Treatment Diabetic Retinopathy Study, ETDRS) who were examined as in keeping with the predesigned proforma. Precise ophthalmological examination was done; fasting and post-prandial blood sugar (FBS and PPBS), glycosylated hemoglobin HbA1C, CRP and serum lipid profile, serum creatinine and uric acid had been assessed.

Results: The present study showed that CRP ranges have statistically significant correlation with DR and also full-size association between increasing lipid levels and DR (p<0.05) was seen. Serum LDL stages and triglycerides additionally confirmed statistically good sized correlation with growing severity of DR.

Conclusions: CRP may be relied as a watchdog biomarker for progression of DR, also persistently deranged lipid profile may be targeted for purpose of remedy, in known diabetics for prevention of advanced DR.

Cytomegalovirus Iritis and Retinitis after Kidney Transplant in a Diabetic Retinopathy and Open-Angle Glaucoma Patient

*First Author: Marc **MANGAHAS***
*Co-Author(s): Marie Joan **LOY***

Purpose: To present a case of a cytomegalovirus (CMV) iritis and retinitis after kidney transplant in a diabetic retinopathy and primary open-angle glaucoma patient.

Methods: Case report.

Results: A 56-year-old male, a known case of diabetic retinopathy and primary open-angle glaucoma, complained of blurring of vision of the right eye 1 month after his kidney transplant. Slit-lamp examination of the right eye showed stellate keratic precipitates and increased intraocular pressure. The posterior segment was unremarkable at the time of examination. Open-angle glaucoma secondary to CMV versus herpetic iritis was considered. Anti-glaucoma and topical steroid medications were initiated. On subsequent follow-ups, visual acuity of the right eye worsened. There was no resolution of the stellate keratic precipitates. Intraocular pressures decreased to 29-32 and 13-19 for the right and left eye. Fundus exam revealed necrotizing retinitis with retinal hemorrhages and perivascular sheathing distributed along the temporal, nasal, and inferior retinal mid-peripheral quadrants. CMV retinitis was suspected. Systemic workup showed positive plasma CMV antigenemia and elevated CMV IgG. The patient was started on intravenous ganciclovir, which improved retinal lesions in 3 weeks, followed by oral valganciclovir.

Conclusions: This is a case of a kidney transplant patient who developed unilateral CMV iritis associated with secondary open-angle glaucoma and subsequent retinitis. This report stresses whole organ recipients are at risk for opportunistic ocular infections and their complications. High clinical suspicion and systemic workup are vital to prompt diagnosis and initiation of therapy. Intravenous and oral valganciclovir sufficiently improved retinal lesions and control of symptoms.

Diabetic Retinopathy as an Early Predictor for Cognitive Impairment: A Systematic Review and Meta-Analysis

*First Author: Robert N.f. **CHAN***
*Co-Author(s): Carol **CHEUNG,** Raymond N.C. **CHAN,** Victor T.t. **CHAN,** Esther T.w. **CHENG,** Ziqi **TANG***

Purpose: To explore the potential of diabetic retinopathy to serve as an early predictor for cognitive impairment.

Methods: Registered on the International Prospective Register of Systematic Reviews (CRD42021236747), our study included original human studies in English, with keywords 'diabetic retinopathy' and 'cognitive impairment'. We searched PubMed and EMBASE on 9th July 2021 and evaluated the study quality using the Newcastle-Ottawa Quality Assessment. Odds ratios (OR) and risk ratios (RR) were used as the main outcome measures for cross-sectional and longitudinal studies, respectively. The effects of potential moderator variables, such as mean onset age of DM, mean duration of DM, and mean HbA1c, on effect sizes were assessed using meta-regression model.

Results: The final analysis included 1,963,914 subjects in 17 and 8 cross-sectional and longitudinal studies. In the cross-sectional analysis, DR subjects were found to have 1.48- (95% CI: 1.08-2.02) and 1.59- (95% CI: 1.01-2.51) times odds with any cognitive impairment and early stage of cognitive impairment respectively. In the longitudinal analysis, DR subjects were found to have 1.35- (95% CI: 1.12-1.65) and 1.50- (95% CI: 1.06-2.12) times risk of any cognitive impairment and early stage of cognitive impairment respectively. However, DR is not significantly associated with dementia (OR: 1.13; 95% CI: 0.86-1.50) (RR: 1.16; 95% CI: 0.99-1.36). Meta-regression failed to show any statistically significant association between onset age of DM, duration of DM, and HbA1c, and the outcomes.

Conclusions: DR is able to serve as a powerful marker for cognitive impairment and cognitive decline, especially in their early stage.

Double Jeop-"RD": Bilateral Exudative Retinal Detachment with Vitreous Hemorrhage in a Patient with Systemic Lupus Erythematosus, Autoimmune Hemolytic Anemia and Idiopathic Thrombocytopenic Purpura

First Author: Premjith ***MURALEEDHARAN***
Co-Author(s): Shailaja ***BHAT SHENOY,*** *Yogish S* ***KAMATH***

Purpose: To report a rare ocular manifestation in a patient with systemic lupus erythematosus (SLE), autoimmune hemolytic anemia (AIHA) and idiopathic thrombocytopenic purpura (ITP).

Methods: Retrospective case review of a patient, a known case of AIHA and ITP, who presented with bilateral exudative retinal detachment (RD) and vitreous hemorrhage (VH) which eventually led to the diagnosis of SLE.

Results: A 20-year-old female patient presented with a 20-day history of insidious onset, painless, slowly progressive diminution of vision. Prior history of high-grade fever with rashes, oral ulcers and hematuria were present 10 days before this event. Ocular assessment revealed bilateral bullous retinal detachment with retino-retinal adhesion and retina touching the posterior aspect of the lens along with vitreous and white centered retinal hemorrhages. B-scan showed bilateral RD with shifting fluid and subretinal echoes which confirmed the diagnosis. Blood investigations were suggestive of severe anaemia and thrombocytopenia. Antinuclear antibodies were tested in view of bicytopenia and a positive history of AIHA and ITP, and they were positive which lead to the diagnosis of SLE.

Conclusions: A wide array of ocular manifestations are reported in the literature which are sometimes detected months before the diagnosis of SLE, more often revealed at the diagnosis or through the course of the disease. Clinicians must be alert and aware of all the ocular features of auto-immune conditions including the rare ones like this case in order to arrive at the right diagnosis and to nudge the clinician on the right path for management.

Dual Anti-Platelet Therapy Decelerates the Progression of Geographic Atrophy Secondary to Age-Related Macular Degeneration

First Author: Yodpong ***CHANTARASORN***
Co-Author(s): Warin ***SMITTHIMATHIN***

Purpose: To evaluate the effects of dual antiplatelets on expansion rates of geographic atrophy (GA) in age-related macular degeneration (AMD).

Methods: This was a 2-centered, cohort analysis of AMD patients who had unifocal GA from 2018 to 2020. We excluded patients with active CNV, a history of anti-VEGF treatment, and concomitant use of anticoagulants. Patients were sorted into those receiving dual antiplatelet therapy: a daily dose of 75mg clopidogrel plus 81mg aspirin (DAPT group); and controls whose current medications contained no antiplatelet. GA areas were measured by red-filtered fundus autofluorescence at baseline, 3, 6, and 12 months. The primary outcome was absolute 12-month changes in square root (SQRT) GA area.

Results: The DAPT (24 eyes, 1-year retention rate=92%) and control group (14 eyes) had comparable age and baseline SQRT GA area (1.2±1.3 and 1.8±1.5mm, adjusted p=0.23). At 12 months, after controlling for age and the presence of drusen (soft drusen or reticular pseudodrusen), DAPT resulted in fewer changes in the SQRT GA area compared to the controls (0.097 versus 0.17mm, p=0.02). The presence of drusen was the only predictor of more rapid GA growth (p=0.02), and subfoveal choroidal thickness reduction (24±11µm, p=0.04). 1-year letter loss was comparable between two groups (1.8 in the DAPT and 3.5 in the controls, p=0.50).

Conclusions: Dual antiplatelets decelerated the GA growth rates over the 12 months. Drusen-associated GA may represent a more generalized form of choroidal nonperfusion. Altogether, the results support the hypothesis that choriocapillaris occlusion and outer retinal hypoxia contribute to the AMD pathogenicity.

Efficacy of ND-YAG Laser Vitreolysis for Symptomatic Floaters in a Tertiary Government Hospital: A Randomized Control Study

First Author: Chester ***PATARAY***
Co-Author(s): Peter Mark ***CHAO,*** *Ivan* ***OLAIVAR,***
Ricardo Tobias ***PAPA***

Purpose: Symptomatic floaters have negative impact on the quality of life of patients. This study evaluates the efficacy of vitreolysis using subjective and objective assessment tools. As a promising treatment option for symptomatic floaters, this could fill the gap between observation and vitrectomy.

Methods: This is a prospective, interventional, participant-blinded and outcome assessor-blinded, sham-controlled randomized study from May to September 2019. Patients were randomly assigned to YAG or sham laser. Main outcomes include subjective change in 10-point Visual Disturbance Score, self-rated 5-level Qualitative Improvement scale and objective assessment using observer-rated 5-level Floater-Disparity scale. Secondary outcomes include change in visual acuity and any adverse event.

Results: Thirty-one patients (36 eyes, 10 males and 21 females) were enrolled. Each group had 18 eyes, mostly phakic, with mean duration of symptom of 14.83 months (SD=17.05) in the YAG-laser group and 13.06 months (SD=11.05) in the sham-laser group. The 10-Point Visual Disturbance Score in the study group improved by 6 vs 0 in the control group (mean difference, 5.72; 95% CI, 5.04-6.41; p=0.0001). The study group had 100% success rate in the subjective Improvement Scale vs 0% in the control group (p=0.0001). In the objective Disparity Scale, the study group had a success rate of 94.44% vs 0% in the control group (p=0.0001). No significant change in visual acuity post-laser was recorded. Three patients (16%) from the YAG-group had retinal burns vs none on the sham-group, but comparative analysis showed no statistical significance (z=–1.81, p=0.070).

Conclusions: YAG-laser vitreolysis effectively improve floater symptoms and appearance with acceptable safety profile.

Endogenous Klebsiella Pneumoniae Panophthalmitis with Perinephric and Psoas Abscesses in a 42-year-old Diabetic Female

First Author: Charmaine ***MALABANAN***

Purpose: To present a rare case of endogenous panophthlamitis with Klebsiella pneumoniae bacteremia and perinephric and psoas abscesses.

Methods: Case report.

Results: We are presented with a diabetic female with a 2-week history of sudden onset blurring of vision of the right eye associated with left flank pain, no history of trauma. On presentation, visual acuity was no light perception. Examination showed an edematous, erythematous, proptotic right eye with severely restricted extraocular movements. Anterior segment exam revealed diffuse conjunctival injection, mucoid discharge, corneal edema, and fibrin in the anterior chamber. Dilated exam was limited due to diffuse chamber reaction and corneal edema. Intraocular pressure was elevated to 42 mm Hg. Ophthalmic ultrasonography revealed vitritis with choroidal thickening. Vitreous tap was done, with intravitreal injection of vancomycin and ceftazidime. Intravenous ceftriaxone, topical levofloxacin and oral acetazolamide were given. Pars plana vitrectomy was deferred due to the fulminant course. Vitreous cultures revealed growth of Klebsiella pneumoniae while urine culture showed growth of Klebsiella pneumoniae and Staphylococcus. Patient was started on IV gentamycin. Ultrasound and contrast CT scan of the whole abdomen revealed bilateral pyelonephritis with left perinephric and psoas abscesses. Percutaneous drainage was done with decrease in abscess. During her course in the ward, patient's left eye became phthisical, with no light perception. She was discharged with resolution of eye pain and swelling.

Conclusions: Endogenous endophthalmitis is a rare blinding condition. A good clinical eye with high index of suspicion and prompt intervention in these cases, would result in good visual prognosis and better quality of life.

Evaluation of Dosing Regimen Patterns and Treatment Adherence to Anti-VEGF Therapy for Management of Proliferative Diabetic Retinopathy: Perspective from Indian Ophthalmologists and Retina Specialists

*First Author: Vidya **IYER***
*Co-Author(s): Utkarsh **SHAH***

Purpose: Nationwide, cross-sectional survey to understand Indian physicians' perspective on anti-VEGF treatment pattern and treatment adherence for proliferative diabetic retinopathy (PDR) management.

Methods: Questionnaire-based, telephonic survey was conducted among 13 physicians (retina specialists=7, ophthalmologists=6), who manage PDR patients and administer intravitreal anti-vascular endothelial growth factor (anti-VEGF) injections in private-settings across India. Data were analyzed for common themes/trends.

Results: Major treatment goals for prescribing anti-VEGF therapy by the physician are decrease/control neovascularization, improvement in vision, reducing macular edema, and controlling hemorrhage. Majority physicians discuss the available anti-VEGF agents and provide comparative assessment of their cost, FDA-approval status, and follow up regimen with the patients. All the physicians follow pro re nata (PRN) regimen for PDR management. Physicians opine that majority of their patients continue the same molecule prescribed at first instance throughout the journey of treatment. Brand/molecule switching occur if the desired response is not achieved after 2 to 3 injections and due to affordability issues. Physicians opine that nearly one-third patients drop out of anti-VEGF therapy. Reasons for patient dropout are repeated follow-up, increased cost burden, desired vision improvement not achieved and restricted movement due to co-morbidities. Majority physicians are satisfied with the results of anti-VEGF therapies.

Conclusions: Majority of the Indian physicians recommending anti-VEGF therapy for PDR follow the PRN regimen and are highly satisfied with the desired outcomes. Treatment dropouts are mainly driven by cost of anti-VEGF therapy, repeated follow up and failure to achieve desired vision improvement.

Evaluation of Interleukin-6 and Tumor Necrosis Factor-Alpha in Tears and Its Associated Factors in Age Related Macular Degeneration Patients

*First Author: Abdul-hadi **ROSLI***

Purpose: The objective of this study was to evaluate the interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-α) in tears in age related macular degeneration (AMD) patients and to determine its associated factors.

Methods: This was a comparative cross-sectional study. Patients with early AMD, late AMD and control group who fulfilled the inclusion criteria were recruited into this study. Tears samples were collected, then analyzed using commercial human IL-6 and TNF-α enzyme-linked immunosorbent assay kit to measure IL-6 and TNF-α levels in tears. Only late neovascular AMD (nAMD) was enrolled in this study since there was no late dry AMD available during the study period.

Results: A total of 142 patients (56 early AMD, 56 late nAMD and 30 control group) were recruited in this study. AMD showed significantly higher mean tears IL-6 (21.91 (95% CI: 19.89, 23.93), p= 0.014) compared to control group after adjusted with covariates. However there was no significant difference of mean tears IL-6 between early and late nAMD group after adjusted with covariates (p=0.844). For TNF-α, there was no significant differences of mean tears TNF-α between AMD and control group as well as between early and late nAMD after adjusted with covariates (p=0.324 and p=0.749 respectively). There was no significant association found between IL-6 and TNF-α

level in tears with duration of AMD, serum level of IL-6 and TNF-α, smoking status and AMD status.

Conclusions: IL-6 in tears showed significant elevation among AMD. Therefore, IL-6 in tears can be used as non-invasive biomarker for AMD screening.

Evaluation of Treatment Outcomes of Polypoidal Choroidal Vasculopathy Subtypes in a Multicenter Randomized Controlled Clinical Trial

*First Author: Colin **TAN***
*Co-Author(s): Louis **LIM,** Wei Kiong **NGO***

Purpose: To evaluate the treatment outcomes of polypoidal choroidal vasculopathy (PCV) subtypes among patients from a multicenter randomized controlled trial.

Methods: Sixty patients with macular PCV 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 versus 8.5 (type B) and 6.9 (type C) ($p<0.001$). The proportion of patients with VA ≥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.

Extensive Submacular Hemorrhage in a Patient with Myopic Choroidal Neovascularization

*First Author: Marc **MANGAHAS***

Purpose: To present a known case of myopic choroidal neovascularization (CNV) who developed extensive submacular hemorrhage.

Methods: Case report.

Results: A 68-year-old female was previously treated for myopic CNV presenting as a small, round subfoveal hemorrhage of the left eye. A single injection of intravitreal bevacizumab provided resolution and she was regularly monitored. Seven months later, she complained of sudden blurring of vision of the left eye. Visual acuity was 20/50 and hand movement for the right and left eyes, respectively. Slit-lamp examination was unremarkable. The posterior segment showed extensive submacular hemorrhage occupying the majority of the macula and inferior retinal mid-periphery. The right eye was unremarkable. Monthly intravitreal bevacizumab injection was initiated. Further enlargement of the submacular hemorrhage and mild vitreous hemorrhage were observed. After 3 doses, an indocyanine green angiogram and optical coherence tomography were done to rule out pathologies like polypoidal choroidal vasculopathy but showed blocked fluorescence and hyporeflectivity from the remaining submacular hemorrhage. Monthly anti-VEGF injections were continued. There was an eventual decrease of the submacular hemorrhage and resolution of the vitreous hemorrhage. Visual acuity of the right eye improved to counting fingers at 2 feet.

Conclusions: Myopic CNV is a complication of myopic degeneration, presenting as small subretinal gray lesion with minimal submacular hemorrhage. It has good response to anti-VEGF treatment. In our case, the submacular hemorrhage was unusually extensive and a slow response to anti-VEGF treatment. Other pathologies such as PCV should be ruled out.

To our knowledge, there are no published reports presenting similarly to our case.

Faricimab in Neovascular Age-Related Macular Degeneration: Week 48 Results from the Phase 3 TENAYA and LUCERNE Trials

First Author: Robyn ***GUYMER***
Co-Author(s): Karen ***BASU,*** *Frank* ***HOLZ,*** *Hugh* ***LIN,*** *Carlos* ***QUEZADA RUIZ,*** *Tien-yin* ***WONG***

Purpose: To assess efficacy, safety, and durability of faricimab, a bispecific angiopoietin-2/vascular endothelial growth factor-A antibody, in patients with neovascular age-related macular degeneration (nAMD).

Methods: TENAYA (NCT03823287, N=671) and LUCERNE (NCT03823300, N=658) are randomized, double-masked, active comparator–controlled, 112-week, phase 3 trials of faricimab in nAMD. Patients were randomized 1:1 to faricimab 6.0 mg up to every 16 weeks (Q16W) or aflibercept 2.0 mg every 8 weeks (Q8W). Based on disease activity at weeks 20 and 24, patients in the faricimab arm were allocated to Q8W, every-12-week (Q12W), or Q16W dosing until week 60.

Results: Both trials met their primary endpoint with consistent results; mean change in best corrected visual acuity from baseline averaged over weeks 40, 44, and 48 with faricimab up to Q16W (TENAYA +5.8; LUCERNE +6.6 ETDRS letters) was noninferior to aflibercept Q8W (+5.1; +6.6 ETDRS letters). 79.7% and 77.8% of patients in TENAYA and LUCERNE, respectively, were on ≥Q12W dosing intervals at week 48, with 45.7% and 44.9% of patients on Q16W dosing. Central subfield thickness (CST) reductions from baseline (weeks 40, 44, 48 average) with faricimab up to Q16W (TENAYA −136.8 µm; LUCERNE −137.1 µm) were comparable with aflibercept Q8W (−129.4 µm; −130.8 µm). Faricimab was well tolerated; no cases of vasculitis or occlusive retinitis were reported.

Conclusions: Faricimab up to Q16W demonstrated noninferior vision gains compared to aflibercept Q8W in patients with nAMD, with ~80% of patients on ≥Q12W and ~45% on Q16W fixed dosing intervals at week 48. Reductions in CST were meaningful. Faricimab was well tolerated.

First Case of Subretinal Ocular Angiostrongyliasis Associated with Retinal Detachment in the United States

First Author: Kayne ***MCCARTHY***
Co-Author(s): Marina ***GILCA,*** *Gregg* ***KOKAME,*** *Keke* ***LIU,*** *Pauline* ***MERRILL***

Purpose: Angiostrongylus cantonensis, commonly known as the rat lungworm, is mostly found in Asia, the Pacific Basin, and the Caribbean, but is also endemic in Hawaii, especially on the island of Hawaii. Ocular angiostrongyliasis is an uncommon but previously reported complication associated with permanent vision loss.

Methods: This is the first reported ocular angiostrongyliasis involving the retina or posterior segment of the eye in Hawaii and the continental United States.

Results: A 24-year-old male from Chicago visited the island of Hawaii, where he worked on a farm and ate a vegetarian diet. He fell sick in Hawaii and was transferred to a Chicago hospital, where he was hospitalized for eosinophilic meningitis. One month later, he developed a retinal detachment which required surgical repair involving a pars plana vitrectomy. During the reattachment of the retina during surgery, a live motile nematode in the subretinal space was identified. An endolaser probe immobilized and killed the subretinal nematode which was subsequently extracted through the sclerotomy. Thermal scars around all retinal holes including the retinotomy site were made to stabilize the retina, and perfluoropropane gas was injected to achieve temporary tamponade. Thereafter, his cerebrospinal fluid returned positive for angiostrongylus cantonensis antibodies. During extended follow-up, the patient eventually lost all vision in the affected eye due to recurrent retinal detachment.

Conclusions: This case of ocular angiostrongyliasis demonstrates the importance

of obtaining travel history from endemic areas, knowing the risk of developing eosinophilic meningitis, and understanding the risk of permanent vision loss in cases involving the retina.

Imaging Characteristics of Bilateral CSCR Cases: 12 Months Follow Up

First Author: Sumit ***SINGH***
Co-Author(s): Supriya ***ARORA,*** *Deepika* ***PARAMESWARAPPA,*** *Jay* ***CHHABLANI,*** *Niroj* ***KUMAR SAHOO***

Purpose: To report the disease pattern, progression, and imaging characteristics in eyes with bilateral central serous chorioretinopathy (CSCR).

Methods: This was a retrospective case review of bilateral CSCR patients with active disease in at least one eye. Multimodal imaging including fundus photography, fundus autofluorescence, optical coherence tomography (OCT), fluorescein and indocyanine angiography (FA/ICGA) was done at baseline and follow up visits. Disease classification was done using recently described classification criteria. The degree of asymmetry in the disease distribution pattern at baseline and disease progression during follow up visit with a minimum duration of 12 months was studied.

Results: Among 103 CSCR patients, 36 patients (34.95%) with mean age of 53.6 ± 10.5 years had bilateral CSCR at baseline. Five patients (13.9%) had asymmetrical disease i.e., simple in one eye and complex in fellow eye. Rest 31 patients had bilaterally similar disease (simple, 2; complex, 29). Mean duration of follow up was 17.58 ± 13.84 months. There was no significant difference between both eye parameters at last follow up (best corrected visual acuity, BCVA; central macular thickness, CMT; and subfoveal choroidal thickness, SFCT) (all $p>0.05$). At last follow up, 22 eyes (2 simple and 20 complex) remained active whereas none of the eyes converted from simple to complex CSCR.

Conclusions: Complex CSCR, in contrast to simple CSCR, is more commonly bilaterally distributed. Moreover, disease distribution in complex CSCR tends to have symmetric pattern if bilateral disease is present. Conversion rate of simple CSCR to complex type is low.

Impact of Long-Term Use of Intravitreal Anti-Vascular Endothelial Growth Factors on the Choroid in Refractory Neovascular Age-Related Macular Degeneration

First Author: Mahima ***JHINGAN***
Co-Author(s): Sumit .

Purpose: To study the long-term impact of intravitreal anti-vascular endothelial growth factors (anti-VEGF) on the choroid in poor responders versus good responders in neovascular age-related macular degeneration (nAMD).

Methods: A retrospective review of patients with nAMD at a tertiary institute was done. Poor responders (PR) were eyes on long-term anti-VEGF treatment with inability to extend treatment that needed a double dose of medication (n=20). Good responders (GR) were eyes in long-term remission after at least three injections that remained dry for a year until the last visit (n=20). Patients underwent comprehensive examination, fluorescein angiography (FA) and optical coherence tomography (OCT) at all visits. Choroidal vascularity index (CVI), subfoveal choroidal thickness (SFCT), choriocapillaris thickness (CC) and Haller's and Sattler's layer thickness (HSL) were analyzed for statistical significance, besides demographic factors.

Results: Mean age at presentation was 76.9 (± 7.2) years in the PR and 79.07 (± 6.15) years in GR. Slight female preponderance was noted in the poor (61.1%) and good responders (72.2%). Mean follow-up was 72.5 (± 26.1) months in PR and 84.5 (± 28.1) months in GR ($p=0.17$). Mean number of injections (PR, 50.35; GR, 18.9) and average treatment free interval (PR, 6.75 months; GR, 49.25 months) differed significantly in the two groups ($p<0.0001$). Both groups demonstrated a significant reduction in CRT, CC, HSL, SFCT, CVI and increase in size of geographic atrophy (GA) over time. Rate of

growth of GA in mm2 per year [PR=0.133 (± 0.2); GR=0.579 (± 0.7), p=0.009] differed too.

Conclusions: Over time treated eyes with nAMD show thinning of the choroid and its components with a corresponding reduction in CVI in both good and poor responders. Rate of growth of GA is higher in GR compared with PR.

Inadvertent Foveal Burns during Panretinal Photocoagulation: Initial Management and Early Outcomes

*First Author: Alberto Jr **CHACON***

Purpose: To describe the outcomes of a case of foveal injury secondary to Nd:YAG 532um laser burns treated with oral and periocular steroids.

Methods: Case report.

Results: There was an immediate drop in best corrected visual acuity (BCVA) from a baseline of 20/25 to 20/100 measured 3 hours post foveal exposure but returned to baseline by 1st week and was sustained until last follow up at 7 weeks. A dense nasal scotoma was evident during the 1st week, which gradually improved through time. No subjective complaints were noted. OCT showed edema and hyperreflective changes from the laser with resolution of cystic edema after 1 week but with recurrence by the 7th week.

Conclusions: Inadvertent exposure of the fovea can cause injury and decrease in vision. Prompt use of systemic and periocular depot steroids may have a role in ameliorating the damaging effects of foveal burns. Similar cases are discussed.

Intrachoroidal Cavitations in High Myopia

*First Author: Santosh **SHARMA***
*Co-Author(s): Roshni **MOHAN,** Nikita **SONAWANE***

Purpose: To report the rare finding of intrachoroidal cavitations and elaborate their clinical and imaging characteristics in high myopia.

Methods: Observational case report by analyzing fundus examination with slit lamp biomicroscopy using 90 diopter lens and further investigation with spectral domain optical coherence tomography (SD-OCT) of lesions (focal chorioretinal atrophy).

Results: SD-OCT revealed the presence of features suggestive of intrachoroidal cavitations in two patients with high myopia at two topographically separate locations, namely peripapillary region and the macula.

Conclusions: Clinical appearance of intrachoroidal cavitations at peripapillary and macular locations can mimic the appearance of pathologies such as choroidal tumors or colobomas respectively. SD-OCT can be useful in confirming the presence of intrachoroidal cavitations and can also be useful for studying the course of these lesions on follow-up visits.

Intravitreal 5-Fluorouracil and Low Molecular Weight Heparin Injection following Rhegmatogenous Retinal Detachment Surgery: A Systematic Review and Meta-Analysis

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*Co-Author(s): Arjan **DHOOT,** Peter **KERTES,** Rajeev **MUNI,** Marko **POPOVIC***

Purpose: This review assesses the safety and efficacy of 5-fluorouracil (5FU) with low molecular weight heparin (LMWH) for the prevention of proliferative vitreoretinopathy (PVR) following pars plana vitrectomy (PPV) for rhegmatogenous retinal detachment (RRD) repair.

Methods: We conducted a comprehensive search of three independent databases (Ovid MEDLINE, EMBASE and Cochrane CENTRAL) from inception until May 2021. Randomized control trials and observational studies on the safety and efficacy of 5FU with LMWH for PVR prophylaxis following PPV for RRD repair were included. Incidence of PVR was the primary outcome. Reattachment rates and adverse events, including keratopathy, anterior chamber flare, cataract formation, elevated IOP and macular pucker were secondary outcomes.

Results: Five studies with a pooled total of 539 eyes in the 5FU with LMWH group and 516 eyes

in the treatment naïve group were included. The incidence of PVR formation following PPV was not significantly different between 5FU with LMWH group and the treatment naïve group (9.9% vs. 12.2% respectively; P=0.55). The primary and final reattachment rate was not statistically different in the 5FU with LMWH group versus the treatment naïve group (78.2% vs. 76.4%; P=0.27 and 91.0% vs. 88.2%; P=0.57; respectively). There were no significant differences in adverse events such as keratopathy, anterior chamber flare, cataract formation, elevated IOP and macular pucker (P=0.15; P=0.67; P=0.10; P=0.85; P=0.12; respectively).

Conclusions: Our meta-analysis shows no significant differences in the safety and efficacy outcomes for incidence of PVR in patients treated with 5FU and LMWH versus no adjuvants.

Intravitreal Aflibercept in Routine Clinical Practice: 12-Month Results from the Taiwanese Cohort of Treatment-Naïve Patients with Macular Edema secondary to Retinal Vein Occlusion in the AURIGA Study

First Author: San-ni ***CHEN***
Co-Author(s): Helmut ***ALLMEIER,*** *Wen-lu* ***CHEN,*** *Tobias* ***MACHEWITZ,*** *Chang-hao* ***YANG***

Purpose: AURIGA (NCT03161912) is an ongoing, 2-year, prospective, observational study evaluating intravitreal aflibercept (IVT-AFL) in retinal vein occlusion (RVO) and diabetic macular edema in routine clinical practice across 11 countries. Here, we report 12-month outcomes for the treatment-naïve RVO cohort in Taiwan.

Methods: Eligible patients (aged ≥18 years) with central (CRVO) or branch RVO (BRVO) were treated with IVT-AFL at their physician's discretion according to local practice. The primary endpoint was mean change in best-corrected visual acuity (BCVA) from baseline to month (M) 12, measured at the visit closest to day 360 (days 300–420). Safety was monitored throughout.

Results: The analysis included 38 patients with CRVO and 88 with BRVO (mean age: 65.6 years). By M12, mean (95% CI) BCVA improved by +11.8 letters (3.6, 19.9) for CRVO and +14.6 letters (9.6, 19.5) for BRVO (baseline±SD: 42.7±21.2 and 49.2±19.3). Overall, 57.0% gained ≥10 letters and 48.2% gained ≥15 letters (6.1% lost ≤15 letters). Mean central retinal thickness decreased by −329 µm (−403, −255) for CRVO and −250 µm (−293, −207) for BRVO (baseline±SD: 606±204 and 531±176). The mean number of IVT-AFL injections for CRVO and BRVO was 3.4±1.2 and 3.3±1.3 by M6 and 4.6±2.0 and 4.4±2.3 by M12. Overall, 11.9% received ≥5 injections by M6 and 18.3% received ≥7 injections by M12. The IVT-AFL safety profile was consistent with previous studies. No intraocular inflammation, retinal vasculitis, or endophthalmitis was reported.

Conclusions: IVT-AFL showed clinically relevant functional and anatomic improvements at 12 months in patients with BRVO and CRVO in Taiwan.

Intravitreal Anti-VEGF with and without Topical Non-Steroidal Anti-Inflammatory in Center-Involving Diabetic Macular Edema

First Author: Sashwanthi ***MOHAN***
Co-Author(s): Gajendra ***CHAWLA,*** *Rajiv* ***RAMAN,*** *Janani* ***SURYA R***

Purpose: Intravitreal anti-VEGF therapy is the mainstay in the management of center-involving diabetic macular edema (CI-DME). Topical non-steroidal anti-inflammatory have been employed to treat CI-DME as well. The aim of this study was to compare visual acuity and OCT outcomes in patients with CI-DME who receive intravitreal anti-VEGF with and without topical NSAID in CI-DME.

Methods: Retrospective study in 2 centers in India. The study compared visual and OCT parameters of patients with CI-DME treated with intravitreal anti-VEGF monotherapy (group 1, N=100) versus intravitreal anti-VEGF therapy with topical NSAIDs given (group 2, N=50) for 1 year.

Results: There were no differences between groups in visual acuity and OCT categories or number of injections based on available data. Group 2 received more mean number of intravitreal injections (Group 1: 2.26±1.71 vs Group 2: 3.74±2.42, p<0.0001).

Conclusions: Combination therapy of topical NSAID with intravitreal anti-VEGF did not show any beneficial effects in terms of visual outcomes, reduction in central subfoveal thickness or reduction in mean number of injections in our study.

Intravitreal Dexamethasone Implant for Diabetic Macular Edema: Comparison of Ranibizumab in Vitrectomized Eyes at One Year

*First Author: Jia-kang **WANG***

Purpose: To compare the efficacy of intravitreal ranibizumab (IVR) and intravitreal dexamethasone implant (IDI) for pseudophakic vitrectomized eyes with diabetic macular edema (DME) in a single institute.

Methods: Pseudophakic vitrectomized eyes with treatment-naïve center-involved DME were enrolled with one eye in each patient. They were divided into one group receiving IDI every 3 to 4 months, and the other group undergoing IVR using 3 monthly plus treat-and-extend injections all with monthly follow-up for 12 months. Switch of intravitreal drugs or deferred macular laser was not allowed. Primary outcome measures included change in central foveal thickness (CFT) in 1 mm by spectral-domain optic coherence tomography, and best corrected visual acuity (BCVA) at month 12.

Results: Twenty eyes were included in the IDI group, and 25 eyes in the IVR group. Significantly better mean final BCVA (0.36 logMAR vs 0.57 logMAR, p = 0.03), more mean visual gains (-0.29 logMAR vs -0.12 logMAR), lower mean final CFT (303.2 μm vs 377.2 μm), and larger mean CFT decrease (-160.1 μm vs -58.2 μm) were found in the IDI group comparing to the IVR group (all p < 0.05). Less mean treatment number (4.56 vs 7.12) and higher rate of post-injection ocular hypertension requiring topical hypotensive agent therapy (29.8% vs 0%) were demonstrated in the IDI group than those in the IVR group (all p < 0.05).

Conclusions: Dexamethasone implant injections had significantly better visual/anatomical improvement, less treatment number, and higher rate of elevated IOP after injections than ranibizumab in pseudophakic vitrectomized eyes for DME during 12-month period.

Is Immediate Laser Necessary? A Retrospective Analysis of Bevacizumab Monotherapy and Need for Additional Laser for Retinopathy of Prematurity

*First Author: Manavi **SINDAL***
*Co-Author(s): Nagesha **CK,** Romana **FAZAL,** Divya **YADAV***

Purpose: To determine the need for laser therapy in eyes receiving intravitreal bevacizumab (IVB) for posterior retinopathy of prematurity (ROP).

Methods: At a tertiary eye care institute, which routinely performs outreach and in-house screening for ROP, the data was retrospectively analyzed of babies who had received IVB for posterior ROP. Birth weight, gestational age (GA) and post-menstrual age (PMA) at injection, course of retinal maturation and requirement of additional laser treatment with their timing was recorded.

Results: Among the 63 eyes of 32 babies, aggressive posterior ROP was seen in 36 (57%) eyes and staged ROP in 27 (43%). The babies were born at a median GA of 31 (IQR-29-32) weeks, and birth weight was 1410 (1280-1697.5) grams. IVB was injected at a median PMA of 36 (34.5-37) weeks. Complete retinal vascularization was seen in 33 (52.4%) at a median PMA of 52 (47-60) weeks, prophylactic laser was need in 17 (27%) at 61 (55.5-63) weeks and only 13 (20.6%) eyes had recurrence of type 1 ROP needing treatment laser, at 42 (39-57) weeks respectively. Babies requiring laser had a significantly lower birth weight (p=0.033) and received injection earlier (p=0.08).

Conclusions: Babies with posterior ROP can be safely treated with IVB monotherapy. Additional

laser can be performed only in the subset of cases who have disease recurrence. Judicious management can obtain optimum outcomes.

Leukemic Retinopathy: Varied Presentations

First Author: Nikita ***SONAWANE***
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Purpose: To present cases highlighting the significance of fundus evaluation in diagnosing leukemia.

Methods: Case 1: A 63-year-old male known diabetic, hypertensive, hyperlipidemic on treatment presented with diminution of vision in OD post cataract surgery. BCVA OD - 6/24 , OS - 6/6. Fundus evaluation revealed severe NPDR OU and roth's spot OD. Patient was advised urgent blood investigations, on the basis of which the diagnosis of chronic myeloid leukemia was made and was started on tablet imatinib (300mg/day). Further he developed cystoid macular edema OU for which he received multiple intravitreal anti-VEGF injections with suboptimal response. Case 2: A 29-year-old male presented with diminution of vision OS. He was known case of CML previously and had stopped treatment since 6 months. BCVA OD - 6/9, OS - 6/36. Fundus evaluation showed OU retinal hemorrhages and whitish retinal infiltrates. For which he was advised urgent hematologist referral.

Results: Both patients were timely referred to hematologist to start treatment. In case 1 fundoscopy helped in diagnosis of CML whereas in case 2 it identified disease relapse.

Conclusions: In case 1 the presence of roth›s spot was the telltale sign which prompted to investigate the patient and led to diagnosis, also to discuss and unfurl the various causes of fluctuating cystoid macular edema. In patient 2 the presence of leukemic infiltrates aided in establishing disease relapse and restarting treatment.

Longer Treatment Intervals are associated with Reduced Treatment Persistence in Neovascular Age Related Macular Degeneration

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Co-Author(s): Daniel ***BARTHELMES,*** *Gemmy* ***CHEUNG CHUI MING,*** *Vuong* ***NGUYEN,*** *Mark* ***GILLIES***

Purpose: To assess the association of 2-year treatment intervals on non-persistence to follow up of neovascular age related macular degeneration (nAMD).

Methods: Data were obtained from the prospectively-defined Fight Retinal Blindness! registry. Treatment interval at 2 years was stratified based on the mean treatment interval over the three visits prior to and including the 2-year visit. Rates of non-persistence to follow-up was assessed from 2 to 5 years.

Results: Data from 1538 eyes were included. The overall rate of non-persistence was 51% at 5 years. Patients on longer treatment intervals (12-weeks) at 2 years were found to be less persistent to long-term follow-up. These eyes were found to have fewer active disease visits in the first 2 years (40%) than eyes treated at 4-weekly intervals (66%, p<0.001). In the multivariable analysis, better vision at 2 years was associated with a lower risk of non-persistence (hazards ratio [HR] [95% CI]: 0.95 [0.93, 0.97], P<0.001), while longer treatment intervals (HR [95% CI]: 1.31 [0.95, 1.8] and 1.54 [1.15, 2.06] for 12-week and >12-week intervals vs. 4-week intervals, respectively, P=0.002) and older patients (HR [95% CI]: 1.03 [1.02, 1.04], p<0.001) were at higher risk of non-persistence.

Conclusions: We found that patients on longer treatment intervals at 2 years were more likely to be non-persistent in treatment in later years. Reinforcing the need for ongoing treatment is important for patients on longer intervals who may feel complacent or that treatment is no longer effective, particularly if newer, longer lasting agents become widely available.

Macular Microvascular Changes in OCTA in Retinal Vein Occlusion after Dexamethasone Implant

First Author: Sherine ***DSOUZA***
Co-Author(s): Hardik ***NANAVATI,*** *Bhavana* ***VASUDEV***

Purpose: To show the role of OCT-A in macular perfusion in retinal vein occlusion (RVO) after dexamethasone implant.

Methods: A 3 month follow up of 30 unilateral eyes with RVO with macular edema treated with intravitreal dexamethasone using 4.5mm x 4.5mm macular OCT-A images was analyzed to observe changes in macular perfusion. The foveal avascular zone (FAZ), vascular density (VD) of superficial capillary plexus (SCP) and vascular density of deep retinal capillary plexus (DCP) were evaluated along with subjective observations to note for any structural changes.

Results: A mean improvement of 6.9 (±0.8) letters was noted after 3 months of follow up after a single intravitreal injection. No significant change was noted in the FAZ of superficial capillary plexus ($p>0.05$). Statistically significant change in FAZ and deep capillary plexus ($p<0.05$) was observed. No significant change was noted in the VD ($p>0.05$) in superficial and deep capillary plexus. There was no statistical correlation between improvement in vision with FAZ and VD. En-face images of OCT-A showed increase in vascular tortuosity in 25 of 30 patients and an increase in hyperreflective spots observed subjectively.

Conclusions: Quantitative and qualitative analysis of macular perfusion can be performed using macular OCT-A. A statistically significant change in vision can be documented in vision which may be correlated to improvement in macular perfusion after Ozurdex implant. FAZ of DCP shows statistically significant improvement. The vascular density of SCP and DCP had no significant difference. Structural changes can be noted in SCP and DCP as a recovery response in RVO.

Multiple Anti-VEGF Intravitreal Injections Lead to Enhanced Restoration of External Limiting Membrane and Ellipsoid Zone in Diabetic Macular Edema

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Purpose: To study the restoration of ellipsoid zone (EZ) and external limiting membrane (ELM) following monthly intravitreal bevacizumab (IVB) in diabetic macular edema (DME).

Methods: Forty consecutive patients aged 40-65 years with DME were prospectively recruited. Three doses (1.25mg in 0.05ml, n=120) of IVB at monthly intervals was given. Visual acuity (logMAR VA) was recorded. The baseline SD-OCT image was compared with subsequent OCT images after injections. Central sub-foveal thickness (CST) and ELM and EZ disruption were noted. ELM disruption was graded as grade-0: ELM intact, grade-1: focal subfoveal disruption of ELM, grade-2: global disruption of ELM within macular cube. Disruption of EZ was graded as per our published classification: grade-0: intact EZ, grade-1: focal subfoveal disruption of EZ, grade-2: global disruption of EZ within macular cube. Data was statistically analyzed.

Results: Mean logMAR VA decreased after IVB therapy from 1.8±0.07 pre-intervention to 0.4±0.05 post-intervention ($p<0.001$). CST reduced from 354.2±15.0µm pre-intervention to 233.2±7.88µm post-intervention ($p<0.001$). Global ELM disruption reduced from 82% pre-intervention to 61% after first dose, 21% after second dose and finally 9% after third dose. Global EZ disruption reduced from 80% pre-intervention to 25% after first dose, 18% after second dose and subsequently to 11% after IVB regimen ($p<0.001$). It was noted that in the eyes in which ELM was restored, EZ was also restored after treatment, defining the mechanism of restoration. This was associated with corresponding decrease in logMAR VA.

Conclusions: Anti-VEGF therapy restores the barrier effect of ELM causing enhanced rate of restoration of ELM and EZ in DME.

Multiple Retinal Hemorrhages with Retinal Vein Thrombosis after a COVID-19 Vaccination: A Case Report

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Purpose: To report a case of multiple retinal hemorrhages and retinal vein thrombosis after a vaccination for coronavirus disease 2019 (COVID-19).

Methods: A 61-year-old woman visited the clinic complaining with blurred vision in the left eye. No abnormal finding in the left eye was observed until two months ago, and she had no documented past medical history including hypertension and diabetes. She received COVID-19 vaccine (ChAdOx1 nCoV-19 vaccine, AZD1222) four days ago, and experienced blurred vision 3 days before this visit. Best corrected visual acuity (BCVA) was 20/25 in the left eye.

Results: Multiple retinal hemorrhages were found on entire retina in the fundus examination. In addition, multiple perivascular leakages were identified on the retina and peripapillary area in fluorescein angiography (FFA). However, definite non-perfusion, capillary dropout, microaneurysm and neovascularization were not observed, and arm-to-retinal time was not delayed. There was no macular edema in the optical coherence tomography (OCT). After 2 months, BCVA of the patient was decreased to 20/200 and macular edema was observed in the OCT scan.

Conclusions: Thrombolytic thrombosis syndrome has been reported as an adverse event after the COVID-19 vaccination. Clinical findings of the patient were relatively different from a typical central retinal vein occlusion. This patient showed multiple retinal hemorrhages without delayed arm-to-retinal time and capillary dropout. Moreover, FFA presented multiple thrombosis in the peripheral retinal veins. This report suggests COVID-19 vaccination can induce multiple retinal hemorrhage with retinal vein thrombosis, which may be considered as a kind of thrombolytic thrombosis syndrome in the retinal vasculature.

Novel Retinal Findings in β-Thalassemia Major: Older Age and Higher Ferritin Level as the Risk Factors

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Purpose: To investigate retinal changes in β-thalassemia major patients and identify their association with systemic risk factors.

Methods: In this prospective study, 120 β-thalassemia major patients received complete ophthalmic examinations (best-corrected visual acuity, contrast sensitivity, color vision and indirect ophthalmoscopy) and retinal imaging using color fundus photography and fundus autofluorescence imaging. Patients were grouped according to the presence of thalassemia-related retinal changes. The association between systemic risk factors (age, type and duration of iron chelator use, history of splenectomy, hemoglobin level and ferritin level) and thalassemia-related retinal changes was investigated using logistic regression analysis.

Results: Thalassemia-related retinal changes were identified in 36.7% of patients. Several distinct retinal changes were observed, including retinal refractile bodies in 10% of patients and retinal hemorrhage in 5.8% of patients. Fundus autofluorescence imaging showed abnormal patterns in 36.3% of patients with thalassemia-related retinal changes and 18.4% of patients without thalassemia-related retinal changes. Age (odds ratio [OR] = 1.10, 95% confidence interval [CI] 1.03–1.18) and ferritin level (OR 1.16, 95% CI 1.01–1.33) were associated with thalassemia-related retinal changes.

Conclusions: Novel retinal changes were observed in β-thalassemia major patients. This study identified older age and higher ferritin level as risk factors for thalassemia-related retinal changes.

Ocular Circulation a Window to the Systemic Diseases: HRAO with NA AION as a Presenting Feature of Polycythemia

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Purpose: To present the first report of combined hemiretinal artery occlusion with NA AION as the primary manifestation and aid in the diagnosis of polycythemia.

Methods: A 71-year-old hypertensive male presented with sudden onset of painless diminution of vision in the right eye of two days duration. Examination revealed absence of perception of light, 15 degrees esotropia (with abduction deficit) and afferent pupillary defect in the right eye with pallid disc edema with retinal pallor in the superior hemiretinal area. Left eye vision was 6/9 with small hypermetropic disc. A diagnosis of combined NA AION with hemiretinal artery occlusion was made. He gave history of multiple episodes of transient double vision in the past (suspected TIA) for which he did not seek medical attention.

Results: Investigations revealed undetected diabetes mellitus and raised hematocrit. OCT shows hypoperfusion over the entire superior retina. VEP suggested right eye axonal optic neuropathy. MR-angiogram and cerebrovascular Doppler revealed right ICA stenosis. Echocardiogram revealed a floating thrombus in the arch of aorta. Genetic testing identified a positive JAK-2 mutation for polycythemia. The patient was started on anticoagulants, hydroxyurea, anti diabetics and anti hypertensives. On follow-up visits, no visual improvement was noted.

Conclusions: The presence of various unaddressed systemic disorders like sustained hyperglycemia, uncontrolled hypertension and undiagnosed polycythemia probably culminated in the development and progression of the thrombo embolic condition leading to this rare ocular presentation.

Optic Disc Melanocytoma associated with Neuroretinitis: A Rare Presentation

First Author: Aniket ***RAI***
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Purpose: To describe a rare presentation of optic disc melanocytoma with neuroretinitis.

Methods: We present a rare case report of a 40-year-old female presented to us with complains of diminution of vision in right eye for 1 week. History of trauma with wooden board in right temporal region 6 months back. Her vision was 1mfc in right eye and 6/6 in left eye. Pupil was sluggishly reacting to light and IOP was 12 and 13 mm Hg in right and left eye respectively. Anterior segment was unremarkable. A 3*2mm pigmented lesion was seen covering the optic nerve head except the inferior margin which was hyperemic and blurred. FA shows hypofluorescence seen with leakage at the disc inferiorly. OCT shows raised nodular hyperreflectivity at its anterior surface and dense posterior shadowing of all retinal layers with optically empty appearance. FAF show hypofluorescence of the lesion.

Results: Resolution of disc edema and faster visual recovery following treatment with IV methyl prednisolone tapered with oral steroids.

Conclusions: Melanocytoma is a deeply pigmented variant of melanocytic nevus that classically occurs in the optic disc, sometimes with contiguous involvement of the adjacent retina or choroid. Optic disc melanocytoma rarely presents with neuroretinits. Visual recovery is faster if prompt treatment is given. Although melanocytoma is typically a relatively stationary lesion, it can exhibit malignant transformation into melanoma in 1–2% of cases. A patient with a melanocytoma of the optic disc should be examined annually.

Optical Coherence Tomography Angiography Findings in a Case of Polypoidal Choroidal Vasculopathy

First Author: Ruth Camille ***ANTOLIN***
Co-Author(s): Patricia ***QUILENDRINO***

Purpose: This case is to illustrate the diagnostic features and treatment behavior of polypoidal choroidal vasculopathy (PCV) to intravitreal bevacizumab with the aid of optical coherence tomography angiography (OCTA).

Methods: We present a case of a 50-year-old male with a sudden blurring of vision in the left eye. Baseline visual acuity (VA) of the affected eye was 20/100 and indirect ophthalmoscopy revealed submacular hemorrhage with multiple subretinal orange nodules. PCV impression was made after initial evaluation and imaging using fluorescein angiography and optical coherence tomography (OCT) with angiography. The patient underwent pneumatic displacement with intravitreal bevacizumab for the hemorrhage.

Results: The diagnosis was confirmed after follow-up OCTA showed multiple polypoidal lesions (PL) with branching vessel network (BVN) corresponding to the subretinal lesions. The patient was regularly monitored using OCTA and was given bevacizumab retreatment for any new or increased size of the PLs. The patient's VA returned to 20/20 and was maintained.

Conclusions: In conclusion, detection of PCV on OCTA rests on identifying the polypoidal lesions and the branch vessel network. Correlation with OCT key findings and flow scans helps in confirming its diagnosis. The behavior of PCV on OCTA shows that the BVN persists even with bevacizumab treatment and that polyp responses vary.

Optical Coherence Tomography and Imaging Biomarkers as Outcome Predictors in Diabetic Macular Edema Treated with Dexamethasone Implant

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Co-Author(s): Wei-yu ***CHIANG,*** *Cheng-hsiu* ***WU,*** *Wei-chi* ***WU***

Purpose: To determine the predictive value of imaging biomarkers in diabetic macular edema (DME) outcomes following dexamethasone (DEX) implant(s).

Methods: A retrospective, multicenter study with DEX-treated DME patients. Best-corrected visual acuity (BCVA) and central foveal thickness (CFT) on optical coherence tomography (OCT) before and after intravitreal DEX implants were evaluated. Baseline imaging biomarkers were graded using fundus photography and OCT, and the predictive value of biomarkers for significant treatment effects at 6 months was analyzed.

Results: Sixty-seven eyes of 47 patients were included from 4 medical centers. Six months after 2.0 ± 0.8 (mean ± SD) DEX implants, 35 (52%) and 16 (24%) eyes had CFT reduction ≥ 10% from baseline and decreased to < 300 μm, respectively. BCVA improved ≥ 3 lines in 15 (22%) and remained stable in 38 (57%) eyes. At six months, eyes with severe intraretinal cyst (IRC), abundant hyperreflective dots (HRD), and moderate or severe hard exudate had a significantly higher chance of CFT reduction ≥ 10% (OR = 1.24; 95% CI, 1.01-1.52; OR = 1.27; 95% CI, 1.03-1.55; and OR = 1.50; 95% CI, 1.30-1.74, respectively). Eyes with abundant HRD at baseline and those that underwent three DEX implants were more likely to achieve CFT < 300 μm (OR = 1.32; 95% CI, 1.04-1.66; and OR = 1.44; 95% CI, 1.15-1.81, respectively).

Conclusions: Eyes with DME and severe IRC, abundant HRD, or moderate-to-severe hard exudate at baseline were more likely to show a significant reduction in CFT six months after DEX implant.

Paraproteinemic Maculopathy: A Presenting Feature and Mimicker of Recalcitrant Diabetic Macular Edema

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Purpose: To report a case of paraproteinemia that presented with recalcitrant macular edema in the background of diabetic retinopathy (DR). There was complete resolution of edema with chemotherapy.

Methods: A 61-year-old diabetic male was evaluated for recent-onset macular edema in both eyes. In the setting of background DR, he was treated with multiple intravitreal anti-VEGF and steroid injections. However, a progressively increasing macular edema despite standard therapy prompted us to do a systemic evaluation.

Results: The patient was hospitalized for pain abdomen secondary to splenomegaly which was later found to be due to Waldenstrom macroglobulinemia. A revised diagnosis of paraproteinemic maculopathy was made and started on curative intent chemotherapy with rituximab and bendamustine. The maculopathy resolved completely in both eyes over a period of 2 years with no recurrence of underlying disease.

Conclusions: Maculopathy is a rare presenting manifestation of underlying paraproteinemias. A high degree of suspicion and need for prompt evaluation is needed to recognize this entity. In this regard, recalcitrant diabetic macular edema needs thorough systemic evaluation to rule out systemic causes.

Periocular Steroids for Macular Edema associated with Retinal Arteriovenous Malformation

First Author: Roshni ***MOHAN***

Purpose: Retinal racemose angiomas (RRH) or arteriorvenobs malformation (AVM) are rare vascular anomalies of the retina. About 30% of patients have associated intracranial malformations called Wyburn Mason syndrome. It may sometimes be associated with macular edema and defective vision. We are reporting a case of type 2 RRH with macular edema treated with periocular steroids.

Methods: A 38-year-old healthy male presented with sudden onset defective vision in his left eye (OS). His anterior segment evaluation was normal. Fundoscopy OS revealed abnormal network of vessels in superotemporal quadrant with surrounding edema and exudation encroaching the macula. The first branch of superotemporal artery was seen communicating with the vein through an abnormal dilated vessel. Fundus fluorescein angiography (FFA) showed filling of this dilated vascular bed in early frames with late leakage. Optical coherence tomography (OCT) showed subretinal fluid, intraretinal cysts and hyper reflective foci corresponding to hard exudates. Imaging of brain and orbit was normal.

Results: We decided to inject intravitreal bevacizumab (IVB) 1.25 mg/0.05 ml. However the macular edema, retinal thickness worsened and visual acuity dropped. We decided to inject posterior subtenon injection of triamcinolone acetonide (40 mg/ml). 3 weeks later there was decrease in the edema and visual acuity improved significantly. We followed up for six months and there was no further deterioration of vision or recurrence of macular edema.

Conclusions: RRH is associated with macular edema, the treatment of which is not clearly elucidated. However long term follow up would be required, because its natural history is not well elucidated.

Photodynamic Therapy for Bilateral Exudative Age-Related Macular Degeneration Refractory to Anti-VEGF Agents – A Case Report

First Author: Ting-yu ***WU***

Purpose: To report a patient with bilateral exudative age-related macular degeneration which did not respond to multiple injections of anti-VEGF agents and improved after photodynamic therapy.

Methods: A cases report.

Results: A 60-year-old man complained of blurred vision for months. Fundus examination showed diffused drusens with subretinal fluid over macula in both eyes. Optical coherence tomography (OCT) showed bilateral subretinal fluid with exudates and retinal pigment epithelial detachment. Fluorescein angiography (FAG) revealed choroidal neovascularization of both eyes. However, after 5 times of intravitreal injection of ranibizumab and one injection of aflibercept, there was no improvement in visual acuity and findings on OCT image. Full dose photodynamic therapy was then performed in both eyes and the subretinal fluid gradually reabsorbed 4-5 months later. No recurrence was found for more than 3 years.

Conclusions: Besides the switch of different anti-VEGF agents, we can also consider photodynamic therapy as the rescue treatment for eyes with age-related macular degeneration refractory to anti-VEGF agents.

Pigmentary Retinopathy in a Patient with Neurofibromatosis Type I

*First Author: Kim Paolo **LORENZO***
*Co-Author(s): Darby **SANTIAGO***

Purpose: Neurofibromatosis type 1 is an autosomal dominant condition characterized by cutaneous, neurologic, and ophthalmologic manifestations. We report a case of retinal pigmentary dystrophy in a patient with neurofibromatosis type 1.

Methods: This is a case of a 63-year-old Filipino woman with multiple neurofibromas, plexiform neurofibromas, café-au-lait macules, and intertriginous freckling, who presented with progressive nyctalopia and color vision deficit. On ophthalmologic exam, best corrected visual acuity was 20/40 in the right eye and 20/50 in the left eye. Ishihara color vision test was 1/16 on both eyes. On slit lamp exam, she has bilateral Lisch nodules. On indirect ophthalmoscopy of both eyes, there was arteriolar attenuation with retinal atrophic changes with bony spicule-like hyperpigmented lesions at the near periphery up to the central retina. There are retinal atrophic changes at the parafovea-perifovea with relative sparing of the fovea.

Results: On fundus autofluorescence imaging of both eyes, there were hypoautofluorescent areas corresponding to the atrophic areas seen on indirect ophthalmoscopy. Fluorescein angiography of both eyes showed areas of transmission defect and staining as well as hypofluorescent patches along the major arcades. There were few hyperfluorescent spots at the foveal avascular zone. On optical coherence tomography of the macula, there was bilateral macular thinning and atrophy of the photoreceptor layer.

Conclusions: We described a case of retinal pigmentary dystrophy in a patient with clinically diagnosed neurofibromatosis type 1. The association between these two conditions has yet to be established. Patients should be well-advised regarding the nature and progression of the retinal disease.

Pigmented Focal Scleral Nodule

*First Author: Christopher **GO***
*Co-Author(s): Adrian **FUNG***

Purpose: To report a case of focal scleral nodule (FSN) with atypical features on multi-modal imaging including pigmentation and hypoautofluorescence.

Methods: A retrospective case review of multimodal imaging to determine the characteristics of this lesion.

Results: A 61-year-old asymptomatic diabetic woman was referred following an incidental finding of raised fundus lesion in her right eye. Fundus examination of the right eye showed a 3mm diameter partially pigmented circular lesion located at the superior margin of the optic nerve head. The lesion was partially hypoautofluorescent on fundus autofluorescence. EDI-OCT demonstrated a dome-shaped elevation of the lesion within the sclera, with overlying choroidal thinning.

Conclusions: Features in this case that are consistent for FSN include its solitary nature,

peripapillary location, slight elevation, size around 1-disc diameter and scleral thickening and choroidal thinning on EDI-OCT. However, the pigmentation within our lesion is a novel finding in FSN that has not been described before. Encountering a pigmented lesion raises the possibility of other differentials including choroidal nevi, choroidal melanoma and congenital hypertrophy of retinal pigmented epithelium (CHRPE). However these lesions are quite different from our case. It is likely that our case was a typical FSN that then became pigmented, with melanosomes involving the flanges of the lesion where thin choroid remains. The etiology of FSN remains elusive. This case will be followed-up long term to identify changes in its nature, particularly the pigmentation. The understanding that FSN can be partially pigmented may eventually help unravel the origins of this poorly understood lesion.

Poor Visual Prognosis of Central Retinal Artery Occlusion in a Teenager

First Author: Mia ***PURNAMA***

Purpose: To report a case of central retinal artery occlusion (CRAO) in a teenage patient.

Methods: A case report of central retinal artery occlusion in a healthy young girl. A 15-year-old girl developed sudden visual loss in the right eye since three days. There was no fever, headache and pain on eye movement. Visual acuity in the right eye was light perception and found afferent pupillary defect. Fundus examination on the right eye revealed pale retinal edema in all quadrants and cherry red spot. All blood test results were normal. The patient was hospitalized for examinations and intravenous steroid treatment.

Results: Over two weeks treatment of steroid, visual acuity in the right eye improved to 2 meter counting finger. Fundoscopy on the right eye showed reduced retinal edema, optical coherence tomography-based angiography (OCTA) at the macula on the right eye revealed typical ischemic changes in superficial and deep retinal capillary plexuses, and obtained widening of foveal avascular zone (FAZ).

Conclusions: This case suggests that CRAO can occur in a healthy teenager. Late treatment has a poor visual prognosis.

Prognostic Utility of Hyperreflective Spots in Predicting Outcomes of Intravitreal Therapy in Diabetic Macular Edema: A Systematic Review and Meta-Analysis

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Purpose: Hyperreflective spots (HRS) are considered as biomarkers in predicting response to intravitreal therapy (IVT) in diabetic macular edema (DME). We aimed to determine if there was a quantitative reduction in HRS following IVT in DME, if response to anti-VEGF drugs was different from steroids, and if HRS-response was associated with improvement in visual acuity (VA) or reduction in central macular thickness (CMT).

Methods: PubMed/MEDLINE, Scopus, ProQuest, CINAHL, Wiley online and Web of Science were searched based on MOOSE guidelines evaluating HRS as biomarker in DME (between 1st January 2011 and 1st July 2020). Publication bias was analyzed (Begg and Mazumdar rank correlation test and funnel plots). Heterogeneity was assessed using the I2 statistic. Meta-analysis was done using random-effects model.

Results: A total of 1168 eyes from 19 studies were included. Pooled standardized mean differences showed that IVT was associated with a reduction in quantitative HRS (z=-6.3, 95% CI = -1.09 to -0.55, p<0.0001). There was no difference in outcomes between anti-VEGF and steroid therapies (Q*=1.4, df=1, p=0.23). Extreme between-study heterogeneity was observed (I2=93.2%) with significant publication bias (Kendell's Tau a= -0.526, p=0.001). Presence/absence of HRS at the start of the therapy was not associated with improved VA at the end of treatment (Hedges' g= 0.237, 95% CI = -1.39 to 1.87, I2 =84%, p=0.5).

Conclusions: There is a definite reduction in quantitative HRS following either form of intravitreal therapy. The evidence on predicting CMT outcomes were limited by the number of analyzable studies, owing to wide variation in individual study designs, and lack of randomized controlled trials.

Purtscher-Like Retinopathy: Presentation of SLE in a Pediatric Patient

First Author: Mohd Khairy ***ZAINAL ABIDIN***
Co-Author(s): Zunaina ***EMBONG,*** *Qi* ***NGOO***

Purpose: To report a case of systemic lupus erythematosus (SLE) in a 10-year-old girl with bilateral eye presentation of Purtscher-like retinopathy.

Methods: A case report.

Results: A 10-year-old Chinese girl presented with lethargy for 4 weeks and intermittent fever for 2 weeks. The fever was associated with rashes. She was treated as pyrexia of unknown origin. She denied any blurring of vision, eye pain or redness. On examination, generally she was febrile with temperature of 39°C with facial rash. There were discoid rashes involving both hands and generalized erythematous skin over the hernial region. However, there was no hepatomegaly, splenomegaly, or lymphadenopathy. She was referred for eye assessment to rule out any ocular association of connective tissue disease. Ocular examination showed poor visual acuity in both eyes with 6/15 in the right eye and 6/30 in the left eye. Anterior segment examination was normal in both eyes. Fundus examination showed presence of generalized Purtscher-like retinopathy with tortuous retinal vessels bilaterally. Optic disc was pink with normal cup-disc ratio in both eyes. Optical coherence tomography showed hyperreflectivity of the inner retina, as well as cystoid macular edema in both eyes. Blood investigation revealed leukopenia, anemia, low C3 and C4 with positive both antinuclear antibody (ANA) and anti-dsDNA antibody. She was finally diagnosed as SLE and was treated with systemic steroid by pediatric team.

Conclusions: Fundus examination for pediatric patient presented with pyrexia of unknown origin should be regularly done since lupus retinopathy reflects systemic immune complex-mediated disease.

Quantitative Impact of COVID-19 Pandemic on Vision in Age-Related Macular Degeneration Patients in Western Pennsylvania

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Co-Author(s): Jay ***CHHABLANI,*** *Joshua* ***ONG,*** *José-alain* ***SAHEL,*** *Shruthi* ***VENKATESH***

Purpose: To quantitatively characterize the impact the COVID-19 pandemic has had on vision loss in age-related macular degeneration (AMD) patients.

Methods: In a longitudinal analysis from 2018-2020, 333 patients with a confirmed diagnosis of active wet AMD aged 18 years or older seen before and during the lockdown (March 2020-December 2020) were assessed for visual acuity changes. Main outcome measures included changes in the number of clinic visits, anti-VEGF injections, visual acuity as measured by logMAR scoring, and patients lost to follow-up during the COVID-19 lockdown.

Results: A total of 295 eyes of 172 patients were included. 240 eyes of 161 patients (48.34%) were lost to follow-up during the lockdown. During lockdown, the mean number of clinic visits was 4.62 (2.98) compared to 4.33 (2.92) in the pre-COVID period ($p = 0.203$). The mean number of anti-VEGF injections was 4.83 (3.15) during the lockdown and 4.45 (3.03) in the pre-COVID period ($p = 0.114$). The mean logMAR scores of the participants increased from 0.73 (0.43) pre-COVID to 0.84 (0.49) during the lockdown ($p = 0.002$).

Conclusions: We report 48% of patients who were receiving AMD-related care were lost to follow up and we report a significant loss in vision during the lockdown period owing to a reduced number of visits and injections.

Rare Case Report of Complete Ophthalmic Artery Occlusion in a 28-Year-Old Man

First Author: Shet ***CHOY***
Co-Author(s): Krishnalatha ***BUANDASAN,*** *Ui Lyn* ***LOH***

Purpose: To highlight the diagnostic dilemma of ophthalmic artery occlusion in a young patient with metabolic syndrome and diffuse large B-cell lymphoma.

Methods: Case report.

Results: A 28-year-old male presented on the day after an acute loss of vision in his right eye which was associated with right temporal headache. He is an active smoker with underlying obesity, uncontrolled hypertension, dyslipidaemia, hypothyroidism, and diffuse large–B cell lymphoma under remission. Premorbidly, patient's vision was good. Visual examination of the right eye showed no perception to light in all four quadrants and marked relative afferent pupillary defect. Anterior segment was unremarkable. Funduscopic examination showed pale and edematous retina especially the posterior pole with absence of cherry red spot. Optic disc was swollen, and all vessels were attenuated with box-carring seen temporally. There were no new vessels. Left eye was normal. Ultrasound carotid Doppler noted echogenic thrombus along the right internal carotid artery (ICA) causing its complete obstruction. Echocardiography showed no vegetations or thrombi. Magnetic resonance imaging of brain and orbit showed no evidence of lymphoma metastasis. Full blood picture was not suggestive of cancer-related thrombosis. Diagnosis of right ophthalmic artery occlusion secondary to metabolic syndrome was made. Patient had quit smoking. He was referred to vascular surgical team and medical team to optimize his comorbids.

Conclusions: Ophthalmic artery occlusion although rare, is an ophthalmic emergency which requires a holistic and systemic approach to identify the cause, especially in young patients, to avoid more sinister vascular events which could be fatal.

Real World Insights on Anti-VEGF Treatment Pattern and Treatment Adherence in Indian Patients with Neovascular Age-Related Macular Degeneration: Questionnaire-Based Survey Results

First Author: Maulik ***BHAVSAR***
Co-Author(s): Nitin ***MAKSANE***

Purpose: To obtain insights from Indian healthcare-professionals (HCPs) on the treatment goals when recommending anti-vascular endothelial growth factor (anti-VEGF) therapy in patients with neovascular age-related macular degeneration (nAMD), factors influencing anti-VEGF choice, treatment regimen, patient dropout rate and HCPs' satisfaction with anti-VEGF therapy.

Methods: A cross-sectional, questionnaire-based, telephonic survey was conducted across India in real-world settings to include 40 HCPs (20 retina specialists and 20 ophthalmologists) who use anti-VEGF injections for nAMD management.

Results: Each HCP attended to an average of 11 new nAMD patients per month (retina specialist: 13; ophthalmologists: 9) and ~50% patients came for second opinion. Vision improvement is the main treatment goal (75% HCPs) while recommending anti-VEGF therapy, followed by stabilization/preservation of vision, reduction/drying of fluid, anatomical improvement and reduced dependency for daily activities. The choice of anti-VEGF therapy is joint decision of patient and the HCPs (n=28) after considering factors like approval status, affordability, and safety. The HCPs suggested a loading dose of 3 injections followed by pro re nata regimen, with regular safety assessment. Approximately 30% patients discontinue the treatment; unaffordability, regular follow-ups, and dissatisfaction with the improvements in vision were three main reasons for drop-out. HCPs reported satisfaction with the use of anti-VEGF therapy in 72% cases; however, they also stressed that the results vary with patients and time of presentation.

Conclusions: Most of the participating HCPs recommended anti-VEGF therapy for

improving/preserving vision in patients with nAMD. Monthly injections and high costs were the major barriers in use of the therapy.

Recurrent Macular Edema and Optic Neuropathy in Patient with Retinitis Pigmentosa

*First Author: Raj **HIRAWAT***
*Co-Author(s): Nagesha **CK,** Pratyusha **GANNE***

Purpose: To report an unusual and rare presentation of combined recurrent macular edema and optic neuropathy in retinitis pigmentosa. A favorable treatment response with steroids is highlighted.

Methods: A 29-year-old, deaf and dumb by birth had presented with sudden drop in right eye vision to perception of light. He was previously diagnosed as a case of retinitis pigmentosa (RP) featuring classical bony spicules, disc pallor and attenuated vessels and had received multiple posterior subtenon's triamcinolone injections for recurring macular edema. Currently, there was grade 3 RAPD in the right eye with minimal cystoid macular edema without any disc edema.

Results: Contrast enhanced (CE)-MRI brain and orbit did not reveal any enhancing optic nerve or brain white matter lesion. He was treated with 3 doses of intravenous methyl prednisolone (IVMP) (1g for three days) and vision dramatically improved to 6/9. Patient had 3 more attacks of mono-ocular vision loss subsequently over the next 2 years and all responded well to IVMP. His NMO/MOG were negative, repeat CE-MRI brain, orbit and spine were normal. Tests for other autoimmune diseases including collagen vascular diseases were negative.

Conclusions: Combined presentation of retinitis pigmentosa, recurring macular edema and optic neuropathy is rare. Prompt recognition and early therapy results in full recovery of vision.

Renal Function Change after Two-Year Intravitreal Anti-VEGF Treatment for Diabetic Macular Edema

*First Author: Yi-ting **HSIEH***

Purpose: To evaluate the change of estimated glomerular filtration rate (eGFR) after intravitreal anti-vascular endothelial growth factor (VEGF) treatment for diabetic macular edema (DME).

Methods: Patients who had received intravitreal injections of ranibizumab or aflibercept for DME for at least 2 years were retrospectively enrolled. Those with a baseline eGFR <15mL/min group or under dialysis were excluded. The eGFR at baseline and during the follow-up period, and the event of dialysis during the follow-up period were collected. Change of eGFR was calculated and compared among different groups of baseline eGFR level, and the associating factors for eGFR decline and dialysis were evaluated.

Results: Of the 108 enrolled patients, the eGFR had a mean decline of 10% at 12 months and 17% at 24 months after intravitreal anti-VEGF treatment. Patients in the eGFR >120 mL/min group and the 15–30 mL/min group had more decline (32% and 37%), while those in the 61–90 mL/min group had the least decline (4%) in eGFR after 2-year treatment. One out of 52 patients (1.9%) receiving ranibizumab and 5 out of 56 patients (8.9%) receiving aflibercept started hemodialysis or peritoneal dialysis within the 2-year follow-up period (P = 0.21). Poor baseline eGFR was correlated with dialysis after anti-VEGF treatment (HR=0.910 per increase of 1 in eGFR, P = 0.005).

Conclusions: There was a decline in eGFR after two-year intravitreal anti-VEGF treatment for DME. Patients with extremely high or low eGFR had more eGFR decline, and those with poor baseline eGFR tended to need dialysis after anti-VEGF treatment.

Retinal Manifestations Lead to the Diagnosis of Blood Cancer – Leukemia: A Case Report

*First Author: Lay **KIMHOUR***

Purpose: To report a case of a female adult whose vision disturbance was the first concern during her first ophthalmic visit with retinal manifestations that led to the suspicion of a type of blood cancer; leukemia.

Methods: A 30-year-old female patient experienced a vision drop progressively for about 3 months and suddenly lost after waking up. Visual acuities recorded were CF 2m in the right eye and 6/60 in the LE. Dilated fundus examination on the RE exhibited the optic disc swelling with multiple NVs associated with venous tortuosity, multiple dot-blot hemorrhages, pre-retinal hemorrhage, and Roth's spot. LE revealed flamed-shape hemorrhage, subhyaloid macular hemorrhage, and Roth›s spots. Optical coherence tomography and fundus fluorescence angiography were then performed for the subsequent investigation.

Results: Depending on clinical signs and clinical settings, the patient was presumptively diagnosed as RE CRVO and BE Valsalva-like retinopathy secondary to hemopathy. Therefore, non-ocular features have been questioned. Surprisingly, the information that have further received indicated hemopathy. Blood test was then asked before getting referred to hematologist. Unfortunately, the patient passed away four weeks after receiving treatment abroad without any shreds of evidence of the type of leukemia.

Conclusions: Leukemic retinopathy is the most common ocular feature of leukemia that essentially requires us to have a better understanding. Therefore, the primary care physician needs to be aware. An early diagnosis that leads to a suspicion of any type of blood cancer, principally leukemia, would be a great advantage toward saving or prolonging the patient›s life.

Retinal Microvascular Changes in Non-Diabetic Chronic Kidney Disease on Hemodialysis: An Optical Coherence Tomography Angiography-Based Study

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Purpose: Long-term morbidity and mortality are associated with chronic kidney disease (CKD). Using OCTA, we analyzed changes in the retinal microvasculature in non-diabetic CKD in comparison with age-matched healthy controls.

Methods: We recruited 30 healthy volunteers and 30 CKD patients to a prospective cross-sectional study. Patients were scanned using DRI Triton plus OCT machine. Analysis was performed on a scan area of 4.5x4.5mm centered on the fovea generated from superficial and deep retinal vascular plexus for all the eyes. We used local fractal analysis method to quantify the OCTA parameters. The FAZ was also quantified.

Results: 25 males and 5 females were included in the study (mean age, 46.65 years). Mean vessel density in superficial plexus was 34.20% pre-dialysis compared to 33.45% post dialysis, whereas vessel density in the deep plexus pre-dialysis was 26.06% as compared to 25.85%. Superficial and deep vessel densities in age-matched controls were 36.82% and 50.08% respectively. Compared to healthy controls, CKD patients had reduced vascular density ($p<0.05$ for both). FAZ measures did not differ between groups.

Conclusions: We report reduced vascular density in CKD patients as compared to age-matched controls. Post-dialysis we noted a further reduction in vessel density in both superficial and deep plexus among CKD patients. These vascular changes explain the emergence of retinopathy in patients with non-diabetic renal failure. Further prospective studies with larger cohort of patients will aid to understand the disease better.

Retinal Nerve Fiber Layer Thickness Post Pan-Retinal Photocoagulation in Proliferative Diabetic Retinopathy

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Purpose: The purpose of this study is to evaluate the retinal nerve fiber layer (RNFL) thickness in type 2 diabetes mellitus (T2DM) patients with proliferative diabetic retinopathy (PDR) following pan-retinal photocoagulation (PRP).

Methods: A prospective cohort study was conducted from June 2012 until December 2013. RNFL thickness was determined using optical coherence tomography before and at three months after completion of PRP.

Results: A total of 44 PDR patients were enrolled into this study. Mean global RNFL thickness showed significant reduction at three months post PRP ($p < 0.001$) from 112.11µm (38.94) to 96.46µm (29.54). Based on quadrant, all quadrants had significant reduction in RNFL thickness at three months post PRP except nasal quadrant. Inferior quadrant ($p < 0.001$) from 134.77µm (43.27) to 116.34µm (37.94), superior quadrant ($p = 0.002$) from 129.98µm (57.82) to 117.23µm (40.33) and temporal quadrant ($p < 0.001$) from 92.80µm (42.32) to 77.89µm (35.67) RNFL thickness pre and post PRP respectively.

Conclusions: PRP was associated with reduction of RNFL thickness in T2DM patients with PDR at three months post PRP.

Retinal Vascular Complication of Dengue Fever, an Unexplored Entity: A Case Series

First Author: Ratu Puri ***SASTRADIWIRJA***

Purpose: To report a case series of retinal vascular manifestations of dengue fever (DF) and spectral-domain optical coherence tomography (OCT) features.

Methods: Retrospective review of five cases with retinal vascular occlusion complicating DF.

Results: Eight eyes of 5 patients with confirmed DF were studied. All of them were female. The mean age was 23.8 years. The mean duration from DF diagnosis to development of visual complaint was 11.8 days. Presenting best corrected visual acuity ranged from 20/20 to counting fingers (mean BCVA 6/120). All patients had no other known risk factors to develop vascular occlusion. First case is of a 23-year-old female with sequential bilateral central retinal artery occlusion (CRAO). Inner retina hyperreflectivity and macular edema depicted on OCT. Second case presented with both eyes retinal cotton wool spots in a Purtscher-like configuration. OCT showed juxtafoveal intraretinal cysts and diffuse retinal thickening. The third patient, a 19-year-old woman with left eye positive visual phenomenon and an OCT feature of paracentral acute middle maculopathy (PAMM). Fourth and fifth patients presented with right superotemporal branch retinal vein occlusion (BRVO) and left inferotemporal BRVO, respectively. They are complicated by cystoid macular edema seen on OCT.

Conclusions: Vascular occlusion secondary to DF, an endemic disease in Indonesia, has been rarely reported. OCT is a useful tool for the diagnosis and monitoring of disease progression. This complication potentially entails significant visual impairment albeit maximum treatment. It highlights the importance of awareness of ocular involvement in patients with DF.

Retinal Vascular Fractal Dimension and Cognitive Dysfunction: Systematic Review and Meta-Analysis

First Author: Ting-yu ***WU***

Purpose: Retinal vascular fractal dimension (Df) reflect the overall complexity of the retinal vascular network, further representing the status of the cerebral vascular systems. Investigating the relationship between the retinal vascular Df and cognitive function may show the contribution of microvascular changes to cognitive dysfunction.

Methods: A systematic review and meta-analysis was carried out to compare the measurement of retinal vascular fractal dimension between normal elderly and patients with cognitive dysfunction.

Results: The meta-analysis of four studies showed the mean total, arteriolar and venular fractal dimension in Alzheimer's disease (AD) was significantly reduced compared with healthy controls. But in another two studies, there was no significant reduction of fractal dimension in patients with cognitive dysfunction, defined by poor performance in the cognitive test, compared with the control group.

Conclusions: Overall, the results of this meta-analysis showed that total, arteriolar and venular Df of retinal vessels all decreased in AD patients. However, the evidence cannot support the application of this examination to other forms of dementia or cognitive dysfunction. Further studies are needed to determine the role of the Df of the retinal vascular network in the detection or diagnosis of the cognitive dysfunction.

Retinal Vein Occlusion following COVID-19 Vaccination

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Purpose: To present two cases of retinal vein occlusion presenting immediately after receiving COVID-19 vaccination.

Methods: First patient was a 50-year-old male known diabetic (with HBA1C 13.2) who presented 4 days after second dose of Covisheid with painless DOV. BCVA OD - 6/60, OS - 6/6. Fundus examination OD revealed feature suggestive of central retinal vein occlusion. OS showed mild non proliferative diabetic retinopathy changes. OCT revealed cystoid macular edema with central foveal thickness of 571um in right eye. Second patient was a 43-year-old female with unremarkable systemic history who presented with OD sudden onset DOV 3 days after receiving second dose of vaccination (Covishield, AZD1222, ChAdOx1). Her BCVA was OD 5/60 and OS 6/12. Anterior segment examination showed immature senile cataract (OU) with dense central posterior sub-capsular cataract in OD. Fundus examination OD revealed feature suggestive of impending central retinal vein occlusion. OS fundus was unremarkable. OCT OD showed hyper-reflectivity of inner layers but no CME. Both the patients were thoroughly investigated to rule out causes of thromboembolism. Lately, there are reports on vascular thromboembolic catastrophes post-vaccination, especially with ChAdOx1 and with proposed hypothesis.

Results: Both patients were followed up till resolution of retinal hemorrhages. The first patient was given intravitreal injection anti-VEGF for cystoid macular edema.

Conclusions: To the best of our knowledge, there are no previous reports on retinal venous occlusion following AZD1222 vaccination. Also to report this rare adverse event and unfurling the possible pathophysiology behind it.

Risk of Intraocular Inflammation following Intravitreal Injection of Anti-Vascular Endothelial Growth Factor Agents: A Network Meta-Analysis

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Purpose: The relative incidence of intraocular inflammation (IOI) between anti-vascular endothelial growth factor (VEGF) agents for the treatment of neovascular age-related macular degeneration (nAMD) is not well established. Recent reports suggest an increased incidence of IOI with brolucizumab. This network meta-analysis investigates the risk of IOI following intravitreal anti-VEGF injections.

Methods: A systematic literature search was performed on Ovid MEDLINE, EMBASE, and Cochrane CENTRAL from 2005 to April 2021. RCTs comparing IOI incidence following intravitreal bevacizumab, ranibizumab, brolucizumab, or aflibercept for nAMD were included. Primary outcomes were the incidence

of sight-threatening IOI (endophthalmitis, retinal vasculitis, retinal vascular occlusions) and best corrected visual acuity (BCVA). Secondary outcomes included the incidence of iritis/iridocyclitis, vitritis/vitreous cells, vitreous haze/floaters, and generalized intraocular inflammation.

Results: 14 RCTs reporting on 6759 eyes at baseline were included. No significant differences were observed between anti-VEGF agents for primary outcomes. Compared to aflibercept, brolucizumab was associated with a significantly higher incidence of generalized IOI (RR=6.24, 95% CI=[1.40, 27.90]) and vitreous haze/floaters (RR=1.64, 95% CI=[1.00, 2.67]). There were no significant differences between comparators for other secondary outcomes.

Conclusions: There were no significant differences between brolucizumab, aflibercept, bevacizumab, and ranibizumab for sight-threatening IOI outcomes and BCVA. There is a significantly higher risk of generalized IOI and vitreous haze/floaters following brolucizumab relative to aflibercept. Our findings, alongside other recent safety findings, suggest the need for further investigation in the use of brolucizumab for the treatment of nAMD.

Role of Dual Inhibition of Ang-2 and VEGF-A in Patients with Macular Edema due to Branch or Central/Hemiretinal Retinal Vein Occlusion: Rationale and Design of the Faricimab Phase 3 BALATON and COMINO Trials

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Purpose: Dual inhibition of angiopoietin (Ang)-2 and vascular endothelial growth factor A (VEGF-A) with faricimab offers excellent visual acuity (VA) gains with strong durability in patients with diabetic macular edema. We will investigate the effects of faricimab on VA and durability in patients with macular edema due to retinal vein occlusion (RVO).

Methods: BALATON (NCT04740905; n=570; branch RVO) and COMINO (NCT04740931; n=750; central/hemiretinal RVO) are phase 3, multicenter, randomized, double-masked, active comparator-controlled studies comparing faricimab with aflibercept in anti-VEGF treatment-naïve patients with branch or central/hemiretinal RVO. Both studies will compare 6x monthly injections of faricimab 6.0 mg with aflibercept 2.0 mg. Patients will continue to faricimab 6.0 mg administered in up to 16-weekly intervals using a personalized treatment interval (PTI) dosing regimen (week 24-72). PTI adjustments are based on changes in central subfield thickness (CST) and best-corrected VA (BCVA).

Results: The primary endpoint is noninferiority of faricimab versus aflibercept in mean change from baseline in BCVA (week 24). Secondary endpoints (week 24): mean change from baseline in BCVA, CST, and NEI VFQ-25 composite score; proportion of patients gaining/avoiding loss of ≥15, ≥10, ≥5, or >0 letters. Secondary endpoints (week 72): same endpoints as week 24 plus durability of treatment and number of study drug injections received (week 24-72). Ocular/non-ocular adverse events, faricimab plasma concentration over time, and anti-drug antibody development will be assessed.

Conclusions: BALATON and COMINO will evaluate whether dual inhibition of Ang-2 and VEGF-A with faricimab improves outcomes beyond anti-VEGF monotherapy in patients with RVO and whether treatment can be personalized.

Role of Intravitreal Aflibercept in Radiation Maculopathy secondary to Plaque Brachytherapy in Choroidal Melanoma Resistant to Bevacizumab: Case Series

First Author: Monisha ***APTE***
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Purpose: To present cases of sub-foveal serous detachment and macular edema in choroidal melanoma treated with intravitreal aflibercept injection.

Methods: Interventional case report. Review of clinical, photographic, and radiological records was done.

Results: A 23-year-old male, case of left eye choroidal melanoma and a 38-year-old male, a case of left sided oculodermal melanocytosis with left eye choroidal melanoma had undergone Ruthenium-106 plaque brachytherapy. Both of them presented with diminution of vision in their left eyes subsequently. Optical coherence tomography of their eyes showed presence of sub-foveal serous detachment in the first case and macular edema in the second case secondary to plaque brachytherapy which persisted even after dose of intravitreal bevacizumab injection. Hence both the patients were given intravitreal aflibercept injection which led to resolution of subretinal fluid in the first case and subsidence of macular edema in the second case leading to improvement in their visual acuity.

Conclusions: Intravitreal aflibercept is an effective rescue therapy in the treatment of radiation maculopathy showing incomplete response to bevacizumab.

Safety of Suprachoroidal Injection of Proprietary Triamcinolone Acetonide Formulation (CLS-TA/ARVN001) across Three Retinal Diseases

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Purpose: Suprachoroidal injection (SCI) of proprietary triamcinolone acetonide formulation (CLS-TA/ARVN001) is under investigation as targeted drug delivery and treatment for chorioretinal diseases. This post-hoc analysis assessed procedural safety of SCIs across 1274 procedures in 8 clinical trials and 3 disease states.

Methods: Datasets were assessed from clinical trials involving noninfectious uveitis (NIU), diabetic macular edema (DME) and retinal vein occlusion (RVO), and included patients who received one or more SCIs, as monotherapy or with intravitreal anti-VEGF (IVT). Rare but serious adverse events (SAEs) known to occur with intraocular injection, including lens injury, suprachoroidal hemorrhage, retinal tear, retinal detachment, endophthalmitis, and reduced visual acuity were assessed. SAEs in the study eye were assessed on the procedure day.

Results: A total of 626 patients received one or more SCIs in their study eye, either as monotherapy (N=166) or with IVT aflibercept (N=460). Three (0.48%) of 626 patients experienced 3 SAEs of interest in the study eye, all occurring in patients receiving multiple injections and all deemed not treated-related by masked investigator: one NIU monotherapy patient experienced retinal detachment, occurring approximately 8 weeks after the SCI in a different quadrant, and 2 RVO patients receiving combination therapy experienced reduced vision. There were no SAEs involving lens injury, suprachoroidal hemorrhage, or endophthalmitis in patients receiving SCIs, either alone or in conjunction with IVT anti-VEGF.

Conclusions: Overall, across 8 clinical trials involving NIU, DME and RVO, patients receiving SCI experienced few SAEs associated with intraocular injections.

Seven-Year Outcomes of Diabetic Macular Edema by the OCT Patterns following Initial Intravitreal Ranibizumab Injection

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Purpose: To evaluate the outcomes of diabetic macular edema (DME) over 7 years based on the morphologic pattern on optical coherence tomography (OCT) after intravitreal ranibizumab injection.

Methods: A total of 27 eyes of 27 patients diagnosed with DME were classified according to OCT features: diffuse retinal thickening (DRT), cystoid macular edema (CME), and serous retinal detachment (SRD). All patients received three consecutive monthly intravitreal injections of 0.5 mg ranibizumab. After injections, patients received intravitreal anti-vascular

endothelial factor injection (VEGF) or steroid injection as needed. All patients were analyzed for over 7 years for the number of injections, best-corrected visual acuity, central subfield thickness, macular volume, and macular ganglion cell-inner plexiform layer (mGC-IPL) thickness changes.

Results: The eyes were classified into DRT (14 eyes), CME (6 eyes), and SRD (7 eyes) groups. DRT group received significantly fewer injections (DRT: 4.86 ± 2.35, CME: 11.67 ± 7.87, SRD: 12.57 ± 10.50) and maintained the best visual acuity during the 7 years. Whereas CME group had the worst visual acuity (DRT: 0.29 ± 0.25, CME: 0.49 ± 0.45, SRD: 0.45 ± 0.46) and the thinnest mGC-IPL thickness (DRT: 70.20 ± 16.90, CME: 49.86 ± 13.80, SRD: 80.40 ± 14.21) among three groups after 7 years.

Conclusions: The long-term clinical courses of DME varied according to the morphologic OCT patterns after injections. Since CME pattern showed the worst visual prognosis, additional injections can be considered more frequently than DRT pattern.

Size of Hemorrhage, Age of Onset and Diagnosis of Polypoidal Choroidal Vasculopathy are Important in Predicting Visual Outcome in Patients with Neovascular Age-Related Macular Degeneration Presenting with Subfoveal Hemorrhage

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Purpose: To identify factors affecting outcome in patients with neovascular age-related macular degeneration (NVAMD) and polypoidal choroidal vasculopathy (PCV), who presented with subfoveal hemorrhage (SFH) treated with anti-vascular endothelial factor (VEGF) agents.

Methods: Eyes treated with anti-VEGF with SFH >1 disc area (DA) were identified retrospectively (n = 20). Visual acuity (VA) and central subfield thickness (CST) from baseline to last follow up, along with SFH area, thickness, minimum distance from fovea to SFH border and time to resolution were noted.

Results: Spearman rank correlation shows large area of SFH correlates with longer duration (P = 0.019) and more injections (P = 0.018) needed for resolution. Older age of the patients correlates with worse visual outcome at the time of resolution (P = 0.009). Comparing NVAMD group (n = 13) with PCV group (n = 7), PCV group has a better visual acuity at resolution of hemorrhage (P = 0.02). Comparing SFH group with patients with both SFH and sub-retinal pigment epithelium hemorrhage (SRPEH) at fovea, patients with only SFH have thicker hemorrhage (P = 0.003) yet better visual acuity (P = 0.031).

Conclusions: Young age and diagnosis of PCV are associated with better visual outcome at resolution of hemorrhage. Larger hemorrhage correlates with longer duration and more injection before resolution.

Spectral Domain Optical Coherence Tomography Characteristics of Pregnancy-Induced Simultaneous Bilateral Central Serous Chorioretinopathy in an Indonesian Woman

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Purpose: Simultaneous bilateral presentation of central serous chorioretinopathy (CSC) in the absence of pregnancy-induced hypertension (PIH) and gestational diabetes is quite rare. We want to report a case of pregnancy-induced bilateral CSC in an Indonesian woman and describe its spectral domain optical coherence tomography (SD-OCT) characteristics.

Methods: A case report.

Results: A 33-year-old pregnant Indonesian female presented at 32 weeks gestation complaining of uncomfortable vision first noted at 28 weeks gestation. This is her second pregnancy, without previous history of PIH or diabetes. Best corrected visual acuity (BCVA) was 20/20 in both eyes. Dilated fundus examination revealed bilateral central serous detachments in the macula, with small yellowish exudates in right eye. OCT in both

eyes showed serous subretinal fluid, hyper-reflective foci, and "ragged" ellipsoid zones (photoreceptors) in both eyes. Right eye macula OCT also showed several small retinal pigment epithelial detachment and "double layer" sign. The patient was seen 3 months later after vaginal delivery. She still retained BCVA 20/20 in both eyes. The serous macular detachment had resolved. The macula OCT showed resolution of the subretinal fluid in both eyes, with a small retinal pigment epithelium (RPE) alterations that persisted in the right eye.

Conclusions: The SD-OCT findings in pregnancy-induced CSC are the same with classic CSC. However, the presence of hyper-reflective foci and exudations suggests the possible cause of CSC in pregnancy which is vascular hyperpermeability due to elevated plasma cortisol levels particularly during the third trimester. Fortunately, CSC during pregnancy typically resolves uncomplicated within several weeks post partum with minimal, if any, visual loss.

Spironolactone for the Treatment of Central Serous Chorioretinopathy: A Meta-Analysis

*First Author: Mara Sabrina **CLEMENTE***
*Co-Author(s): Antonio Niccolo **AGUSTIN***

Purpose: To compare the efficacy of spironolactone treatment versus conservative treatment in central serous chorioretinopathy (CSCR) using randomized controlled trials.

Methods: Online search databases were used to obtain articles using spironolactone for the treatment of CSCR. Randomized controlled trials comparing spironolactone versus placebo or observation only were included in this meta-analysis. Patients included in this study are individuals aged 18 years old and above diagnosed with CSCR with subretinal fluid seen in OCT and with blurring of vision. Exclusion criteria includes patients who have (1) received prior photodynamic therapy, focal laser photocoagulation of the RPE, and intravitreal injections of anti-vascular endothelium growth factor and other forms of therapy for CSCR, (2) contraindications to spironolactone (severe liver or kidney disease or hyperkalemia), (3) pregnant, and (4) systemic disease or allergy to medications.

Results: In the three studies included, spironolactone has shown an improvement in best corrected visual acuity (BCVA) as compared to observation (weighted mean difference, WMD = -0.05, 95% CI [-0.07, -0.02], $p < 0.0001$). It was also shown that spironolactone had better resolution of SRF as compared to observation (weighted mean difference, WMD = -1.90, 95% CI [-2.83, -0.98], $p < 0.0001$).

Conclusions: Spironolactone had a favorable improvement in best corrected visual acuity and reduction in subretinal fluid height on spectral domain-optical coherence tomography versus observation in patients with central serous chorioretinopathy.

Statin Use and the Incidence of Age-Related Macular Degeneration: A Meta-Analysis

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Purpose: Age-related macular degeneration (AMD) and atherosclerosis share similar risk factors. It is uncertain whether statins have a protective role in the development or progression of AMD. This meta-analysis investigates whether statin use has an effect on the incidence of AMD in the general population, and on progression in patients with existing AMD.

Methods: MEDLINE, EMBASE, and CENTRAL were searched from inception to September 2020. We included studies that measured the risk of AMD development or progression in statin users and nonusers. Primary outcomes were AMD incidence and progression. Secondary outcomes were the incidence of early AMD, late AMD, choroidal neovascularization (CNV), and geographic atrophy (GA).

Results: 21 articles (1 RCT, 20 observational) reporting on 1,460,989 participants were included. The pooled risk ratios [95%

confidence interval] for statin use on any, early, and late AMD incidence were 1.05 [0.85, 1.29] (p=0.44), 0.99 [0.88, 1.11] (p=0.86), and 1.15 [0.90, 1.47] (p=0.27), respectively. In patients with existing AMD, the respective risk ratios for statin use on the incidence of AMD progression, CNV, and GA were 1.04 [0.70, 1.53] (p=0.85), 0.99 [0.66, 1.48] (p=0.95), and 0.84 [0.58, 1.22] (p=0.36).

Conclusions: There was no significant difference in AMD incidence or progression between statin users and nonusers.

Subjective High-Risk Patient Counselling Randomisation Project (SHARP) – Outcomes of Pilot

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Purpose: To determine if additional counseling intervention in the form of videos with an emotional content or technical content can improve follow-up in emergency patients who are at a high risk of vision loss if treatment is delayed.

Methods: Patients presenting to the retina clinic of a tertiary eye care institute, who were diagnosed with either proliferative diabetic retinopathy, rhegmatogenous retinal detachment or age related macular degeneration were randomized into Base arm, Emotional arm and Technical arm. The Base arm received standard counseling, while the patients in the Emotional and Technical arm watched an emotional or disease specific technical video at the end of their appointments. They were administered a questionnaire after viewing the videos.

Results: After randomization of 521 patients, 185 patients were in Base Arm, 160 in Emotional and 176 in Technical arm. The patients in the Technical arm had significantly higher show-up probability (p = 0.07) compared to Base arm. Show-up probability of the patients in Emotional arm was higher than Base arm, but was not significant (p = 0.18). The questionnaire revealed that patients in the Emotional arm expressed more sadness, anxiety and anger; while those in the Technical arm felt more shame.

Conclusions: The results support that the use of emotional and technical videos after patient appointments has a potential for increasing the follow-up rate of emergency patients. These outcomes can pave the way for better counseling in the future. The randomized trial to analyze this hypothesis is currently underway.

The Efficacy of Subtenon Triamcinolone Acetonide Injection on Choroidal Structure by Perfusion of Retinal Plexus and Choriocapillaris in Patients with Retinitis Pigmentosa who had Cystoid Macular Edema Refractory to Carbonic Anhydrase Inhibitors

First Author: Bugra ***KARASU***

Purpose: To evaluate efficacy of subtenon triamcinolone acetonide injection (sTA) on choroidal structure by perfusion of retinal plexus and choriocapillaris in patients with retinitis pigmentosa (RP) who had cystoid macular edema (CME) refractory to carbonic anhydrase inhibitors (topical and systemic CAIs).

Methods: Thirty-two eyes of 32 patients with CME secondary to RP were analyzed, prospectively. Enhanced in-depth imaging optical coherence tomography (EDI-OCT) and optical coherence tomography angiography (OCTA) images were recorded 1 day before and 1 month, 3 months and 6 months after performing sTA. Total choroidal area (TCA), luminal area (LA), stromal area (SA) and choroidal vascularity index (CVI) were calculated under Image J software.

Results: Mean baseline best corrected visual acuity (BCVA) increased from 0.91±0.32 to 0.35±0.19 logarithmic minimum angle of resolution (logMAR)(p<0.001) at 6 months after sTA. TCA decreased to 2.45±0.49 mm2 from 2.08±0.45 mm2 (p<0.001); LA decreased to 1.79±0.17 mm2 from 1.45±0.19 mm2 (p<0.001); and SA decreased to 0.56±0.37 mm2 from 0.49 ±0.28 mm2 (p<0.001). In contrast to these, CVI increased significantly according to follow ups (p=0.001). Choriocapillaris vascular

density (VD) detected by OCTA increased from 32.97±10.87 at baseline to 33.97±16.31 at month 6 (p =0.031). VD of deep capillary plexus vessel detected as 28.46 ± 9.78 at baseline increased to 29.26±11.43 at month 6 (p =0.020). Furthermore, a prominent increase in superficial and deep capillary plexus, choriocapillaris perfusion and CVI was observed 1 month after sTA administration (p<0.001). IOP values did not change significantly (p=0.260).

Conclusions: OCTA and EDI-OCT demonstrated a significant increase in superficial and deep capillary plexus, choriocapillaris perfusion and CVI at 1 month after performing sTA. Increase in all parameters at month 1 can be considered as increment of choroidal blood flow following sTA.

The Phase I/IIa HORNBILL Study Examining the Safety, Tolerability and Early Response of BI-X in Patients with Diabetic Retinopathy and Diabetic Macular Ischemia Treated with Pan-Retinal Photocoagulation

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Purpose: Diabetic macular ischemia (DMI), a complication of diabetic retinopathy (DR), can lead to irreversible vision loss and currently has no approved treatment. HORNBILL (NCT04424290) is an ongoing Phase I/IIa study investigating the safety and early biological response of ischemia modulator BI-X in patients with DMI.

Methods: Patients with proliferative DR and DMI are eligible for study inclusion. Currently, 12 participants have enrolled into three non-randomized, open-label, single-rising dose (SRD) cohorts (0.5 mg, n=3; 1.0 mg, n=3; 2.5 mg, n=6) Each participant received one intravitreal dose of BI-X. The primary endpoint is the number of dose-limiting events. Secondary endpoints include the numbers of drug-related and ocular adverse events (AEs).

Results: Overall, there were no severe, dose-limiting or drug-related AEs reported. Ocular AEs were reported in 4 participants: temporary increase in IOP; conjunctival hemorrhage and ocular hyperemia that resolved without sequelae (all 0.5 mg); mild post-procedural pain (2.5 mg). Participants in the 0.5 and 1.0 mg cohorts have completed 99 days' follow-up; mean best-corrected visual acuity (BCVA) changed from 8.3 to 5.3 letters in the 0.5 mg cohort and from 52.7 to 58.0 in the 1.0 mg cohort.

Conclusions: In this SRD part, BI-X was well tolerated by all enrolled participants. The effect of 2.5 mg BI-X on BCVA and foveal avascular zone size in patients with DMI will be further examined in a sham-controlled, single-masked, randomized, multiple-dosing cohort.

The Preproliferative Stage in Type 2 Macular Telangiectasia

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Purpose: To study clinical and imaging features of various stages of macular telangiectasia (MacTel 2).

Methods: In this retrospective study, cases of MacTel 2 with fluorescein angiography (FA), optical coherence tomography (OCT) and OCT-angiography (OCTA) imaging were included. Based on angiographic perifoveal fluorescence, 2 groups were formed: Group 1: diffuse hyperfluorescence and group 2: diffuse+focal hyperfluorescence. Later, based on OCT features, group 2 was subdivided into group 2A: without SRNVM and group 2B: with SRNVM. Clinical, FA, OCT and OCTA features were analyzed. Eyes showing conversion to the proliferative stage at final visit were noted.

Results: 94 eyes of 48 patients were included. Group 1 (n=28) showed diffuse perifoveal hyperfluorescence, hyperreflective middle retinal layers, absent SRNVM (p=0.006) on OCT and dilated perifoveal capillaries in deep capillary plexus (DCP) on OCTA. Group 2A (n=40) showed diffuse+focal perifoveal hyperfluorescence, hyperreflective middle

retinal layers (p=0.001), hyporeflective outer retina cavities (p=0.021), absent SRNVM with dilated and bunching perifoveal capillaries (p=0.004) in DCP. Group 2B (n=26) showed late diffuse+focal perifoveal hyperfluorescence, foveal contour irregularity (p=0.002), retinal pigment clumps (p=0.015) and SRNVM on OCT with bunching of capillaries in DCP and vessels in outer retina (p=0.002). Five eyes showed conversion to group 2B at final visit.

Conclusions: There exists a distinct disease stage called "preproliferative" MacTel 2 showing clinical features of non-proliferative disease, diffuse+focal perifoveal hyperfluorescence on FA, absent SRNVM on OCT and bunching perifoveal capillaries in DCP on OCTA. Its identification is important for suspecting proliferative disease, planning management and follow-up visits accordingly.

Three-Dimensional Modeling of the Choroidal Angioarchitecture in a Multiethnic Asian Population

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Purpose: To describe the topographic variation of choroidal angioarchitecture of the macula using three-dimensional (3D) modeling of the choroid in a healthy Asian population and to investigate the determinants of choroidal vascularity index (CVI).

Methods: 50 healthy participants were recruited from stratified randomization based on subfoveal choroidal thickness (SFCT) quintiles of the Singapore Epidemiology of Eye Diseases Study. Spectral-domain optical coherence tomography (SD-OCT) using enhanced depth imaging was performed. CVI was calculated based on OCT B-scans binarization and segmentation of the binarized choroid layer using previously reported techniques. Comparisons among 3D CVI measurements of the whole, superior, central, and inferior macula, two-dimensional (2D) CVI of the fovea, and SFCT were made.

Results: The choroidal angioarchitecture, which is represented by CVI, demonstrated little topographic variation across the macula. 3D CVI (whole macula) and 2D CVI (subfoveal) were significantly associated only with each other. They were not significantly associated with SFCT and other factors like spherical equivalent, axial length, age, and ethnicity. 2D CVI (subfoveal) only had a moderate agreement with 3D CVI in the central macula, in comparison with 3D CVI of the whole macula and the superior and inferior macula, which showed poor agreement. There was no significant influence of the scanning volume on 3D CVI measurements of the macula.

Conclusions: This study has described the topographic variation for choroidal angioarchitecture and determinants of 3D CVI in healthy eyes. CVI is a robust and stable biomarker for chorio-retinal diseases. 2D CVI of the fovea is representative of the 3D CVI in a normal eye.

Three-Year Outcomes of Treatment Switching in Refractory DME -Anti-VEGF and DEX implantation

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Purpose: To evaluate the effects of additional intravitreal anti-VEGF injection treatment on visual prognosis and safety in patients with diabetic macular edema initially refractory to anti-VEGF and dexamethasone (DEX) implantation.

Methods: This retrospective, chart-review study recruited 49 eyes of 46 patients with persistent or recurrent diabetic macular edema after previous DEX implantation following anti-VEGF treatments in one or both eyes. All patients were followed up for at least 36 months. The number of previous DEX implantation therapy, best-corrected visual acuity (BCVA), central subfield thickness (CST), macular volume, and intraocular pressure (IOP) were measured at baseline.

Results: The patients were divided into two groups; persistent diabetic macular edema that required additional anti-VEGF treatment and did not require additional treatment. Previously, 2.24 ± 0.70 and 1.61 ± 0.69 intravitreal dexamethasone implants were performed, respectively (p=0.780). The BCVA was 0.49 ± 0.31 and 0.22 ± 0.20 at baseline, respectively (p=0.012). After 36 months, the BCVA was higher in the group that did not require additional treatment (0.29 ± 0.24 and 0.22 ± 0.21, respectively), but there was no significant difference (p=0.432). CST was 308.81 ± 81.32 and 294.00 ± 53.11 (p=0.034) at baseline, respectively, and 264.00 ± 48.97 and 252.18 ± 37.35 after 36 months (p=0.154).

Conclusions: In refractory diabetic macular edema, treatment switching is a good way to expect better visual prognosis. Additional treatment can improve visual acuity.

Tissue Plasminogen Activator and Pneumatic Displacement in the Treatment of Submacular Hemorrhage

*First Author: Colin **TAN***

Purpose: To evaluate the safety and efficacy of a minimally invasive technique to treat submacular hemorrhage using tissue plasminogen activator (TPA) and pneumatic displacement.

Methods: A cohort study of consecutive patients presenting with submacular hemorrhage was performed. Intravitreal injection of 0.05ml TPA was given, followed by pneumatic displacement using 0.3ml perfluoropropane gas. Risk factors for long-term success and visual outcomes were assessed using multivariate analysis.

Results: Sixty-three patients, mean age 63.5 years, had a single-treatment success rate of 89.3% (66.1% with blood displacement; 23.2% with blood dispersion). Age-related macular degeneration was the cause of submacular hemorrhage in 23 patients (36.5%) and polypoidal choroidal vasculopathy (PCV) accounted for 36 (57.1%). Forty-seven patients (74.6%) had improved or no deterioration of visual acuity (VA), with 35 (55.5%) gaining ≥2 lines of vision after treatment. Good visual outcomes (final VA ≥6/12) were achieved in 69% (45.9% of patients who had clinical displacement; 23.1% with dispersion; none in those without displacement or dispersion).

Conclusions: TPA and pneumatic displacement of submacular hemorrhage is minimally invasive, efficacious and safe. Good visual outcomes can be achieved, especially in younger patients.

Topographic and Angiographic Correlation with Visual Outcomes in Hyperbaric Oxygen Treated Central Retinal Artery Occlusion: The HORA Study Report

*First Author: Chi Lik **AU***
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Purpose: Hong Kong first established hyperbaric oxygen therapy (HBOT) for central retinal artery occlusion (CRAO) treatment since 2018. Research was done under the title of HORA (Hyperbaric Oxygen for central Retinal Artery occlusion) study. This study aims to identify factors associated with good visual outcome.

Methods: Patients diagnosed with CRAO with symptom onset ≤6 hours were recruited for a course of HBOT situated in a tertiary hospital receiving territory-wide CRAO referrals from both public and private practitioners 24 hours every day. Patients› demographics, onset-to-door/HBOT time, diseased eye characteristics and imaging results, medical and drug history were all collected prospectively.

Results: 26 patients aged 67.5±13.3 years old (44–89) were included, with male-to-female ratio of 1.6:1. Mean follow up period was 10.0±5.3 months, and mean visual acuity (VA) improvement was 0.48±0.57 logarithm of minimal angle of resolution (Z=-3.67, p=0.0001). Age, pre-HBOT VA, usage of anti-platelet/anti-coagulant, onset-to-door time and onset-to-HBOT time were not correlated (p=0.49, 0.42, 0.42, 0.36, 0.42) with VA outcomes. Concerning optical coherence tomography (OCT) parameters, 1mm zone of central macular thickness (CMT) was not

associated with VA changes (p=0.119), but the circular rim of 1-to-3mm zone of CMT was fairly associated (Spearman›s coefficient 0.45, p=0.02). Fundus fluorescein angiography's (FFA) complete retinal perfusion time was moderately associated with visual outcome (Spearman›s coefficient 0.58, p=0.01). One patient had concomitant stroke with CRAO, otherwise no further ischemic cerebro-cardiovascular events, nor contralateral eye CRAO happened during the follow-up period.

Conclusions: HBOT is promising to CRAO patients to regain vision for navigation. Thinner 1-to-3mm zone CMT, but not the central 1mm zone, was associated with better visual outcome.

Topographical Distribution of Retinal Neovascularization and Capillary Non-Perfusion in Proliferative Diabetic Retinopathy on Ultra-Wide Field Fluorescein Angiography

First Author: Vatsala ***NIDHI***
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Purpose: Prospective, observational study to analyze the topographic distribution of NVE (neovascularization elsewhere) and CNP (capillary non perfusion) by UWFA (ultra-wide field fluorescein angiography).

Methods: Diabetic patients presenting to a tertiary care hospital underwent UWFA either on Optos 200Tx (Optos plc, Dunfermline, United Kingdom) or Optos California (Optos plc, Dunfermline, United Kingdom). Lines along the horizontal and vertical retinal meridians that intersected at the optic disc were overlaid on the UWFA images. NVE and CNP areas were assigned to the superotemporal, inferotemporal, superonasal, or inferonasal quadrants. Two trained readers independently analyzed the image. For CNP areas, the disc diameters were chosen to be the reference unit and the area was calculated in disc diameter squares. Using Image J version 1.49b (US National Institutes of Health, Bethesda, Maryland, USA), the graders manually delineated the border of the CNP.

Results: A total of 253 eyes of 187 patients were evaluated. Out of 187 patients, only 4 were of type 1 diabetes mellitus and the rest had type 2 diabetes mellitus. NVE in PDR was most common in the superotemporal quadrant ($p<0.05$). The CNP area was maximum in the superonasal quadrant on UWFA ($p <0.05$). Mean CNP areas were maximum in patients with only NVD and it was minimum in patients with only NVE on UWFA ($p<0.05$).

Conclusions: We conclude that diabetic neovascular lesions and capillary non-perfusion areas are distributed asymmetrically throughout the retina. Eyes that develop NVD appear to have more areas of overall non-perfusion compared with eyes that do not.

Treatment Burden of Diabetic Macular Edema in a Malaysia University Setting

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Purpose: To examine the treatment burden, disease activity and treatment pattern among diabetic macular edema (DME) patients in a Malaysia university setting.

Methods: This study included treatment-naïve DME patients receiving intravitreal anti-VEGF between 2015-2019. Data was retrieved retrospectively from patients' medical records. Outcome measures including number of injections and clinic visits, change in visual acuity (VA) and central subfield thickness (CST) were analyzed over 4 years.

Results: A total of 236 DME patients (373 eyes; mean age: 60.08±8.89), of which 58% had bilateral disease, were included. Mean number of clinic visits was the highest at year 1 (10.26±2.87) then reduced to 7.66±2.71, 5.86±2.83, and 6.81±3.43 at year 2, 3, and 4 respectively. Mean number of injections was the highest at year 1 (5.75±2.67) and reduced to 2.53±2.84, 1.71±2.43, and 2.14±2.82 at year 2, 3, and 4 respectively. Mean VA, in Snellen decimals, at baseline of 0.39±0.20 improved to 0.47±0.20 at year 1

and maintained over year 2 (0.51±0.20), year 3 (0.52±0.1) and year 4 (0.49±0.24). Mean CST improved from 391.74±133.73µm at baseline to 314.16±101.13µm at year 1 and maintained at 319.43±101.13µm, 306.08±78.11µm, and 320.87±97.90µm in subsequent years. There were 56.8% (212/373) of eyes that completed the loading dose. The default rate at year 1 was 29.5% and increased to 44.2% at year 2.

Conclusions: This study demonstrates improvement and subsequent maintenance of VA and CST with a reducing injection burden over time. The high number of non-injection visits may indicate the potential of a treat-and-extend approach to reduce the clinical burden.

Treatment Burden of Neovascular Age Related Macular Degeneration in a Malaysian University Hospital Setting

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Purpose: To evaluate the treatment burden, disease activity and treatment pattern in a cohort of patients with neovascular age related macular degeneration (nAMD) in a Malaysian university hospital setting.

Methods: This study included treatment-naïve nAMD patients receiving intravitreal anti-VEGF between 2015-2019. Data was retrieved retrospectively from patients' medical records. Outcome measures include number of injections and clinic visits, change in visual acuity (VA), central subfield thickness (CST), and presence of retinal fluid over time.

Results: 92 patients (104 eyes; mean age 69), of which 62.5% were polypoidal choroidal vasculopathy (PCV) variant, were included. Mean number of clinic visits were 10.77, 7.73, 8.36 and 8.89 over year 1 to 4 respectively. Mean number of anti-VEGF injections were 7.04 in year 1 and reduced to 3.9, 4.21 and 4.92 injections in subsequent years. Baseline VA of 0.36 Snellen decimals improved to 0.42 at year 1, 0.44 at year 2 and 0.45 in both year 3 and 4. CST reduction from 314µm at baseline to 247µm at year 1 was not maintained in the following years at 308µm, 288µm and 312µm respectively. At baseline, 65.4% had subretinal fluid, 60.5% had pigment epithelial detachment and 20.2% had intra-retinal fluid. All fluid compartments regressed over time with most improvement occurring in year 1. 76.9% of patients received a complete loading dose. The default rate at year 1 was 21.2% and increased to 43.8% at year 2.

Conclusions: This study demonstrates improvement in VA and retinal fluid with a reduced injection burden after year 1.

Retina (Surgical)

A Diagnostic Dilemma: Ocular Tuberculosis or Ocular Sarcoidosis-A Case Presentation of Multispecialty Approach to Diagnosis and Management of Definite Ocular Sarcoidosis with Multisystem Involvement

First Author: Sanjeewa ***KALUARACHCHI***

Purpose: To present the approach to diagnosis and management of a case of definite ocular sarcoidosis with multisystem involvement in Provincial General Hospital (PGH) Kurunegala Sri Lanka.

Methods: A 26-year-old male presented initially with predominant bilateral posterior segment inflammation with multifocal choroiditis. Routine work-up was done to arrive at a diagnosis in ward setting with multidisciplinary approach.

Results: His mediastinoscopy and biopsy was performed in chest hospital Welisara Sri Lanka due to multiple mediastinal lymphadenopathy including para tracheal and hilar nodes. Histology revealed non caseating granulomatous inflammation of lymph nodes which gave the clue to arrive at a diagnosis of definite ocular sarcoidosis. After a course of steroids, he was shifted to azathioprine as a steroid sparing agent. Even with the treatment he developed vitreous traction bands with macular traction with optic disc granulomata in the right eye and received a 23 G TPPV (pars plana vitrectomy) to relieve the traction.

He is maintaining 6/6 vision in both eyes with treatment.

Conclusions: Multidisciplinary approach helped to arrive at a diagnosis of definite ocular sarcoidosis in this complex case and preserved the vision.

A Human Amniotic Membrane Plug to Repair Retinal Break Suspended on the Cliff Edge of Posterior Staphyloma in Pathologic Myopia with Rhegmatogenous Retinal Detachment

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Purpose: To report a case of pathologic myopia with recurrent rhegmatogenous retinal detachment where a retinal break located on the margin of posterior staphyloma was successfully treated with advance surgical technique, using solely cryopreserved-human amniotic membrane (hAM) and silicon oil tamponade.

Methods: A case report.

Results: An 81-year-old female patient with one functional eye presented with one week history of progressively deteriorating visual acuity. Pathologic myopia and retinal detachment with retinoschisis over macular area were noted. Patient received a standard 23-gauge 3 port pars plana vitrectomy (PPV), peeling of epiretinal membrane and internal limiting membrane as well as laser photocoagulation and pneumopexy. The retina was well attached post-operatively. Two months post operation, recurrent rhegmatogenous retinal detachment with a new retinal break at the cliff edge of posterior staphyloma was identified. In order to prevent the poorly located break from further enlargement consequent to laser burn, we performed PPV with hAM implantation underneath the break overlying the extensive chorioretinal atrophy. Three days later, the OCT showed re-attached retina and hAM lying well in situ under the break. The surgery was anatomically successful, and patient reported great improvement in visual quality as well as acuity at 1 month follow-up. Visual acuity has remained stable for one year so far.

Conclusions: Challenging cases with retinal breaks over unfavorable locations such as within macular, posterior staphyloma, excessive patchy chorioretinal atrophy, may inevitably result in further iatrogenic damage. This novel technique could be an ideal solution for better recovery.

A Rare Case of Asteroid Hyalosis Camouflaging Optic Neuritis

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Purpose: To present an unusual case of severe vision loss in asteroid hyalosis associated with optic neuritis.

Methods: We present a case of a 54-year-old female who came with complaints of severe vision loss in left eye. Clinical examination revealed grade 2 cataractous changes in lens associated with grade 3 RAPD in her left eye. Dense asteroid hyalosis with incomplete PVD obscuring the fundus particularly optic nerve head and macula was noted. So before planning for surgical intervention to assess the visual potential, visual evoked potential was advised. To our surprise left eye VEP demonstrated extinguished response. MRI brain confirmed the diagnosis of old optic neuritis with associated features of multiple sclerosis.

Results: As we know asteroid hyalosis will not cause visual distrurbances per se. Rare ocular conditions like mechanical block by dense asteroids, vascular occlusion and vitreous hemorrhage have been reported to be the cause of vision loss in asteroid hyalosis. To our knowledge we are not aware of optic neuritis as a cause of vision loss in asteroid hyalosis being reported.

Conclusions: Asteroid hyalosis rarely causes visual symptoms, thus other causes of vision loss should be extensively investigated as they may require a completely different clinical approach and therapy before considering asteroid hyalosis as the primary cause of the

patient's symptoms, especially in middle aged females.

Can Prophylactic ILM Peeling Prevent Postoperative Macular Pucker Formation in RD Cases?

First Author: Purva ***DATE***
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Purpose: To determine whether ILM peeling during PPV for rhegmatogenous RD reduces the incidence of ERM formation.

Methods: Retrospective study of RD patients undergoing PPV with or without ILM peeling were analyzed. All cases with at least 1 year of follow-up were included. Vision, intraoperative complications, occurrence of ERM, and OCT characteristics were noted.

Results: Out of 159 eyes recruited, ILM peeling was done in 78 eyes (49%). Overall occurrence of ERM was 20%. Seven eyes (9%) in ILM peeling group and 25 eyes in non-ILM peeling group (31%) showed ERM (P = 0.001). Postoperative vision was significantly better in ILM peeling eyes (0.48 ± 0.4) vs non peeling eyes (0.77 ± 0.6) [P =0.003]. In multivariable models adjusting for type of tamponade, ILM peeling reduced the likelihood of ERM formation by 75% (P = 0.01).

Conclusions: ILM during PPV for rhegmatogenous RD significantly reduces ERM formation in the postoperative period and is associated with better visual and anatomical outcomes.

Chronic Post-Operative Endophthalmitis after Cataract Surgery

First Author: Patricia Abigail ***LIM***

Purpose: To present a case of chronic post-operative endophthalmitis (CPE).

Methods: A case of a 56-year-old Filipino female with no known co-morbidities came in due to blurring of vision of the right eye with associated eye pain. Patient had previously undergone cataract surgery of the right eye several weeks prior. B-scan was done showing endophthalmitis in the right eye. Initially, physical examination revealed hyperemic conjunctiva, with ciliary injections, clear cornea, no keratoprecipitates, deep chambers, note of occlusio pupillae with presence of fibrous membranes on top of the lens and pupil border. Patient underwent vitreous tap with intravenous antibiotics followed by synechiolysis + total capsulectomy + pars plana vitrectomy.

Results: Five weeks post-operatively, the patient's right eye showed marked clinical improvement with resolution of occlusion pupillae, fibrous membranes and anterior chamber reaction previously noted.

Conclusions: Chronic post-operative endophthalmits is an infectious disease that occurs at least six weeks post surgery, more often than not after cataract surgery. Diagnosis heavily relies on culture as well as clinical picture. In cases like ours where culture has no yield, CPE must not be dismissed as about half of the CPE cases yield no culture results. New guidelines dictate the value of early vitrectomy in accelerating infection clearance. In cases where immediate surgery is not an option, and culture results are not yet available, empiric intravitreal antibiotics may offer help in treating CPE. Overall, while rare, CPE is a devastating complication of cataract surgery. Early recognition and accurate diagnosis may be tantamount to saving a patient's eyesight.

Clinical Features, Management and Outcome of Diabetic Retinopathy complicated by Chronic Myeloid Leukemia

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Purpose: To describe the clinical presentation, management strategies and outcomes in patients with co-existing diabetes mellitus (DM) and chronic myeloid leukemia (CML).

Methods: This retrospective study reviewed records of all the patients with co-existing DM and CML from 2017 to 2020 for demographic details, systemic co-morbidities, presenting clinical features, treatment strategies and final outcome.

Results: Seventeen patients (mean age, 49.4±8.6 years) were included. Six patients did not have a prior history of CML. Only three patients had HbA1C ≥8 g/dL. Twenty-eight eyes (82.4%) presented with visual loss. The mean presenting best-corrected visual acuity (BCVA) was logMAR 0.90±0.86 (Snellen equivalent, 20/159). All eyes presented with proliferative retinopathy. The presenting clinical features included vitreous hemorrhage (26.5%), tractional retinal detachment (TRD, 23.5%), macular edema (26.5%), neovascular glaucoma (NVG, 11.8%) and hyphema (5.9%).,The treatment administered included pan-retinal photocoagulation (64.7%), anti-vascular endothelial growth factor intravitreal injections (35.3%) and vitrectomy (38.2%). Retina was attached in 91.2% of patients at last follow-up (mean follow-up, 14.5±13.0 months). Final BCVA was logMAR 0.72±0.81 (Snellen equivalent, 20/105). Final BCVA was ≥20/60 in 17 eyes (50.0%) and <20/200 in ten eyes (29.4%). Three eyes underwent cycloablation. IOP was controlled in all the patients.

Conclusions: Patients with co-existing DM and CML present with advanced retinopathy, which tends to progress rapidly. An aggressive ocular and systemic treatment, and a closer follow-up is warranted for such patients. The final outcome is poor.

Comparison of Standard Operating Microscope versus Intraoperative Optical Coherence Tomography-Guided versus Three-Dimensional Heads-Up Display Surgical Platform for ERM Peeling (SMOOTH Study)

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Purpose: To compare dye-assisted epiretinal membrane (ERM) peeling using standard operating microscope (SOM) versus peeling without staining using either microscope integrated optical coherence tomography (Mi-OCT) or three-dimensional heads-up display (3D-HUD) platform.

Methods: In a prospective, randomized, and interventional study, patients requiring surgical intervention for ERM were randomized into group A (Mi-OCT) and group B (3D-HUD), where dye was not used; and group C (dye-assisted peeling using SOM). Primary outcomes included percentage of the eyes where complete ERM removal was possible without staining in groups A and B, intraoperative and postoperative complications, and best-corrected visual acuity (BCVA) at 3 months follow-up. Secondary outcomes included total surgical and ERM peel time.

Results: Complete ERM peeling was possible in 80% (group A) and 70% (group B) without the dye use. Post operatively no recurrence of ERM was seen in group A and group B, except for one (10%) in group C. BCVA at 3 months improved significantly from baseline in all. The mean surgical and ERM peel time was significantly less in group A and B than group C.

Conclusions: Mi-OCT and 3D-HUD have an additional advantage over SOM in terms of shorter surgical time and preventing the need to use dyes.

Comparison of the Intraocular Pressure Control Performance with 27 Gauge Dual-Cutting and Previous Generation Single-Cutting Beveled Vitrectomy Probes

First Author: Valeri ***KOLESNITCHENKO***
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Purpose: To evaluate intraocular pressure (IOP) control performance of 27 Gauge (Ga) dual- and single-cutting beveled vitrectomy probes under different settings.

Methods: 27Ga dual-cutting 20K cuts-per-minute (cpm) and single-cutting 10K cpm beveled vitrectomy probes were driven by a dual-pneumatic vitrectomy system with IOP control to aspirate solution in an eye model. Six samples were tested under core duty cycle and vacuums of 250 mm Hg and 650 mm Hg. Cut rates ranged from 2,500 cpm to 10,000 cpm for 10K probes and from 2,500 cpm to 20,000 cpm for 20K vitrectors.

Results: Without IOP compensation, 27Ga 20K probes' IOP was similar for all cut rates. IOP ranged from 22.71±0.30 mm Hg to 22.81±0.37 mm Hg for 250 mm Hg, and 7.93±0.46 mm Hg to 8.33±0.32 mm Hg for 650 mm Hg. 10K probes' IOP ranged from 25.47±0.38 mm Hg to 27.46±0.43 mm Hg for 250 mm Hg and 16.14±0.77 mm Hg to 19.30±0.77 mm Hg for 650 mm Hg. When IOP control was enabled, IOP levels for 10K and 20K probes were similar and both had no significant difference under different cut rate. IOP of 20K probes at maximum cut rate obviously increased to 29.24±0.75 mm Hg for 250 mm Hg, and 27.42±2.64 mm Hg for 650 mm Hg compared to result without system's IOP intervention.

Conclusions: 27Ga dual-cutting 20K cpm vitrectomy probes provide a more constant IOP level compared to single-cutting 10K cpm vitrectors under different cut rates without IOP compensation. When IOP control was enabled, there was no significant difference of IOP for 20K probes and 10K probes.

Concordance between Microperimetry and Optical Coherence Tomography Changes after Internal Limiting Membrane Peeling for Epiretinal Membrane

*First Author: Yi-ting **HSIEH***
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Purpose: To investigate the correlations between retinal sensitivity measured with microperimetry and anatomical changes after internal limiting membrane (ILM) peeling for idiopathic epiretinal membrane (ERM).

Methods: A retrospective case series included 36 eyes that received ERM and ILM peeling for idiopathic ERM. Best-corrected visual acuity (BCVA), microperimetry-3 (MP-3) and spectral domain optical coherence tomography (OCT) were performed simultaneously after the surgery. Twenty nine spots at the central 8° visual field were examined in MP-3, and all anatomical changes at the corresponding MP-3 spots were carefully examined in OCT, including inner retinal dimple, microcyst and large cyst at inner nuclear layer (INL), and outer retinal lesions including cyst at outer nuclear layer (ONL), thinning of ONL, ellipsoid zone (EZ) disruption, large drusen and other important features.

Results: The mean examination time after operation was 21.7±20.8 months. Multivariate linear mixed model analysis revealed that microcyst at INL, large cyst at INL, and outer retinal lesions were all independently correlated with poor retinal sensitivity ($P < 0.05$). Multivariate linear regression analysis revealed that the accumulated number of outer retinal lesions at 8° central macular area was correlated with poor BCVA ($P = 0.040$). Inner retinal dimple was correlated with neither BCVA nor retinal sensitivity.

Conclusions: In eyes that have received ILM peeling for idiopathic ERM, the retinal sensitivity was poorer at the areas with microcysts at INL, large cysts at INL and outer retinal lesions, but not inner retinal dimples. Careful manipulation should be taken to prevent potential retinal function damage associated with ILM peeling.

Cryotherapy versus Laser Retinopexy for Inferior Retinal Break

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Purpose: Primary anatomic success rate for pars plana vitrectomy (PPV) in the repair of rhegmatogenous retinal detachment (RRD) with inferior breaks is considerably lower than RRD with superior breaks. Studies have highlighted the need for additional scleral buckling when managing such cases. However, there are occasions when the patient is unable to tolerate prolongation of surgery or the associated discomfort of scleral buckling. Our purpose is to compare the primary reattachment rate of PPV for RRD with inferior breaks using cryotherapy or endolaserr.

Methods: A retrospective medical record review of patients who had RRD with inferior breaks between the years 2010 and 2020 at 1 center by a single surgeon. Procedures that were combined with scleral buckling, that

utilized heavy oil tamponade or dual cryo-laser retinopexy were excluded.

Results: A total of 133 eyes were included in this study. There were 63 eyes that underwent vitrectomy with cryotherapy and 70 eyes with endolaser. The cryotherapy group had a success rate of 94.2% as 66 cases out of 70 achieved primary reattachment. On the other hand, only 45 out of 63 eyes (68%) in the endolaser group successfully obtained primary reattachment, thus leading to a significant P value (P=0.000397).

Conclusions: This study suggests the type of retinopexy influenced the surgical outcome of PPV for RRD with the inferior breaks when scleral buckling was not used. Therefore, in cases where scleral buckling is not suitable, retinopexy with cryotherapy is a better choice than retinopexy with endolaser.

Cystoid Macular Edema after Repair of Primary Rhegmatogenous Retinal Detachment: Incidence, Causes and Clinical Outcomes

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Purpose: To analyze the incidence, predictors, and outcomes of patients who developed cystoid macular edema (CME) after surgery for a primary rhegmatogenous retinal detachment (RRD).

Methods: We performed a retrospective cohort analysis of 124 eyes in 121 patients who underwent successful surgery for primary RRD from 2016 to 2020. Patients were categorized into three groups: pars plana vitrectomy (PPV) (n=97), scleral buckling surgery (SB) (n=13) and vitrectomy combined with scleral buckle (PPV-SB) (n=14). None of the study eyes had grade C proliferative vitreoretinopathy, or received simultaneous cataract surgery. Data collected included demographics, visual acuity, lens status, area of detached retina (clock hours), baseline macular status, postoperative data, and time-to-event with censored observations.

Results: The 1-year cumulative risk 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). Key determinants associated with post-vitrectomy CME were greater area of detached retina (adjusted hazard ratio (AHR), 1.53; 95% confidence interval (CI), 1.17-1.99) and 360-degree endolaser (AHR, 3.33; 95% CI, 1.04-17.62). In adjusted analysis of patients in the PPV group, CME resulted in decreased vision (logMAR) during early postoperative period (≤6 months) (coefficient, 0.27; 95% CI, 0.08-0.47; p=0.006). However, this association did not remain significant at the final observation (follow-up time, 26.7±19.9 months) (coefficient, 0.08; 95% CI, -0.06-0.22; p=0.27).

Conclusions: Close monitoring for early diagnosis of intraretinal cysts is essential in high-risk individuals. To avoid post-reattachment CME, surgeon may take care not to apply the prophylaxis endolaser to unnecessary areas, particularly in eyes with preoperatively extensive RRD.

Dehydrated Human Amniotic Membrane Patching in the Treatment of Macular Holes

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Purpose: To describe a novel, dehydrated human amniotic membrane patching (DHAMP) technique for macular hole (MH) surgery.

Methods: Prospective, single-center, interventional case series. Three eyes with MH of varying etiology (idiopathic, post-traumatic and myopic) underwent pars plana vitrectomy, internal limiting membrane peeling and DHAMP. A brilliant blue-stained, 2 mm diameter amniotic membrane patch was positioned over the MH followed by either 20% sulfur hexafluoride or 1000-centistoke silicone oil endotamponade. Anatomic closure rate, visual acuity outcomes and post-operative complications are reported.

Results: Successful anatomic closure was demonstrated by optical coherence tomography in all eyes (100%) 2 weeks after surgery. The mean (SD) preoperative logMAR distance-corrected visual acuity improved from

1.80 (0.87) to 0.53 (0.32) after surgery (P = 0.08). One eye (33%) developed postoperative intraocular pressure rise requiring medical treatment and subsequent cataract surgery.

Conclusions: DHAMP is a promising adjunctive method for promoting MH closure. Further studies are needed to fully elucidate the benefits and risks of this novel adjunctive technique.

Early Clinical Experiences with a 20000 Cut Rate, Beveled-Tip, 25-Gauge Microincisional Vitrectomy System

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Purpose: To report our initial experiences and clinical outcomes using a 20000 cuts-per-minute (cpm), beveled-tip, 25-gauge cutter probe system for various vitreoretinal diseases.

Methods: Prospective, interventional case series of 50 consecutive eyes undergoing an assortment of vitreoretinal procedures by 3 attending surgeons utilizing a 20000 cpm, 25-gauge, beveled-tip, microincisional vitrectomy system to treat common vitreoretinal conditions. Clinical outcomes include achievement of surgical objectives, operative times, number of surgical steps, usage of ancillary instruments, corrected distance visual acuity (CDVA), surgeon assessment of amount of pulsatile traction (0=none, 10=inadvertent retinal trauma occurs repeatedly from retinal traction), adverse events.

Results: We successfully accomplished the surgical objectives in all eyes. The mean total operative duration, core, shave and total vitrectomy times were 2356 ± 708, 233 ± 138, 333 ± 222 and 567 ± 273 seconds, respectively. The mean number of surgical steps was 4.0 ± 1.1. The mean number of times an ancillary instrument was placed inside the eye was 4.2 ± 2.6. The mean CDVA at the three-month postoperative visit improved by 0.25 decimal units (P<0.001). Adverse events included elevated IOP (10%) and recurrent vitreous hemorrhage (10%). Nine of 10 patients reported no postoperative discomfort. None of the eyes required sclerotomy sutures. The mean surgeon assessment of pulsatile traction was 0.9 ± 0.7.

Conclusions: A beveled-tip 20000 cpm cutter probe was found to be effective, efficient and safe for accomplishing the surgical objectives in a variety of vitreoretinal conditions and is associated with minimal pulsatile traction and improved fluid dynamics.

Efficacy of Internal Limiting Membrane Peeling during Vitrectomy for Rhegmatogenous Retinal Detachment

*First Author: Jia-kang **WANG***

Purpose: To investigate the efficacy and adverse effects of internal limiting membrane (ILM) peeling during vitrectomy for rhegmatogenous retinal detachment (RRD).

Methods: Vitrectomy without ILM peeling was performed for patients with RRD as the control group, and vitrectomy with ILM peeling as the treatment group. Best-corrected visual acuity (BCVA), fundus examination, and optical coherence tomography (OCT) were arranged during follow-up and included as postoperative evaluation.

Results: The treatment and control group were composed of 172 and 151 eyes respectively. Age, gender, status of macula off, proliferative vitreoretinopathy (PVR) grade, high myopia, and use of silicone oil or long-acting gas were comparable between 2 groups. The occurrence of epiretinal membrane after the surgery was significantly lower in the treatment group than that in the control group (0: 14.5%, p = 0.0001). The central foveal thickness and primary surgery failure with submacular persistent fluid was also significantly less in the treatment group (p < 0.05). But there was no difference between 2 groups in final BCVA (p = 0.27). However, 4 cases with iatrogenic full-thickness macular hole happened in the treatment group instead of that in the control group. Four cases were high myopes with axial length more than 28 mm. The BCVA and reattachment rate were similar in 2 groups.

Conclusions: Combined ILM peeling during vitrectomy was effective for prevention of postoperative formation of macular pucker in patients with RRD. But simultaneous ILM peeling was guarded in high myopic patients with RRD treated with vitrectomy owing to low incidence of complications with iatrogenic macular hole.

Efficacy of ND-YAG Laser Posterior Membranotomy for Premacular Hemorrhage in a Tertiary Government Hospital: A Case Series

*First Author: Chester **PATARAY***
*Co-Author(s): Peter Mark **CHAO***

Purpose: Premacular hemorrhage causes rapid and debilitating severe decline in vision to patients. For those seeking immediate intervention, YAG-laser membranotomy is a judicious option that fills the gap between unsatisfactory conservative management and invasive procedures. This study aims to evaluate its efficacy in terms of anatomical and functional outcomes.

Methods: This is a prospective, interventional, single-center, case series study from April to June 2021. Patients who fulfilled the inclusion/exclusion criteria were recruited and underwent YAG-laser membranotomy. Pre- and post-laser visual acuity, color fundus photos and OCT were documented from baseline to week 4. These data were collected and analyzed statistically to determine the efficacy of laser.

Results: Three patients (3 eyes, 2 females and 1 male) were recruited. All cases were secondary to diabetic retinopathy, phakic, and with left eye affectation. The median duration of symptoms was 21 days, the median size of hemorrhage was 91DD and the median visual acuity was +2.00 logMAR. In terms of laser parameters, the median laser energy (mJ), number of laser shots, and total energy used were 8mJ, 10 shots, and 80mJ respectively. For anatomical outcome, the average median percent-change in total size of hemorrhage was -88.33% and was statistically significant ($\chi 2=8.79$, $p=0.032$), while the median percent-change of hemorrhage size within the macula only was –100.00%. For functional outcome, the visual acuity had a median percent-change of –26.25% and was statistically significant ($\chi 2=8.14$, $p=0.043$).

Conclusions: ND-YAG laser membranotomy is an effective approach to subhyaloid hemorrhage with both significant anatomical and functional outcome.

Endoscopic Pars Plana Assisted Vitrectomy in a Case of Persistent Fetal Vasculature with Anterior Segment Dysgenesis and Secondary Angle-Closure Glaucoma

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*Co-Author(s): Salvame **ERIKA,** Maria Katrina **MALGAPU,** Jocelyn **SY***

Purpose: To present a surgical approach of a 1-year-old with persistent fetal vasculature (PFV) associated with anterior segment dysgenesis and secondary angle-closure glaucoma (SACG).

Methods: Case report.

Results: A 1-year-old female born full-term presented with progressive enlargement of the right eye (RE). The patient was able to blink to light with an elevated intraocular pressure (IOP) of 45 to 54 using a tonopen. On portable slit lamp examination of the RE, the horizontal corneal diameter was 13mm with flat anterior chamber, multiple correctopia and iridocorneal touch, and corneal opacities at 9 and 12 o›clock. There was no view of the posterior pole hence b-scan ultrasonography was done showing a linear hyperechoic opacity extending from the posterior lens capsule to the nerve and attached retina. The left eye (LE) was unremarkable with normal IOP and slit lamp examination. The patient underwent a 23-gauge endoscopic assisted pars plana vitrectomy with endodiathermy and amputation of the stalk, and endocyclophotocoagulation of the RE. Intraoperatively, the optic disc showed optic nerve cupping. Post-operatively, IOP decreased within normal pressure. However, visual evoked potential results showed absence on the RE and preservation on the LE.

Conclusions: PFV is a developmental disorder that can be associated with rare ocular congenital anomalies posing a more therapeutic surgical challenge. With limited sources of age-matched cornea, endoscopic assisted vitrectomy can be a valuable tool in approaching compromised cornea to provide early surgical intervention. Family counseling and education are essential in these cases due to limited visual outcomes despite surgical management.

Enhanced Depth Imaging Ocular Coherence Tomography Measurement of Subfoveal Choroidal Thickness: A Boon to Decide Time of Silicon Oil Removal!

First Author: Shruti ***SHIRWADKAR***

Purpose: To evaluate the effect of silicon oil endotamponade on choroidal thickness.

Methods: 30 eyes of 30 patients who had undergone 3 port pars plana vitrectomy with 1000 centistoke silicon oil endotamponade for retinal detachment were included. All patients were evaluated for complete ophthalmic check-up preoperatively, 1 month, 3 months after vitrectomy with silicon oil tamponade and 1 month post silicon oil removal. Choroidal thickness was measured using enhanced depth imaging on optical coherence tomography. Contralateral eyes served as controls.

Results: Mean subfoveal choroidal thickness values of operated patients were 289.20 microns at 1 month, 281.93 microns at 3 months postoperatively and 268.23 at 1 month post silicon oil removal. Change in SFCT was statistically significant in first and final measurement. Total duration of silicon oil tamponade in the eye was correlated with percentage of change in SFCT and was not related to endolaser photocoagulation. Values of the fellow eyes were taken at 1 month, at 3 months postoperatively and at 1 month post silicon oil removal. The difference in the values were not statistically different.

Conclusions: Choroidal thickness in eyes with silicon oil has reduced. Silicon oil as endotamponade may have effect on anatomy and functioning of choroid. Measurement of subfoveal choroidal thickness by enhanced depth imaging OCT is a reliable technique to detect early changes in choroidal thickness and may act as an important deciding parameter on silicon oil removal.

High Vitreous Concentrations of Fatty Acid-Binding Protein4 could be Involved in the Etiology of Proliferative Diabetic Retinopathy

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Purpose: To identify the fatty acid-binding protein4 (FABP4) and vascular endothelial growth factor A (VEGFA) in vitreous fluid from patients with proliferative diabetic retinopathy (PDR).

Methods: We enrolled 40 eyes which underwent 25 or 27-gauge vitrectomy due to PDR (n=20) and non-PDR (n=20, including epiretinal membrane and macular hole). Undiluted vitreous specimens were collected during their initial core vitrectomy and put into the deep freezer immediately. Vitreous concentrations of FABP4 (V-FABP4) and VEGFA (V-VEGFA) were determined by enzyme-linked immunosorbent assays. Data including height and weight, systemic blood pressures, several blood biochemistry and blood flow at the optic nerve head (ONH) by laser speckle flowgraphy (LSFG) were collected.

Results: V-FABP4 and V-VEGFA were significantly higher in PDR patients than in non-PDR patients ($P < 0.001$) with a high positive correlation ($r=0.72$, $P<0.001$) between them. Both were not affected with body mass index values and the presence of vitreous hemorrhage. Among the clinical parameters, V-FABP4 correlated positively with creatinine levels and negatively with age and aspartate transaminase (AST) levels, while V-VEGFA correlated positively with fasting plasma glucose and hemoglobin A1c (HbA1c) and negatively with AST levels. Multiple regression analyses demonstrated that V-VEGFA, or V-FABP4, AST and HbA1c were independent

predictors of V-FABP4 or V-VEGFA, respectively. Both were also negatively correlated, but more evident in V-FABP4, with the ONH ocular blood flow.

Conclusions: FABP4 may be synergistically involved in the etiology of PDR with VEGFA.

Intraocular Pressure Compensation Performance for 25 Gauge Dual-Cutting and Single-Cutting Beveled Vitrectomy Probes Comparison

First Author: Valeri ***KOLESNITCHENKO***
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Purpose: To understand intraocular pressure (IOP) compensation performance for 25 Gauge (Ga) dual- and single-cutting beveled vitrectomy probes under different system settings.

Methods: 25 Ga 20K cuts-per-minute (cpm) and 10K cpm vitrectomy probes were driven by a vitrectomy system with IOP control to aspirate in an eye model. Six samples were tested under core duty cycle and varying vacuums. Both system IOP compensation enabled and disabled settings were used.

Results: Different from results of 10K probes without IOP compensation, changing the cut rate did not generate a significant difference for 20K probes. 20K probes' IOP at maximum cut rate was 21.96 ± 0.6 mm Hg for 250 mm Hg, and 7.47 ± 0.98 mm Hg for 650 mm Hg. When IOP control was enabled, IOP levels for 20K probes and 10K probes were similar and not significantly influenced by cut rate changes. 20K probes' IOP at maximum cut rate increased to 32.32 ± 1.07 mm Hg for 250 mm Hg, and 37.12 ± 4.04 mm Hg for 650 mm Hg compared to result without IOP compensation.

Conclusions: 25 Ga dual-cutting 20K cpm vitrectomy probes have a more constant IOP when cut rate changes without IOP control compared to the previous generation single-cutting 10K cpm vitrectomy probes. Using IOP compensation can help surgeons to keep the eye at stabilized IOP ranges during aspiration of 25 Ga dual-cutting 20K cpm vitrectomy probes and maintain the efficiency of aspiration.

Intravitreal Methotrexate as an Adjunct in Preventing Proliferative Vitreoretinopathy in Complicated Retinal Detachment Surgeries

First Author: Salvame ***ERIKA***

Purpose: To present complicated retinal detachment (RD) cases deemed with high likelihood of proliferative vitreoretinopathy (PVR), given intravitreal methotrexate in different modalities and their outcomes.

Methods: Case series.

Results: Case 1: A 56-year-old one-eyed male presented with chronic blurring of vision (BOV) of the right eye. Visual acuity (VA) was poor light perception with occlusio pupillae. B-scan shows open funnel RD. Scleral buckling (SB), phacoemulsification with aphakia, pars plana vitrectomy (PPV) with retinectomy was done. Postoperatively, patient underwent weekly intravitreal methotrexate injection (100mcg/0.05mL) for 6 doses and despite silicone migration requiring subsequent intervention, retina had good attachment with no PVR. VA recovered to hand movement (HM). Case 2: A 24-year-old male had BOV of the left eye due to a vehicular accident. VA is HM, post-corneoscleral laceration repair and was referred due to RD. Intraoperatively, incarcerated retina was noted at the site of repair. Patient underwent SB, lensectomy with aphakia, PPV on intravitreal methotrexate infusion. Postoperatively, VA improved to CF with no PVR. Case 3: 63-year-old female myope, post penetrating keratoplasty, pseudophakic and post-YAG capsulectomy had choroidal and RD prompting SB, PPV with RD surgery under intravitreal methotrexate infusion. Postoperatively, hypertensive episodes caused preretinal hemorrhage with PVR formation.

Conclusions: Proliferative vitreoretinopathy remains a threat in success rates of complex retinal detachment cases. Intravitreal methotrexate can be used to prevent PVR. No single recommended mode of intervention has been suggested for intravitreal methotrexate. And, while there are generally promising results

with methotrexate application, PVR formation remains a multifactorial process.

Key Surgical Pearls of the Implant Insertion Procedure for the Port Delivery System with Ranibizumab

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Purpose: The port delivery system (PDS) is an investigational drug delivery system designed for continuous intravitreal ranibizumab release through a surgically implanted, refillable ocular implant. Here we report on key surgical learnings from the optimization and standardization of the PDS implant insertion procedure.

Methods: The phase 2 Ladder (NCT02510794) and phase 3 Archway (NCT03677934) trials compared the PDS with monthly intravitreal ranibizumab in patients with neovascular age-related macular degeneration.

Results: The implant insertion procedure has 7 major steps: peritomy, implant preparation, scleral dissection, laser ablation of pars plana, pars plana incision, implant insertion, and conjunctival and Tenon's capsule closure. Placement of a traction suture before peritomy aids in visualization of the superotemporal quadrant. Controlled scleral dissection and avoiding grasping wound edges preserves scleral integrity. Edge-to-edge laser ablation of the pars plana while maintaining a final incision size of 3.5 mm ensures a secure implant fit and postoperative hemostasis. Delicate handling of the conjunctiva and Tenon's capsule with nontoothed forceps during peritomy and closure is critical to preserve tissue integrity over the implant. Capturing both the conjunctiva and Tenon's capsule is key when anchoring to the anterior limbus with scleral bites. Hemostasis is critical at all steps to ensure optimal visualization during the procedure and to minimize risk of postoperative vitreous hemorrhage.

Conclusions: To maximize optimal surgical outcomes, the PDS implant insertion procedure requires attention to elements generally not emphasized in other vitreoretinal procedures. PDS procedures have evolved based on learnings from clinical trials, with a view to supporting successful patient outcomes.

LUtein as a novel Neuroprotective Adjunctive therapy to improve visual outcome of rhegmatogenous Retinal detachment (the LUNAR Study)

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Purpose: To examine the efficacy of oral lutein supplement as an adjuvant therapy to improve visual outcome of surgical repair for primary rhematogenous retinal detachment involving the macula (i.e., macula-off retinal detachment).

Methods: A prospective, randomized, double-blinded, placebo-controlled trial of 82 patients with primary macula-off retinal detachment consecutively recruited from a tertiary eye center. Patients were randomized to either taking daily oral lutein (containing lutein 20mg and Zeaxanthin 1mg) or placebo (inactive ingredients only) supplement for 6 months.

Results: There was no significant difference in baseline characteristics between the lutein (N=43) and placebo (N=39) groups. In the lutein group, BCVA was better than that of the placebo group at 6-week (p=0.007), 12-week (p=0.018) and 6-month (p=0.079) visits. The mean average sensitivity of the macula was also significantly better in the lutein group than that of the placebo group over time with mean differences of 1.84 dB (95% CI: 0.60 to 3.09, p=0.004) at month 3, 2.03 dB (95% CI: 0.81 to 3.25, p=0.001) at month 6, and 1.71 dB (95% CI: 0.41 to 3.01, p=0.010) at month 12.

Conclusions: Oral lutein supplement may improve visual outcome, at least in the short-term, or hasten recovery of vision for patients with macula-off retinal detachment successfully repaired by surgery.

Macular Schisis with Neurosensory Detachment associated with Juvenile Open Angle Glaucoma: A Case Report

First Author: Aniket ***RAI***
Co-Author(s): Manabjyoti ***BARMAN***

Purpose: To describe a clinical syndrome of macular schisis with neurosensory detachment associated with juvenile open angle glaucoma.

Methods: We present a rare case report of a 13-year-old male presenting to us with chief complaints of diminution of vision in both eyes since 1 month which was gradual and painless in nature. On examination his BCVA was 3m FC in right eye and 1m FC in left eye. On goniosocpy, all the angles were open in both eyes. On posterior segment examination of both eyes, there were macular schitic changes seen along with sub retinal fluid and near total cupping along with diffuse nerve fiber layer defect which was confirmed on SD-OCT. ERG revealed flat scotopic, reduced rod cone response and a normal cone response. Field testing revealed absolute scotoma in both eyes. Genetic testing was done and no specific gene involved was found.

Results: He was treated on maximum anti glaucoma therapy and was planned for filtration surgery as and when required and was advised to follow up after 3 months.

Conclusions: Macular schisis and detachment can occur in patients with presumed enlarged optic nerve head cups in the absence of obvious congenital anomalies of the disk. The authors believe the cause is leakage of fluid from the vitreous through a tiny hole in the thin tissue of the cup. This is a similar mechanism to that seen in patients with optic pits. A vitrectomy or steps to reduce the intraocular pressure may result in resolution of the fluid and improved vision.

Novel Treatment of Large Full Thickness Macular Hole using Human Amniotic Membrane

First Author: Sri Hudaya ***WIDIHASTHA***
Co-Author(s): Iwan ***SOVANI***

Purpose: To describe a novel option in treatment of large full thickness macular hole by using human amniotic membrane and provide an evidence-based discussion to aid in decision making.

Methods: Case report.

Results: A 57-year-old female was mainly complaining of gradual decrease of visual acuity in the right eye that lasted for one year. Based on ophthalmology examination, uncorrected visual acuity in the right eye was 1/60 and large full thickness primary macular hole in the right eye was observed on fundoscopy. Optical coherence tomography examination showed horizontal and vertical aperture diameter of the macular hole were 969 μm and 913 μm, respectively. The patient was diagnosed with large full thickness macular hole. Vitrectomy, internal limiting membrane peeling combined with human amniotic membrane plug under the hole, and sulfur hexafluoride tamponade were performed. Three months after surgery, the macular hole was anatomically closed, with improvement of visual acuity to 0.8 logMAR. There were no adverse reaction and recurrences of the macular hole reported during the follow-up period.

Conclusions: The use of human amniotic membrane may be preferred as alternative management of chronic and large full thickness macular hole, thus improving anatomic and visual outcomes.

Outcomes of 25-Gauge Pars Plana Vitrectomy in Primary Rhegmatogenous Retinal Detachment in Pakistan: A Multicenter Study

First Author: Muhammad Amer ***AWAN***
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Purpose: To evaluate the primary anatomical success and visual outcomes in patients with

rhegmatogenous retinal detachment (RRD) undergoing 25-gauge pars plana vitrectomy (25g PPV) in Pakistan.

Methods: A five-year retrospective, interventional cohort study of 418 consecutive patients with RRD who underwent 25g PPV. All the surgeries were performed by two experienced surgeons at tertiary care hospitals in Pakistan. Consecutive patients who underwent 25g PPV surgery as the treatment for RRD between 2013 to 2018 were included. We excluded patients who had a history of previous retinal surgery or did not complete the 4-8 weeks primary outcome visit. Statistical Package for Social Sciences version 23.0 (IBM SPSS Statistics, Armonk, NY) was used for data entry and statistical analysis. A p value of <0.5 was considered significant.

Results: Males were in a higher number 284 (67.9%). The average age of patients was 49 ± 15.8 years. In our study, 186 (44.4%) patients were phakic at the time of presentation. At the primary outcome visit (4-8 weeks follow-up), the primary anatomical success rate was 87.1%. The most common cause of failure was PVR (n=20). The most common complication after vitrectomy was cataract formation in 16.2% of participants, followed by raised IOP in 12% and ERM formation in 8% of patients. No patient developed infectious endophthalmitis in our cohort. There was no difference between the tamponade agent used and the primary retinal reattachment rate (p=0.306).

Conclusions: Surgical outcomes of RRD with 25g PPV surgery were similar to the outcomes reported in the developed world.

Pars Plana Vitrectomy Systems: A Meta-Analysis of Randomized Controlled Trials

First Author: Yuri ***CHABAN***
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Purpose: The uptake of small-gauge (SG; i.e. 23-G, 25-G, 27-G) pars plana vitrectomy (PPV) systems has grown. We aim to investigate the advantages and disadvantages of various PPV systems in a meta-analysis of randomized controlled trials (RCTs).

Methods: A systematic literature search was performed for RCTs comparing PPV systems for any indication. Data on visual and surgical outcomes, including best corrected visual acuity (BCVA), incidence of reattachment, complications, and surgery time, were collected at all available time points. Weighted mean differences (WMD) and risk ratios (RR) were calculated, and meta-analysis was performed with random effects models.

Results: 1,678 eyes from 22 RCTs. The three most common surgical indications were epiretinal membrane (ERM; 33.5% of all eyes), rhegmatogenous retinal detachment (RRD; 22.7%), and vitreous hemorrhage (14.8%). Risk of bias assessment found some concerns in 19 studies (82.6%). Compared to 25-G PPV, 23-G required frequent port suturing (RR=0.46, 95% CI=[0.25, 0.84], P=0.01, I2=0%) and did not improve best corrected visual acuity (BCVA) or the incidence of intraoperative retinal breaks or postoperative hypotony. Compared to 25-G PPV, 27-G lengthened surgery (WMD=4.11 minutes, 95% CI=[0.18, 8.05], P=0.04, I2=73%) and improved final BCVA (WMD=-0.06 logMAR, 95% CI=[-0.11, -0.01], P=0.02, I2=34%). 27-G did not significantly improve the incidence of postoperative hypotony, cystoid macular edema, retinal breaks, or ERM formation.

Conclusions: Compared to 25-G PPV, 23-G requires frequent port suturing (GRADE: moderate certainty), while 27-G may be associated with a better final visual acuity but longer surgery (GRADE: low and moderate, respectively).

Pars Plana Vitrectomy with and without Supplemental Scleral Buckling for the Repair of Rhegmatogenous Retinal Detachments: A Meta-Analysis of 16,184 Eyes

First Author: Arshia ***ESHTIAGHI***
Co-Author(s): Arjan ***DHOOT,*** *Peter* ***KERTES,*** *Prem* ***NICHANI,*** *Marko* ***POPOVIC***

Purpose: To compare the safety and efficacy of pars plana vitrectomy (PPV) alone or with supplemental scleral buckling (PPV-SB) for the treatment of rhegmatogenous retinal detachment (RRD).

Methods: Ovid MEDLINE, EMBASE and Cochrane CENTRAL were systematically searched from January 2000 to June 2021 to identify comparative studies reporting on safety and efficacy outcomes in PPV and PPV-SB for RRD repair. The primary outcome was the final best corrected visual acuity (BCVA), while secondary outcomes were primary and final re-attachment rates, as well as intraoperative and postoperative complications.

Results: There were 39 studies (6 RCTs, 33 observational studies) reporting on 16,184 eyes (10,648 PPV, 5,536 PPV-SB). Final follow-up occurred at a median of 6 months (range: 3-30 months). The final BCVA was similar between PPV and PPV-SB (P=0.10). There was a significant difference in primary reattachment rate favoring PPV-SB (P=0.03), but not final reattachment rate (P=0.57). In terms of complications, PPV was significantly less likely to be associated with macular edema (P=0.02) or epiretinal membrane (P=0.004) formation, while no significant differences were found in the risk of strabismus, corneal defects, hyphema, elevated intraocular pressure, hypotony, cataract formation, proliferative vitreoretinopathy, subretinal hemorrhage, and macular holes.

Conclusions: There were no significant differences in visual outcomes between PPV and PPV-SB, however there were significant differences in primary reattachment rate favoring PPV+SB. PPV was less likely to be associated with macular edema and epiretinal membrane formation, however the risk of other complications was similar between the two procedures.

Peripapillary Microvascular Changes After Epiretinal Membrane Surgery

*First Author: Eung-suk **KIM***
*Co-Author(s): Kiyoung **KIM,** Kyungwoo **YOON,** Seung Young **YU***

Purpose: To evaluate changes of the peripapillary microvascular changes on swept-source optical coherence tomography angiography (SS-OCTA) following pars plana vitrectomy (PPV) with internal limiting membrane (ILM) peeling for epiretinal membrane (ERM).

Methods: Medical records and SS-OCTA images of 31 patients (31 eyes) who had underwent PPV for ERM and followed more than a year, were reviewed. All eyes had ILM peeling after ICG staining. Matlab, semiautomatic software algorithm, was used to identify peripapillary vessel density and flow void area. Total retinal slab of peripapillary and macular 6 x 6 mm excluding optic disc and fovea were analyzed.

Results: On both superficial capillary plexus (SCP) and deep capillary plexus (DCP), peripapillary vessel density was significantly decreased in inferior and temporal quadrant (0.4037 to 0.2951 (p=0.01), 0.3171 to 0.2564 (p=0.01) on SCP, 0.5296 to 0.4461 (p=0.04), 0.4614 to 0.3666 (p=0.01) on DCP, respectively), one year after PPV. Age, preoperative IOP, SF6 tamponade, and postoperative dissociated nerve fiver layer (DONFL) were not related with changes of peripapillary vessel density.

Conclusions: Peripapillary capillaries tend to decrease in eyes with vitrectomy with ILM peeling for ERM. The decreases of vessel densities are more significant in inferior and temporal quadrant on both SCP and DCP.

Persistant Hyperplastic Primary Vitreous with Retinal Detachment in a Teenage Girl

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*Co-Author(s): Jane **FOO ML,** Vishel **SOUNDARAJAN***

Purpose: Persistent hyperplastic primary vitreous (PHPV) is a congenital developmental anomaly with failure of regression of primary vitreous and hyaloid vasculature. We would like to report a case of PHPV associated with cataract and retinal detachment (RD) in a teenage girl.

Methods: A 19-year-old girl was referred for right eye (RE) inferior RD with worsening of vision for 2 weeks. There was no history of trauma and eye surgery before. She was born with RE vision problems and was informed her RE had poor prognosis. Otherwise, the antenatal and birth history were normal.

There was no family history of PHPV. Upon examination, RE vision was hand movement (HM). Left eye vision was 6/36, ph 6/18. There was presence of nystagmus and right esotropia, microcornea and cataract. Fundus found inferior RD and vitreous stalk but hazy view. The B scan showed inferior RD and vitreous stalk appearance. The left eye finding was normal.

Results: RE lens aspiration with intraocular lens implantation combined with pars plana vitrectomy with stalk excision, retinectomy and silicone oil 5000 insertion was done. Intraoperatively, there was presence of vitreous stalk connected to macular fold and traction towards temporal retina with concomitant inferior RD. Macular fold was unable to be completely flattened though with aid of heavy liquid. Post operation, the vision was counting fingers (CF).

Conclusions: Despite poor prognosis of the eye with component of amblyopia, early surgical intervention is still advocated to prevent progressive RD and perhaps to obtain better visual result in PHPV with RD patients.

Postoperative Subchoroidal Gas Post Vitrectomy for Macular Hole Retinal Detachment

*First Author: Paul Samuel **DEL MUNDO***
*Co-Author(s): Rachelle **ANZURES***

Purpose: To present a case of postoperative subchoroidal gas post vitrectomy for macular hole retinal detachment surgery in a myopic eye and to discuss its course and management.

Methods: Case report.

Results: A 61-year-old male presented with blurring of vision of the right eye and was noted to have macular hole with retinal detachment associated with posterior staphyloma. Patient underwent unremarkable pars plana vitrectomy with ILM peeling and gas tamponade combined with phacoemulsification with PCIOL of the right eye. Fourteen percent C3F8 gas was injected using a 10cc syringe with a gauge 30 needle with a 1cc syringe vent on a gauge 30 needle with no plunger. 1 day PO (post operative), VA (visual acuity) was HM with IOP (intraocular pressure) of 16 mm Hg and external examination unremarkable. Fundus examination revealed wavy choroidal detachment with good after movement and sharp margins temporally and superiorly. C3F8 gas was noted to be <50% of the vitreous cavity. Topical antibiotic, anti-inflammatory and anti-cholinergic eye drops as well as oral prednisolone were given. 1 week PO, VA improved to 20/160 with stable IOP. Decrease in the choroidal detachment was noted and the retina appeared attached. 4 weeks PO, VA improved to 20/100 with stable IOP and slowly decreasing choroidal detachment.

Conclusions: The possibility of inadvertent injection of perfluorocarbon gas is present and prompt recognition and appropriate response is needed.

Prevalence of Late Corneal Complications after Vitrectomy among Adult Patients in Universiti Kebangsaan Malaysia Medical Centre

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Purpose: Pars planar vitrectomy (PPV) is an important surgical procedure in ophthalmology to treat retina and vitreous pathology. However, the cornea may be adversely affected by this procedure. We primarily aimed to determine the prevalence of late corneal complications after PPV and its relationship with predisposing factors. Secondarily, visual acuity change after PPV was also investigated.

Methods: This was a retrospective review of all patients undergoing PPV from 2016 to 2019 by two surgeons with minimum of 6 months follow up. Records were reviewed for demographics, surgical history, predisposing factors, late corneal complications and its onset.

Results: Of 369 PPV listed, 250 eyes met the inclusion criteria. Late corneal complications after vitrectomy developed in 31 out of 250 (12.4%) eyes. Of 31 eyes, 11 eyes (35.5%) developed persistent corneal epithelial defect (PCED), 4 eyes (12.9%) developed recurrent

corneal erosion, 4 eyes (12.9%) developed corneal edema, 5 eyes (16.1%) developed corneal endothelial decompensation leading to corneal opacification and bullae and 1 (3.2%) eye developed infectious keratitis. Visual acuity (VA) improved significantly, whereby mean VA at baseline was 1.37 which improved significantly to 1.01, 6 months after pars planar vitrectomy (P=0.009). Logistic regression analysis found gas tamponade (p=0.009) and intraoperative corneal scraping (p=0.002) were significant predisposing factors. However, diabetes mellitus (p=0.961), menopausal status (p=0.881), combined surgery (p=0.27), old age (p=0.765) and gauge size (p=0.907) were insignificant.

Conclusions: PCED is the most common late corneal complication encountered after PPV. Late complications occurred if intraoperative corneal scraping and gas tamponade were performed. Nevertheless, visual acuity improves 6 months after PPV.

Quantitative Measurement of the Regeneration of Ellipsoid Zone after Macular Hole Surgery

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Purpose: To study the pattern and timing of regeneration of the ellipsoid zone (EZ) before and after macular hole surgery.

Methods: Retrospectively review of patients with full thickness macular hole who underwent surgical repair with closed hole and alignment of external limiting membrane (ELM). Visual acuity (VA) and optical coherence tomography (OCT) were collected pre-operatively and post-operatively at 1 month, 3 months, 6 months and 12 months. En face OCT angiography was done by manual segmentation to visualize EZ defect. The defect areas were measured with ImageJ (version 1.51k).

Results: Thirty-five eyes in 34 patients were enrolled. The hole size ranged from 60 to 691um (340.94±175.16) in diameter. The holes were all closed with ELM realignment 1 month after surgery. LogMAR VA improved from 0.79±0.35 to 0.20±0.28 (p<0.001) at 12 months. Mean area of EZ defect before and post-operatively at 1 month, 3 months, 6 months and 12 months were 0.38±0.27 (mm2), 0.036±0.059, 0.020±0.048, 0.016±0.044 and 0.011±0.023, respectively. EZ defects after the surgical repair were categorized into 6 patterns. Patients with smaller macular hole size (p=0.016), smaller pre-operative EZ defect size (p=0.008) and oval shape EZ defect at post-operative 3 months (p=0.012) had greater chance to achieve Snellen VA better than 0.8 at post-operative 12 months.

Conclusions: En face OCT allowed a quantitative measurement of the defect of EZ, which was an important biomarker for visual outcome after MH surgery. From our observation of a limited number of patients, the EZ regeneration had another phase of repair 3 months after surgery.

Retinal Hemangioblastomas in Diagnosis of Von Hippel Lindau Disease: A Case Report

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Purpose: To report a case of Von Hippel Lindau (VHL) disease diagnosed by ophthalmologists from retinal hemangioblastomas (RHs).

Methods: Case report.

Results: A 39-year-old man presented with right eye blurred vision for 2 months. On examination, his vision was 3/60 with a normal anterior segment. Fundoscopy and fluorescein angiography showed multiple RHs with tortuous feeding vessels, suggestive of VHL disease. Optical coherence tomography showed subfoveal fluid. His left eye was blind for more than 10 years. There was no fundus view in that eye due to a dense cataract, and a B-scan showed funnel retinal detachment. Abdominal CT showed multiple suprarenal masses. Subsequently, he underwent bilateral adrenelectomy, splenectomy and distal pancreatectomy. Histology revealed bilateral adrenal gland and pancreas pheochromocytomas. MRI of the brain revealed cerebellar hemangioblastoma

with hydrocephalus. He underwent posterior fossa craniectomy and excision of the tumor. His right eye received laser photocoagulation surrounding the RHs, as well as intravitreal ranibizumab injections. Post procedure, the subfoveal fluid resolved. His eye condition remained stable for 2 years but he then came back with sudden reduced vision for 1 week. This time, his fundus showed subtotal rhegmatogenous retinal detachment. Urgent vitrectomy was performed where the feeder vessels were ligated and RHs removed. Three months post-operatively, he regained 6/48 vision and the retina was flat under silicone oil tamponade, and there was no recurrence of RHs.

Conclusions: Identifying patients with RHs and evaluating for VHL is important for the early diagnosis and treatment of life-threatening complications that may develop in these patients.

Scleral Buckle versus Pars Plana Vitrectomy: A Comprehensive Meta-Analysis of 15,669 Eyes

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Purpose: Pars plana vitrectomy (PPV) and scleral buckling (SB) are two common surgical treatments for rhegmatogenous retinal detachment (RRD). This meta-analysis compares the efficacy and safety of PPV to SB in RRD.

Methods: A systematic literature review was performed using Ovid MEDLINE, EMBASE and Cochrane CENTRAL from 2000 to June 2021. All comparative studies, including randomized controlled trials (RCTs) and observational studies, reporting on the efficacy and/or safety of PPV and SB for the primary surgical management of RRDs were included. Categorical outcomes were reported as risk ratios and continuous outcomes were reported as weighted mean differences with 95% confidence intervals. Meta-analysis for the included comparators was performed using a random effects model. The primary endpoint was final best corrected visual acuity (BCVA). Secondary endpoints were reattachment rates and the incidence of adverse events.

Results: Across 41 studies (8 RCTs, 33 observational studies), 5,304 SB and 10,365 PPV eyes were included. SB achieved a significantly better final logMAR BCVA than PPV (P=0.03). SB had a lower incidence of cataract formation (P<0.00001) and iatrogenic breaks (P<0.00001), but a higher incidence of choroidal hemorrhage (P=0.007), choroidal detachment (P=0.004), and residual subretinal fluid (RSRF) (P<0.00001). Primary (P=0.22) and final (P=0.06) reattachment rates were similar between SB and PPV.

Conclusions: SB had better final BCVA than PPV, however, primary and final reattachment rates were similar. SB had a significantly lower incidence of iatrogenic breaks and cataract formation, while PPV offers a reduced risk of choroidal detachment, subretinal hemorrhage, and RSRF.

Scleral Buckling Alone or in Combination with Pars Plana Vitrectomy for Rhegmatogenous Retinal Detachment Repair: A Meta-Analysis of 6801 Eyes

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Purpose: Differences in efficacy and safety between scleral buckling (SB) versus combination SB and pars plana vitrectomy (SB+PPV) for rhegmatogenous retinal detachment (RRD) repair are unclear.

Methods: Ovid MEDLINE, EMBASE, and Cochrane CENTRAL were searched systematically to identify comparative studies on SB and SB+PPV for RRD repair. Final best corrected visual acuity (BCVA) at last follow-up represented the primary endpoint, while reattachment rates and ocular adverse events were secondary endpoints. A random-effects meta-analysis was performed; 95% confidence intervals were calculated for weighted mean differences (WMD), risk ratios (RR), and number needed to treat/harm (NNT/NNH).

Results: Across 15 studies, 3399 SB and 3402 SB+PPV eyes were included. Compared to SB+PPV, SB alone achieved a significantly better final BCVA (0.29 ± 0.46 vs. 0.52 ± 0.58 logMAR, respectively; WMD=–0.16 logMAR; 95% CI [0.28, –0.04]; P=0.01) and final reattachment rate (98.1% vs. 95.2%, respectively; RR=1.02; 95% CI [1.01, 1.04]; P=0.001; NNT=50). The primary reattachment rate was similar between SB+PPV and SB (RR=0.99; 95% CI [0.95, 1.03]; P=0.47). Eyes with SB alone had a significantly lower risk of cataract development or progression versus SB+PPV (RR=0.37; 95% CI [0.14, 1.01]; P<0.05; NNH=3). The incidence of elevated intraocular pressure (P=0.78), development/progression of proliferative vitreoretinopathy (P=0.36), macular edema (P=0.24), epiretinal membrane formation (P=0.46), and diplopia (P=0.86) were similar.

Conclusions: Compared to PPV+SB, SB alone offers significantly better final BCVA and final reattachment rate along with reduced risk of cataract development or progression in RRD. The primary reattachment rate and incidence of other complications were similar between the two procedures.

Scleral Fixated versus Anterior Chamber Intraocular Lens Implantation: A Meta-Analysis

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Purpose: To compare the efficacy and safety outcomes following scleral fixated (SF) versus anterior chamber (AC) intraocular lens (IOL) implantation in adults.

Methods: A systematic literature search was performed on Ovid MEDLINE, EMBASE, and Cochrane CENTRAL (2005-2020). Inclusion criteria were adult patients, comparison of SFIOL and ACIOL implantation, sample size of at least 5 eyes per group, and English-language articles. Outcomes included corrected distance visual acuity (CDVA), absolute postoperative spherical equivalent, and incidence of complications. Meta-analysis was conducted using a random effects model in which weighted mean differences (WMD) and risk ratios (RR) with 95% confidence intervals (95% CI) were computed. The Risk of Bias in Non-randomized Studies – of Interventions (ROBINS-I) tool was completed for all studies. Certainty of evidence for outcomes was evaluated via the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) tool.

Results: 783 eyes from 9 studies were included. 378 received SFIOL and 405 received ACIOL. Mean age was 71.5 years old, 49.9% of patients were male, and mean follow-up was 24 months. SFIOL had a significantly higher absolute postoperative spherical equivalent (WMD=0.32, 95% CI=[0.03, 0.60], P=0.03) and incidence of IOL decentration (RR=3.35, 95% CI=[1.16, 9.69], P=0.03) compared to ACIOL. There was no significant difference in final CDVA (P=0.26).

Conclusions: SFIOL is associated with a higher absolute postoperative spherical equivalent and incidence of IOL decentration than ACIOL. Future prospective studies are needed to confirm or refute these findings.

Stability and Efficacy of Scleral Tuck Intraocular Lens Implantation in Complicated Cataract Surgery at a Tertiary Eye Hospital

First Author: Surabhi ***KUMARI***

Purpose: To study the stability, refractive outcome and complications of scleral tuck intraocular lens implants in complicated cataract surgery.

Methods: Retrospective observational study of 32 eyes that underwent complicated cataract surgery at a tertiary eye hospital. All patients underwent pars plana vitrectomy with 3 piece foldable intraocular lens implantation by modified Yamane technique. Patients with minimum follow up of six months were included in the study. Complete anterior and posterior segment evaluation were done pre operatively and post operatively at every visit.

Results: The follow up period ranges from 8 months to 44 months. Mean pre operative BCVA (logMAR) changed from 1.67+0.74

to 0.18+0.6 at the last follow up. Though emmetropia was targeted in all cases, it was seen in only 4 eyes. Intraocular lens was centered in 30 eyes (93.75%) at the last follow up and there was no incidence of posterior dislocation. Most common complication noted was secondary glaucoma (18.75%) followed by vitreous hemorrhage (12.5%). Onset of complications ranges from postoperative day 1 to day 56. Majority of the complications were managed conservatively.

Conclusions: Scleral tuck intraocular lens implantation is a safe and effective way of managing complicated cataract surgery. Complications of sutured scleral fixated, iris fixated and anterior chamber IOL can be avoided by the use of this technique.

Subthreshold Laser for Treatment of Refractory Macular Hole

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Purpose: Macular holes (MHs) are foveal defects affecting all layers of the retina and result in significant decline in central visual acuity. Failure of surgical macular hole closure necessitates further intervention. Although not traditionally used in this setting, subthreshold laser offers the advantage of less collateral thermal damage than conventional laser. We report on a 55-year-old patient's response to subthreshold laser for management of a refractory macular hole.

Methods: Patient information was obtained from the cloud-based EMR of the attending physician. A literature search was conducted on persistent macular holes and subthreshold laser using Medline.

Results: A 55-year-old male presented with an acute decrease in vision in his right eye secondary to retinal detachment. After retinal reattachment with pneumatic retinopexy, the presence of a macular hole was confirmed. The hole persisted after cataract extraction with vitrectomy and broad internal limiting membrane (ILM) peeling. In accordance with patient wishes for no further surgery and no face down positioning, subthreshold laser was applied directly to the retinal pigmented epithelium in a circular pattern inside the edge of the macular hole. This was followed by fluid-gas exchange with a push-pull technique using euvolemic C3F8. A month after this procedure, vision had improved by four Snellen lines and complete closure of the MH was confirmed.

Conclusions: Subthreshold laser has several advantages over conventional laser techniques, including reduced collateral thermal damage to the adjacent cells. This case has demonstrated a novel use for subthreshold laser, which combined with push-pull technique was an effective non-surgical treatment option for persistent MH.

Successful Management of Eales Disease with Tubercular Etiology and Vitreous Hemorrhage

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*Co-Author(s): Mirza **METITA***

Purpose: Eales disease is an idiopathic occlusive retinal vasculitis of the peripheral retinal veins, usually affecting young men, with recurrent vitreous hemorrhage as hallmark sign and 38.7% of cases were tuberculous-related. The purpose of this case is to describe a successful management of Eales disease with vitreous hemorrhage that was tuberculous-related.

Methods: Diagnosis was based on history taking with ophthalmology examination, ultrasonography (USG) and laboratory testing.

Results: A 23-year-old man came with chief complaint of blurred vision on his left eye since 2 weeks ago. Visual acuity was 1/60, and vitreous hemorrhage was found through ultrasonography examination. History of vitrectomy and silicon oil due to vitreous hemorrhage 2 months before was also noticed in the right eye. Complete work up was done with positive result of interferon-gamma release assay (IGRA). 6 months of anti-tuberculous therapy and oral steroid on tapered dose was given to the patient. The vitrectomy surgery was performed in the left eye but vitreous

hemorrhage recurred even after surgery. The vitreous hemorrhage resolved 3 months after surgery and the visual acuity became 6/6 with negative result of IGRA.

Conclusions: Young adult presenting with recurrent vitreous hemorrhage that is tuberculous-related is one of the characteristics of Eales disease. Early detection and comprehensive eye examination including USG and IGRA test, as well as appropriate medical and surgery management will give a successful outcome.

Surgical Outcomes of Pars Plana Vitrectomy associated with Retropupillary Iris-Claw Intraocular Lens Implantation

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Purpose: To assess outcomes of PPV (pars plana vitrectomy) with ICIOL (iris-claw intraocular lense) implanted in the retropupillary position for correction of aphakia in several conditions without adequate capsular support.

Methods: A prospective, non-randomized control study of consecutive 173 eyes of 172 patients in which we performed retropupillary ICIOL implantation in luxated or subluxated crystalline lens (49 eyes, group 1), dislocated intraocular lens (79 eyes, group 2), post-cataract surgery aphakia (17 eyes, group 3) and in cases with prior PPV (28 eyes, group 4). Either prior or same-day PPV procedures were performed with 23-gauge technique for different associated anterior or posterior segment indications. The refractive outcome, anatomical outcome, long-term stability of the implants, and possible long-term complications are reviewed.

Results: The mean patient age was 56.9 years (range, 19–93 years). The mean follow-up time was 9.3 months (range, 3 to 19 months). At the end of the follow-up period, BCVA improved in all patients. The mean post-operative best-corrected logMAR visual acuity was 0.17. Ten cases had transient elevated intraocular pressure. One eye presented with choroidal hemorrhage and one with hyphema. Disenclavation of one haptic occurred in one case. Neither case of retinal detachment nor uveitis was observed. The lens position was analyzed using UBM and was found to be parallel to the iris plane in all cases at the end of follow-up.

Conclusions: Either primary or secondary retropupillary ICIOL implantation is an effective and safe procedure to correct aphakia in vitrectomized eyes without capsular support.

The Association of Retinal Ischemia and Neovascularization with Neovascular Glaucoma in Patients with Proliferative Diabetic Retinopathy using Widefield Swept-Source Optical Coherence Tomography Angiography

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Purpose: To investigate the association between wide field swept-source optical coherence tomography angiography (WF SS-OCTA) metrics, including non-perfusion area (NPA) and neovascularization (NV), and the presence of neovascular glaucoma (NVG) in eyes with proliferative diabetic retinopathy (PDR).

Methods: Cross-sectional observational study, prospectively designed. Patients with PDR in one or both eyes, with or without NVG, were imaged with WF SS-OCTA Montage 15x15mm and Angio 6x6mm scan protocols centered on the fovea. Retinal ischemic parameters (NPA, ischemia index [NPA/total retinal area]) and NV features (NV number, NV area, extensive NV) were measured by two independent graders using Montage 15x15mm en face images. Foveal avascular zone (FAZ), macular thickness and choroidal thickness/volume were obtained from Angio 6x6mm images using the ARI Network. WF SS-OCTA retinal and choroidal metrics, systemic and ocular parameters were screened using Least Absolute Shrinkage and Selection Operator logistic regression for variable selection. Firth's Bias-Reduced logistic regression model (outcome: presence of NVG) was used to identify parameters associated with NVG.

Results: Eighty-five eyes of 60 patients without NVG and 9 eyes of 8 patients with NVG were included. Ischemia index (odds ratio [OR]=13.2, 95% confidence interval [CI]: 5.3-30.7, P<0.0002) and best-corrected visual acuity (OR=5.8, 95% CI: 1.2-28.8, P<0.013) were associated with the presence of NVG. NV metrics, macular ischemia (measured by FAZ), and choroidal parameters were not related to NVG.

Conclusions: WF SS-OCTA is useful to evaluate retinal ischemia and neovascularization features. Retinal ischemia index was associated with the presence of NVG in patients with PDR. Longitudinal studies with a larger sample size are needed to validate imaging biomarkers associated with diabetic NVG.

The Effectiveness of Laser Vitreolysis for Vitreous Floaters in Posterior Vitreous Detachment

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Purpose: To determine the change in contrast sensitivity function (CSF) and vision-related quality of life (VRQol) for symptomatic floaters due to posterior vitreous detachment (PVD) following treatment with Nd:YAG laser.

Methods: This is a prospective, interventional study involving patients with symptomatic floaters for more than three months. Patients underwent one to three sessions of vitreolysis. CSF using Freiburg Acuity and Contrast Test (FrACT), and VRQoL survey using National Eye Institute Visual Function Questionnaire-25 (NEI VFQ-25) prior to, and one month after each vitreolysis was analyzed.

Results: Fifty-seven eyes of 45 patients, including 30 females, were recruited. Mean age was 60.4 years. Twelve patients had bilateral laser. Average number of sessions was 2.05. Mean number of shots was 348. Mean power per session was 850.6± 417.6mJ. Mean CSF improved from 3.20 ± 0.85%W to 2.64 ±0.63%W one month after vitreolysis. 25 (43.9%) needed three sessions. Each use of the laser showed a significant mean difference in CSF (%W) before and after first session (0.29±0.49%W (p<0.001); after the first and second (0.35 ±0.53%W (p=0.01)); and after second and third (0.21±0.31%W (p=0.02)) (paired T-test). NEI VFQ-25 scores analyzed showed improvement in median of 4 subscales post treatment: general vision (z=-3.30, p=0.001), near activity (z=3.396, p=0.001), distance activity (z=-2.788, p=0.005), and mental health (z=-2.219, p=0.026) (Wilcoxon signed rank test). Mean overall score increased from baseline (p<0.001). No adverse events were recorded at one month follow-up.

Conclusions: Vitreolysis by Nd:YAG laser improved CFS and VRQoL safely in symptomatic PVD patients.

The Effects of Axial Lengths to the Postoperative Ocular Blood Flows

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Purpose: The purpose of the present study is to study the relationship between axial lengths and postoperative optic nerve head (ONH) blood flow after cataract surgery.

Methods: Three hundred and forty-nine eyes from patients who had undergone cataract surgery were included in the study. Five groups were categorized in accordance with axial lengths as follows: 1) 22 mm group (axial length < 23 mm, 110 eyes), 2) 23 mm group (23 mm ~ 24 mm, 121 eyes), 3) 24 mm group (24 mm ~ 25 mm, 56 eyes), 4) 25 mm group (25 mm ~ 26 mm, 34 eyes), and 5) 26 mm group (≥ 26 mm, 28 eyes). Intraocular pressures (IOPs) and ONH blood flow were measured by laser speckle flowgraphy (LSFG) at pre- and post-surgery and again at 1, 4, and 12 weeks.

Results: The average mean blur rate (MBR) significantly increased in the 22 mm group, 23 mm group, 24 mm group, and was continuing at 12 weeks after surgery. With the exception of the 24 mm group, mean of vascular area (MV) did not change during the perioperative period. However, mean of tissue area (MT) apparently increased in all groups during all of

the postoperative periods. This indicated that improvements of the ONH blood flow were based on the increase of the MT. Upon cataract surgery, macula MBR increased only in the eyes of the 23 mm group.

Conclusions: The ocular blood flows significantly increased only in normal axial lengths.

The Evaluation of Preoperative OCT Prognostic Factors for Macular Hole Surgery: A 4-Year Retrospective Study

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Purpose: To determine the preoperative OCT prognostic factors, i.e. base diameter (BD), minimum linear dimension (MLD), macular hole inner opening (MHIO), macular hole index (MHI), hole form factor (HHF) for macular hole surgery.

Methods: This study is a retrospective study of patients with macular hole that underwent macular hole repair surgery by various techniques between 2017-2020, with a minimum follow-up period of 3 months. The association between the preoperative visual acuity, symptoms and ocular coherence tomography (OCT) parameters were compared to the postoperative visual gain, type of macular hole closure, inner segment-outer segment (IS-OS) integrity and central foveal thickness (CFT).

Results: A total of 30 eyes of 30 patients were included in this study with a mean age of 65.0. A negative correlation was seen between MLD and MHIO with visual gain at 3 months (coef: -0.379; p=0.039) and 6 months (coef: -0.406; p=0.044) respectively. Patients with macular hole closure have significant higher HFF compared to patients with non-closure at 6 months [median (IQR) closure vs non-closure: 0.85 (0.75, 0.99) vs 0.56 (0.46, 0.89); p=0.044]. Visual gain was better significantly in those with closure of macular hole than non-closure at both 3 months (p=0.021) and 6 months (p= 0.041).

Conclusions: MLD and MHIO are important predictive OCT parameters of postoperative functional success and HFF was found to be a reliable anatomical prognostic index.

Vitrectomy and Manipulation of Intraarterial and Intraocular Pressures for Non-Arteritic Central Retinal Artery Occlusion

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Purpose: To describe a surgical technique and report the functional outcome of treating non-arteritic central retinal artery occlusion (N-CRAO) in three eyes of three consecutive patients.

Methods: A retrospective report of clinical presentation, intervention, and treatment outcome.

Results: Three patients underwent vitrectomy at various time intervals from disease onset. Surgical technique involved vitrectomy, detachment of posterior hyaloid, lowering of intraocular pressure (<3 mm Hg), and simultaneous gradual increase of arterial blood pressure (BP) to 165/100 mm Hg (with the slow injection of intravenous adrenaline). Intraoperatively, we noticed immediate perfusion and visible dilation of the blood-filled central retinal artery (CRA) and retinal arteriolar network and dilatation of the central retinal vein. Optic disc massage was performed with a silicone tip cannula for 3 minutes. Then BP was lowered to the preoperative level. The sclerotomy was sutured with 8-0 vicryl and a fluid-filled, slightly hypotonic eye was the target. The final vision improved from preoperative counting fingers and hand motion to 6/60, 6/36+1, and 6/60. Although preoperative macular infarction persisted in all three eyes as demonstrated by optical coherence tomography angiography, the patients claim a convincing subjective visual benefit.

Conclusions: This procedure appears to have positively altered the natural history of the disease in the three eyes. Surgery significantly increased ocular perfusion along the entire

CRA, which can dislodge CRA thrombo-emboli and has the potential to restore retinal perfusion and improve visual outcome if performed before irreversible retina damage. This is a relatively straightforward technique and should join the list of surgical options for treating N-CRAO.

Vitreous Surgery with Autologous Blood Clot Plaque Protection to Prevent Postoperative Macular Hole Formation on the Fovea of High Myopia with Extensive Retinoschisis and Foveal Detachment without Macular Hole: 2 Case Series Report

*First Author: Ching Chih **LIU***
*Co-Author(s): Chia Yi **LEE***

Purpose: To report the efficacy of vitreous surgery with autologous blood clot plaque protection on the fovea to prevent post-operative macular hole (MH) formation for highly myopic eyes with foveal detachment and extensive retinoschisis without MH.

Methods: Retrospective two case series report and literature review.

Results: Two female patients (two highly myopic eyes) with posterior staphyloma with foveal detachment and extensive retinoschisis without MH. Preoperative best-corrected visual acuity (BCVA) revealed 0.1 in patient one and 0.2 in patient two. Vitreous surgery performed on two eyes consisted of core vitrectomy, surgically induced posterior vitreous detachment, removal of the premacular vitreous cortex and internal limiting membrane in the posterior staphyloma, 1 or 2 drops autologous blood were injected over the fovea to form blood clot plaque and then 25% SF(6) gas tamponade. Patients were instructed to maintain a prone position for at least 7 days after surgery. The postoperative follow-up period was 8.5 months in average. In all 2 eyes, foveal reattachment without MH formation and retinoschisis gradually decreased in height, with visual improvement within 1 month postoperatively. The postoperative BCVA improved from 0.1 to 0.5 and 0.2 to 0.7. No postoperative MH formation was noted during the follow-up period.

Conclusions: Postoperative MH formation in foveal detachment and extensive retinoschisis in highly myopic eyes after vitrectomy was reported. Vitreous surgery with autologous blood clot plaque protection on the fovea might have a rationale as prophylactic treatment for highly myopic eyes at high risk of macular hole development.

Translational Medicine

Biological Activity of Gossypin in Medicine for the Treatment of Diabetes: Therapeutic Potential through Scientific Data Analysis

*First Author: Dinesh **PATEL***

Purpose: Flavonoidal class chemical-based preparations have been used in medical field for over 40 years to treat numerous human health complications including disorders of peripheral circulation. More than 100 preparations were available in the field which contain cianidanol, diosmetin, hesperidin, leucocianidin, rutin, and troxerutin.

Methods: Pharmacological potential of flavonoidal class chemicals were mainly due to their known functions as strong antioxidants, free radical scavengers and metal chelators. Biological potential of gossypin in medicine has been investigated through literature data analysis of various scientific research works.

Results: Scientific data analysis of different research works revealed the biological activity of gossypin in medicine for the treatment of diabetes as increased blood glucose and HbA1c levels and reduced plasma insulin and hemoglobin levels were significantly reversed in gossypin treatment in rats.

Conclusions: Literature data analysis of different scientific research work revealed the biological activity of gossypin in medicine for the treatment of diabetes.

Biological Potential of Cirsiliol on Benzodiazepine Receptor: Therapeutic Importance in Medicine

*First Author: Dinesh **PATEL***

Purpose: Phytoconstituents are playing an important role in all plants as they have an important role in their biological process. Phenolic and flavonoidal class chemicals from plant material are beneficial in cancerous, cardiovascular and neurodegenerative disorders in medicine.

Methods: Flavonoidal class phytochemicals are polyphenolic compounds found to be present in plants and their derived plant-based chemicals in nature. Numerous literature databases have been searched in the present investigation in order to find the beneficial properties of cirsiliol in medicine. Biological potential of cirsiliol on benzodiazepine receptor ligand has been investigated through literature data analysis of different scientific research works.

Results: Biological potential of cirsiliol in medicine has been evaluated in the present investigation through literature data analysis of numerous scientific research works. Literature data analysis revealed the biological potential of cirsiliol on benzodiazepine receptor ligand as cirsiliol revealed hypnotic activity in the pentobarbital-induced sleep test but not anticonvulsant effects.

Conclusions: Literature data analysis revealed the biological potential of cirsiliol on benzodiazepine receptor.

Comparison of Visual Estimation of Cupping by Human Ophthalmologist to a Machine Learning Algorithm

*First Author: John **AKKARA***
*Co-Author(s): Anju **KURIAKOSE***

Purpose: To evaluate glaucomatous cupping from fundus images by using artificial intelligence machine learning algorithm and compare its accuracy to a human ophthalmologist grader.

Methods: Color fundus photographs were taken with a Topcon fundus camera (Topcon TRC; Topcon, Tokyo, Japan) by technicians. 150 fundus photos without artefacts were selected and evaluated using a beta version of a deep learning algorithm that analyzes single color fundus photographs to detect glaucomatous cupping. Parameters detected include cup/disc ratio, neuro retinal rim thickness in 4 quadrants, ISNT rule (Figure 3) and disc damage likelihood score.

Results: The deep learning algorithm analyzed 150 fundus photographs. 15 images (10%) were marked as error by the AI, as it could not detect the disc and cupping from the fundus photo. 135 images were evaluated. Mean difference between human grading and AI grading of CDR was 0.7. NetraAI underestimated cupping in 16.3% of cases. 73.3% of CDR calculated was within 0.1 difference of human grading. 89.6% of CDR calculated was within 0.2 difference of human grading.

Conclusions: A comprehensive AI for glaucoma should evaluate all the parameters including IOP, disc, gonioscopy, fields and OCT together; but such an AI system is not ready yet. Currently, it appears that fully automated disc and cup detection does not always work, and there is still a lot of scope for improvement in accuracy.

Data Homogeneity Effect in Deep Learning-Based Prediction of Type 1 Diabetic Retinopathy?

*First Author: Yu-chuan **KANG***
*Co-Author(s): Yih-shiou **HWANG,** Chi-chun **LAI,** Nan-kai **WANG,** Wei-chi **WU***

Purpose: To evaluate a deep transfer learning-based model for identifying diabetic retinopathy (DR) trained by a dataset with high variability and predominant type 2 diabetes (T2D) and compare the performance with the model in patients with type 1 diabetes (T1D).

Methods: The Kaggle dataset, which is a publicly available dataset provided by EyePACS, was used and divided into training and testing the Kaggle dataset. In the comparison dataset,

we collected the retinal fundus images from T1D patients at Chang Gung Memorial Hospital in Taiwan from 2013 to 2020, and the images were divided into training and testing the T1D dataset. The model was developed using different convolutional neural networks. Model performance of DR prediction was evaluated by the testing images from each dataset, and area under the curve (AUC), sensitivity, and specificity were calculated.

Results: The model trained by the Kaggle dataset had AUC of 0.7 and 0.8 in the testing Kaggle and T1D datasets, respectively. On the other hand, the model trained by the T1D dataset had an AUC up to 0.9 when testing in the T1D dataset, while the performance decreased to an AUC of 0.5 when testing in the Kaggle dataset. The heatmaps showed the model›s focus on the retinal hemorrhage, vessels, and exudation to predict DR. In wrong prediction images, artifacts and low image quality affected the model performance.

Conclusions: The model developed by the high variability and T2D predominant dataset could apply to T1D patients. Homogeneity of the dataset could affect the performance, trainability, and generalization of the model.

Development and Validation of a Deep Learning-Based Screening Tool for Retinopathy of Prematurity Detection on Retinal Images Captured through a Tele-Ophthalmology Platform in India

*First Author: Divya **RAO***
*Co-Author(s): Jun Leong **HOE,** Jun Hup **LIM,** Florian M **SAVOY,** Anand **VINEKAR***

Purpose: Retinopathy of prematurity (ROP) is a leading cause of infant blindness. Artificial intelligence (AI) automation can not only improve diagnostic consistencies but can also help scale up ROP screening services to remote and underserved regions of the world. We developed and assessed the performance of an AI algorithm to automatically detect the presence of ROP in retinal images of premature babies.

Methods: We trained a deep learning (DL) algorithm with only temporal images filtered from a tele-ROP screening program in India. It contains 28,975 images captured with various Retcam cameras over 8 years. The dataset was split into train (n=20,642, 71.2%), validation (n=5042, 17.4%) and test sets (n=3291, 11.4%). The algorithm consists of a binary classifier trained with no ROP images on the negative side and images with ROP of stage 2 and above on the positive side. The image labels were retrieved from the daily registers of the tele-ROP program. They consist of per-eye diagnoses provided by trained ROP graders based on all images captured during the screening session. All those requiring treatment had an additional confirmatory diagnosis from clinical examination.

Results: Of the 3291 images in the test set, 33.4% (n=1098) showed presence of ROP (stage 2 and above). Sensitivity was 92.26% (95% CI: 90.52% to 93.77%) with 85 positive images being misclassified. Specificity was 87.73% (95% CI: 86.29% to 89.08%), with 269 images with no ROP being misclassified.

Conclusions: The DL tool for ROP screening shows promising performance. A prospective clinical validation in a real-world tele-ROP platform is under consideration.

Elevated Advanced Glycation End Products are associated with Apoptosis-Related Subfoveal Photoreceptor Ellipsoid Zone in Diabetic Macular Ddema

*First Author: Nibha **MISHRA***
*Co-Author(s): Sandeep **SAXENA***

Purpose: Role of advanced glycation end products (AGEs) in promoting cellular apoptosis in the body is well established. Advanced glycation end products and their receptors contribute to oxidative stress, mitochondrial dysfunction and induce apoptosis. A prospective study was undertaken to evaluate the association of AGEs with subfoveal ellipsoid zone (EZ) disruption in diabetic macular edema (DME).

Methods: Tertiary-care-center–based cross-sectional study included 40 consecutive cases (NPDR=20, PDR=20) with DME and 20 healthy controls in the age group of 40–65 years. Spectral domain optical coherence tomography (SD-OCT) was done for cross sectional imaging of retina. Disruption of EZ was graded as intact EZ and disrupted EZ in the subfoveal area. Advanced glycation end products were assessed by assay of Nε-carboxymethyl-lysine (Nε-CML) using standard protocol. Data was analyzed statistically.

Results: Subfoveal EZ disruption was noted in 77.5% (31/40) of cases of DME. In cases without EZ disruption, visual acuity (logMAR VA) was 0.60 + 0.5, whereas in cases with EZ disruption, logMAR VA was 0.96 + 0.6 ($p< 0.001$). In cases without EZ disruption, Nε-CML was 94.3 + 57 ng/ml, whereas in cases with EZ disruption Nε-CML was 120.6 + 71.98 ng/ml ($p< 0.001$). Univariate analysis was done with Nε-CML as a dependent variable. None of the variables had significant effect on Nε-CML (fasting blood glucose p=0.12, HBA1c p=0.65, central subfield macular thickness p=0.13).

Conclusions: Disruption of subfoveal EZ with increased levels of AGEs in DME provides in vivo histological evidence of AGE-induced apoptosis of retinal photoreceptors.

Endogenous Fungal Endophthalmitis Post COVID-19

*First Author: Daraius **SHROFF***
*Co-Author(s): Neelam **ATRI,** Gagan **BHATIA,** Arpan **GANDHI,** Shishir **NARAIN,** Ritesh **NARULA***

Purpose: To report endogenous fungal endophthalmitis, post recovery from severe COVID-19 infection in otherwise immunocompetent individuals, treated with prolonged systemic steroids.

Methods: Retrospective chart review of cases with endogenous fungal endophthalmitis post severe COVID-19 infection treated at two tertiary care referral eye institutes in North India.

Results: Seven eyes of five cases of endogenous fungal endophthalmitis were studied. All cases had been hospitalized for severe COVID-19 pneumonia and had received systemic steroid therapy for an average duration of 42 +/- 25.1 days (range 18-80 days). All the cases initially complained of floaters with blurred vision after an average of 6 days (range 1 to 14 days) following discharge from hospital. They had all been misdiagnosed as noninfectious uveitis by their primary ophthalmologists. All eyes underwent pars plana vitrectomy with intravitreal antifungal therapy. Five of the seven eyes grew fungus as the causative organism (Candida sp. in four eyes, Aspergillus sp. in one eye). Post-operatively, all eyes showed control of the infection with marked reduction in vitreous exudates and improvement in vision.

Conclusions: Floaters and blurred vision developed in patients after they recovered from severe COVID-19 infection. They had received prolonged corticosteroid treatment for COVID as well as for suspected noninfectious uveitis. We diagnosed and treated them for endogenous fungal endophthalmitis. All eyes showed anatomical and functional improvement after pars plana vitrectomy with antifungal therapy. It is important for ophthalmologists and physicians to be aware of this as prompt treatment could control the infection and salvage vision.

Gender Prediction for a Multiethnic Population via Deep Learning across Different Retinal Fundus Photograph Fields: Retrospective Cross-Sectional Study

*First Author: Tyler Hyungtaek **RIM***
*Co-Author(s): Bjorn Kaijun **BETZLER,** Geunyoung **LEE,** Henrik Hee Seung **YANG***

Purpose: Deep learning algorithms have been built for the detection of systemic and eye diseases based on fundus photographs. The retina possesses features that can be affected by gender differences, and the extent to which these features are captured via photography differs depending on the retinal image field. We aimed to compare deep learning algorithms' performance in predicting gender based on different fields of fundus photographs (optic

disc–centered, macula-centered, and peripheral fields).

Methods: This retrospective cross-sectional study included 172,170 fundus photographs of 9956 adults aged ≥40 years from the Singapore Epidemiology of Eye Diseases Study. Optic disc–centered, macula-centered, and peripheral field fundus images were included in this study as input data for a deep learning model for gender prediction.

Results: The deep learning algorithms predicted gender with an area under the receiver operating characteristic curve (AUC) of 0.94 at the individual level and an AUC of 0.87 at the image level. Across the three image field types, the best performance was seen when using optic disc–centered field images (younger subgroups: AUC=0.91; older subgroups: AUC=0.86), and algorithms that used peripheral field images had the lowest performance (younger subgroups: AUC=0.85; older subgroups: AUC=0.76).

Conclusions: We confirmed that gender among the Asian population can be predicted with fundus photographs by using deep learning, and our algorithms' performance in terms of gender prediction differed according to the field of fundus photographs, age subgroups, and ethnic groups.

Prediction for Visual Impairment in Epiretinal Membrane and Feature Analysis: A Deep Learning Approach Using Optical Coherence Tomography

*First Author: Yun **HSIA***
*Co-Author(s): Yi-ting **HSIEH,** Ying-hui **LAI,** Yu-yi **LIN,** Chung-yen **SU,** Bo-sin **WANG***

Purpose: To develop a deep learning model for predicting the extent of visual impairment in epiretinal membrane (ERM) using optical coherence tomography (OCT) images, and to analyze the features associated with visual impairment.

Methods: Six hundred macular OCT images from eyes with ERM and no visually significant media opacity or other retinal diseases were obtained. Those with best-corrected visual acuity (BCVA) ≤ 0.4 were classified as "profound visual impairment," while those with BCVA > 0.4 were classified as "less visual impairment." Ninety percent of images were used as the training dataset, and 10% were used for testing. We adopted two convolutional neural network (CNN) models (ResNet-50 and ResNet-18) for training, and the t-distributed stochastic neighbor-embedding approach (t-SNE) was used to compare their performance. Grad-CAM technique was used in the heat map generative phase for feature analysis.

Results: During the model development, the training accuracy was 100% in both CNN models, while the testing accuracy was 70% and 80% for ResNet-18 and ResNet-50, respectively. The t-SNE approach found that the deeper structure (ResNet-50) had better discrimination on visual acuity than the shallower structure (ResNet-18). The heat maps indicated that the key features for visual impairment were located mainly at the inner retinal layers of the foveal and parafoveal regions.

Conclusions: Deep learning algorithms can be used to assess the extent of visual impairment from OCT images in patients with ERM. Changes at inner retinal layers had a greater impact on visual acuity than the outer retinal changes.

Vitreous Proteomics of Proliferative Diabetic Retinopathy Highlighting the Role of Inflammation, Visual Transduction and Extracellular Matrix Pathways

*First Author: Sagnik **SEN***
*Co-Author(s): Kuppamuthu **DHARMALINGAM,** Kim **RAMASAMY***

Purpose: To explore the vitreous humor proteome from type 2 diabetes subjects with proliferative diabetic retinopathy (PDR) in the Indian population.

Methods: We performed mass spectrometry-based label-free quantitative analysis of vitreous proteome of PDR (n = 11) and idiopathic macular hole (control, IMH) subjects (n = 12). 9 samples of PDR and 10 samples of IMH were pooled as case and control and compared. Two

samples each of PDR and IMH were analyzed individually without pooling to validate the results of the pooled analysis. Comparative quantification was performed using SCAFFOLD software which calculated fold changes of differential expression. Bioinformatics analysis was performed using DAVID and STRING softwares.

Results: We identified 469 proteins in PDR and 517 proteins in IMH vitreous, with an overlap of 172 proteins. 297 unique proteins were identified in PDR and 345 in IMH. In PDR vitreous, 38 proteins were upregulated ($p<0.05$) and 21 proteins downregulated compared to IMH. Protein distribution analysis clearly demonstrated a separation of protein expression in PDR and IMH. Differentially expressed proteins included alpha-1-antitrypsin, retinol binding protein 3, carbonic anhydrase 1, cathepsin-D, lumican, etc.

Conclusions: Diabetic retinopathy pathogenesis involves proteins which belong to inflammation, visual transduction and extracellular matrix pathways. Comparative proteomics gives us insight into undiscovered pathways of disease pathogenesis, which may be used to develop biomarkers of early stages of disease, to deliver personalized medicine and to develop novel therapies.

VIDEOS

Eye Trauma, Emergencies & Infections

Large Iridodialysis Repair Plus Scleral Fixation of a Four-haptic Intraocular Lens

*First Author: Hung-da **CHOU***

Purpose: To report using modified sewing machine and 4-haptic intraocular lens (IOL) scleral fixation techniques to repair a large iridodialysis and a dislocated lens after ocular blunt injury.

Methods: A 74-year-old woman suffered from ocular blunt injury in the right eye by a rubber band. Upon presentation, her visual acuity was 20/200 in the right eye, and slit-lamp examination showed a large iridodialysis over 180 degrees, a dislocated lens, and prolapsed vitreous in the anterior chamber. Pars plana vitrectomy and lensectomy was performed first. Two weeks later, the iridodialysis was repaired by the modified sewing machine technique, and the IOL was sutured using a 4-haptic IOL fixation method.

Results: Six months after the surgery, the iris was fixed-dilated but opposed well to the sclera, and the IOL had a good centration without tilting. The patient's visual acuity improved to 20/50, with 0 and -1.0 diopters of spherical and cylindrical refractive error, respectively.

Conclusions: It takes a very long time to repair large iridodialysis with the conventional single-suture iris repair technique. The modified sewing machine technique is simple and saves time. Compared to the 2-point IOL fixation methods, the 4-haptic IOL scleral fixation technique can achieve a good centration and less IOL tilting. However, performing iris repair together with 4-haptic IOL fixation is technically challenging and requires careful preoperative planning as well as extreme patience.

Management of Perforated Ocular Injury with Retained Intraorbital Metallic Foreign Body

*First Author: Billal **HOSSAIN***
*Co-Author(s): Mohamed **AHSAN,** Partha **BISWAS,** Dilara **KHATUN,** Anisur **RAHMAN***

Purpose: To explore the outcomes of perforated ocular injury management with retained intraorbital metallic foreign body.

Methods: This patient presented to emergency department with profound loss of vision after splinter injury from grenade burst in training ground. There was perception of light vision. There was an entry wound at upper eyelid along with sclerocorneal injury with dense hyphema. On CT scan there was a retroorbital metallic foreign body. Repair of the wound was done along with pars plana vitrectomy, lensectomy and silicon oil insertion. After four months, silicon oil removed with scleral fixation intraocular lens implantation by the same surgeon. Postoperative best corrected visual acuity, intraocular pressure, lens position and retinal status were evaluated.

Results: This 39-year-old man had a perforated injury with splinter from grenade burst which pierced eyelid, limbus, lens, vitreous cavity, retina, choroid, sclera and then situated at retroorbital region. After repair of sclerocorneal wound there was damage of iris, dense hyphema, disruption of lens capsule, dense vitreous hemorrhage, retinal detachment and exit wound temporal to macula. After the first surgery patient was aphakic with silicon filled eye. After the second surgery, best corrected vision was logMAR 0.80 with intraocular pressure 14 mm Hg. Retina was attached with temporal fibrosis. Vision was maintained up to one year of follow up.

Conclusions: Meticulous management of perforated ocular injury will prevent eye to become phthisic. It can even provide a good stable valuable vision.

Opaque Cornea, Multiple Foreign Bodies and Retinal Detachment: Patience, Persistence and Perseverance is the Key!

First Author: Mohit ***DOGRA***
Co-Author(s): Supriya Dhar ***DHAR,*** *Amit* ***GUPTA,*** *Jitender* ***JINAGAL,*** *Ramandeep* ***SINGH***

Purpose: To demonstrate the surgical steps and outcome of temporary keratoprosthesis (T-kPRO) assisted vitrectomy in a patient with bilateral open globe injury secondary to an accidental blast.

Methods: A middle-aged farmer was involved in an accidental blast that led to 30% burns on his body and face along with bilateral open globe injury. Both his eyes underwent repair along with intravitreal and systemic antibiotics while he was being treated for burns. 15 days later he was referred to our center with a diagnosis of right eye opaque cornea with retinal detachment and multiple intraocular foreign bodies (IOFBs) and left eye phthisis bulbi, for further management. Cornea and vitreoretinal surgeons worked together to formulate a plan to operate on the right eye of this patient.

Results: Collaborative efforts by the cornea and vitreoretinal surgeons were needed to perform T-kPRO assisted lensectomy+vitrectomy, foreign body removal, proliferative vitreoretinopathy dissection, silicone oil tamponade and optical penetrating keratoplasty under general anesthesia. At 3 months follow-up, the patient had a clear graft, completely attached retina under silicone oil, best corrected visual acuity of 2/60 and intraocular pressure of 9 mm Hg.

Conclusions: Timely intervention with judicious preoperative planning coupled with appropriate patient counseling and collaboration of cornea and vitreoretinal surgeons can ensure globe salvage with restoration of ambulatory vision in some patients with severe ocular trauma along with chemical injury.

Pass The Point of No Return: Double Penetrating Ocular Injury With Retained Intraorbital Foreign Body

First Author: Salvame ***ERIKA***
Co-Author(s): So ***JAYSON***

Purpose: To present a case of double penetration of an intraocular foreign body, retained in the infraorbital space, its management and outcome.

Methods: Case report video.

Results: A 20-year-old male presented with metallic ocular trauma of the right eye. Visual acuity was 20/32 with corneoscleral laceration, vitreous hemorrhage, choroidal rupture and orbital imaging revealed 2-mm metallic extraocular, intraobital foreign body, adjacent nasally to the optic nerve. Patient underwent repair of corneoscleral injury with intravitreal injection of antibiotics. An initial barrier laser was done soon after repair. In the subsequent days, vision deteriorated to hand movement as vitreous hemorrhage progressed prompting pars plans vitrectomy with assessment and management of the choroidal rupture site. This video also highlights the approach and tricks including light filters used to maximize surgical outcome. The intraorbital foreign body was retained and patient›s vision improved to 20/25. Monitoring possible development of ocular siderosis was maintained.

Conclusions: Double penetrating ocular injury is an uncommon presentation in ocular trauma. Decision making regarding intervention is multifactorial depending on the suspected foreign body, the ocular structures affected and the extent of visual deterioration. A multi-specialty approach is often necessary and retina wise, concerns include endophthalmitis, management of media opacity in the posterior segment, prevention or repair of retinal detachment, and monitoring for ocular siderosis. Careful planning and synergy of intervention is necessary for maximizing outcome. Special intraoperative techniques and machine specific adjuncts may also be employed for a more efficient surgery.

Pole to Pole Post Trauma Single Sitting Surgery

First Author: Ritesh ***NARULA***
Co-Author(s): Avnindra ***GUPTA***

Purpose: Management of post traumatic effects on the eye is a daunting task for any ophthalmic surgeon. Complications of trauma can involve any intraocular structures all the way from cornea anteriorly to retina and optic nerve posteriorly. Hence, managing these patients requires a multispeciality approach to provide the best prognosis to the patient. Very often, despite a thorough preoperative assessment, on table surprises may challenge a surgeon and test his skills.

Methods: This video highlights these aspects in a 40-year-old male patient who presented to us with a history of blunt injury to the left eye with a stone. He had a visual acuity of hand movements close to face. Preoperative assessment suggested a traumatic cataract with iris dehiscence and organized vitreous hemorrhage. Intraoperatively a zonular weakness about 3-4 clock hours inferiorly was noted. Phacoemulsification was completed under a low vacuum setting and an in the bag IOL was put. Pars plana vitrectomy was completed and the macular pucker subsequently found was opened up. The iris defect was repaired using 10-0 prolene suture with modified Seipser's knot.

Results: Post operatively the patient showed a well formed anterior chamber, a reasonably round pupil.

Conclusions: This video is good example of pole to pole surgery very often needed in post traumatic cases.

Sewing Machine Technique for Repair of a Large Cyclodialysis Cleft

First Author: Manisha ***AGARWAL***

Purpose: To show a novel sewing machine technique of cyclodialysis cleft repair for a 360-degree cyclodialysis cleft caused by blunt trauma.

Methods: A 14-year-old boy with diminution of vision in the right eye to 6/24, N24 following an injury with a badminton racket 4 months back. The applanation tonometry recorded an IOP of 2 mm Hg in the right eye. There was a subluxated lens with an evidence of 360-degree cyclodialysis cleft on gonioscopy. There was hypotonus maculopathy with a hyperemic swollen disc. The boy underwent pars plana lensectomy and anterior vitrectomy and intraoperative gonioscopy to confirm the extent of the cyclodialysis cleft. This was followed by the sewing machine technique of repairing the cyclodialysis cleft using a 26-gauge needle, 30-gauge needle and 10-0 prolene suture. Follow up at 12 weeks showed the IOP was 18 mm Hg and the best corrected visual acuity was 6/9, N6 with +11 D sphere correction.

Results: Cyclodialysis cleft was repaired with build up of the intraocular pressure resulting in resolution of the hypotony maculopathy and improvement of vision.

Conclusions: Successful repair of the 360-degree cyclodialysis cleft with normalization of the intraocular pressure.

Spinning the Web

First Author: Manisha ***AGARWAL***

Purpose: To show the technique of silicone oil retention sutures in aniridic patients thereby preventing the silicone oil from coming into the anterior chamber.

Methods: An 11-year-old one-eyed boy with aniridia and congenital glaucoma developed rhegmatogenous retinal detachment following blunt trauma and a vision of -1/60. He was already on maximum medical management for control of intraocular pressure (IOP) and cup disc ratio was 0.7. He underwent pars plana vitrectomy with silicone oil injection. Silicone oil retention sutures were placed using 10-0 proline sutures through a rail road technique. This avoided the silicone oil entering into the anterior chamber and prevented the cornea from getting compromised and there was no rise of IOP.

Results: Silicone oil removal was done and there was a clear cornea with a well attached retina.

Conclusions: Silicone oil retention sutures are helpful in aniridic patients to prevent the silicone oil from coming into the anterior chamber thereby avoiding a rise in IOP and compensating the clarity of cornea.

Traumatic Eye with Lens Dislocations and Retinal Dialysis

*First Author: Joshua **LUMBANTOBING***

Purpose: To demonstrate a complex management of retinal detachment after blunt trauma with retinal dialysis.

Methods: A 34-year-old male came to our emergency unit after previously hit by several people. His chief complaint was blurry vision in his right eye. Initial visual acuity was hand movement, and a traumatic lens dislocation was found on the examination. ICCE was performed to evacuate the lens and one week after the surgery the retinal detachment was identified on posterior segment evaluation with some vitreous haziness. Proceeding to the second surgery, intra-operatively, there was a retinal dialysis around 4-clock hours and the surgery was performed until the retina was flat and silicone oil was used as a tamponade.

Results: After 3 months from the previous surgery, the silicone oil was evacuated and IOL was implanted. Last follow-up visual acuity reached 6/20 on Snellen chart and retina was flat.

Conclusions: Retinal dialysis is mostly found in traumatic eye and needs special precautions in similar ocular trauma cases. Early management of these cases brought good prognosis.

"Peek a Boo" in Case of Trauma

*First Author: Bhavana **VASUDEV***
*Co-Author(s): Sherine **DSOUZA***

Purpose: To demonstrate management of siderotic bulbi in a case of trauma.

Methods: A 25-year-old male with history of trauma 2 months back presented with features of siderosis bulbi. Intraocular foreign body was not visible on B scan, but showed on CT scan. This case was managed surgically and the video of the same is presented.

Results: Postoperatively there was no intraocular inflammation with retina attached.

Conclusions: In case of trauma vigilance to look out for foreign body by scleral indentation is mandatory as proven by our video.

General Ophthalmology

Assessment of Airflow Dynamics at a Simulated Slit Lamp Examination

*First Author: Bentley **LOGAN***

Purpose: To visually assess airflow dynamics at the slit lamp to understand the function of personal protective equipment.

Methods: Respiratory droplets are the primary mode of transmission SARS-CoV-2, however aerosols may also be implicated. An electronic aerosol generator was used to simulate respiratory particle size visually demonstrating particle movement whilst breathing at the slit lamp and review currently available personal protective equipment during the SARS-CoV-2 pandemic.

Results: The visual assessment of airflow dynamics at the slit lamp highlights the exposure to potential respiratory droplets and aerosols to individuals undertaking slit lamp examinations.

Conclusions: Understanding airflow dynamics at the slit lamp may allow for improved risk management in clinical practice and to assess the effectiveness of implementing personal protective equipment and protocols. Further research is required and expansion into other ophthalmological examination techniques could be beneficial to understand the benefits and limitations of personal protective equipment with exposure to potential respiratory droplets.

Evisceration by Equatorial Sclerotomy Technique

*First Author: Ankita **AISHWARYA***

Purpose: To discuss various techniques and principles of evisceration to restore volume and to prevent enophthalmos with emphasis on evisceration by equatorial sclerotomy technique.

Methods: We used the modified technique of evisceration by equatorial sclerotomy technique.

Results: In this video, we demonstrate evisceration in a 39-year-old male with a painful blind eye following trauma. We use the novel circumferential complete equatorial relaxing incision technique in this patient to allow a larger implant with anterior placement and thus preservation of orbital volume.

Conclusions: It is a simple procedure that allows the placement of a stable and an optimally sized implant following evisceration in the setting of atrophic bulbi or phthisis bulbi.

Kitchen Ophthalmic Surgeon: Surgical Training in the COVID Era

*First Author: John **AKKARA***
*Co-Author(s): Anju **KURIAKOSE***

Purpose: In order to practice ophthalmic surgical skills when routine surgeries have been stopped, ophthalmic surgical residents can practice their skills in the kitchen at home. All types of ocular surgeries can potentially be emulated.

Methods: The kitchen can be converted into a surgical wetlab with some imagination. Dedicated to young ophthalmologists in training, we show the various things we can use to convert a kitchen into an ophthalmic surgical wet lab. There is a method to simulate looking through a microscope, practice superior rectus suture, incision, tunneling, capsulorrhexis, nucleus delivery, trenching, chopping, cortex aspiration and IOL placement using kitchen items. Glaucoma, squint, oculoplasty and cornea surgeries can be practiced using things found in the house. Single-pass four-throw pupilloplasty, iridodialysis repair and other complex techniques can be easily learnt. These tips and tricks will help to make skillful, confident surgeons who take every opportunity to learn.

Results: These techniques demonstrated in the video can be used to practice MSICS, phacoemulsification, trabeculectomy, keratoplasty, pupilloplasty and iridodialysis repair.

Conclusions: This video will be useful for all ophthalmic surgical trainees all over the world especially in times where access to the hospital wetlab is difficult.

Wetlab/Skill Lab Practice using a Smartphone: An Innovative Idea

*First Author: Anniksha **N***
*Co-Author(s): Sanjana **CHILUKURI,** Gowtham **KIM,** Thupalli **LALITHAMRUTHA,** Joshmitha M **S,** Adithya **TELLAKULA***

Purpose: Due to the COVID-19 pandemic, surgical practice for junior residents is becoming a challenge. Many colleges lack wetlabs / skill labs for the residents to practice. Hence here is an innovative idea of setting up our own skill lab at a desired place using a smartphone.

Methods: Materials required: Smartphone, surgical instruments, suture material, holder to support the phone, Thermocol, boiled tomato. Material required are taken. Place the smartphone on the support at a working distance of 15 cm. The phone›s camera works as a microscope.The flashlight from the phone acts as coaxial illumination. The screen acts as an eye piece of a microscope. Looking through the screen, surgical skills can be practiced under the phone.

Results: This helps in practicing surgical techniques like suturing and capsulorrhexis at any desired place with just a smartphone.

Conclusions: This benefits the postgraduate residents to practice surgical techniques in

places where there is a lack of skill labs and lesser number of patients.

When Flags Meet: A Case of Argentinian Flag Sign in the Setting of Phacomorphic Glaucoma, Pathologic Myopia and Vitrectomized Eye

*First Author: John Gabriel **SALAS***
*Co-Author(s): Salvame **ERIKA,** Pormida **KRISTINE,** Jocelyn **SY***

Purpose: To present a case of Argentinian flag sign occurring in a vitrectomized patient with pathologic myopia and phacomorphic glaucoma, highlighting the approach and various challenges encountered.

Methods: Video presentation.

Results: A 37-year-old male, previously vitrectomized and known pathologic myope presented with phacomorphic glaucoma in the right eye (RE). Visual acuity was hand movement with good light projection, intraocular pressure (IOP) was 51 mm Hg. An intumescent lens is inherently at risk for a run-out capsulorrhexis. Meanwhile, a myopic eye and vitrectomized eye presents challenges in anterior chamber (AC) and capsular bag stability among other things (e.g. lens-iris diaphragm retropulsion syndrome). Pre-operative IOP control was achieved. Needle decompression was done, however, an Argentinian flag sign still occurred. Capsulorrhexis was completed and careful removal of lens material was done. Near the end of the case, a posterior capsule rent (PCR) was noted. A sulcus intraocular lens was implanted. Post-operative best corrected visual acuity (BCVA) was 20/63, which was his BCVA prior to cataract development.

Conclusions: An Argentinian flag sign may be prevented with adequate needle decompression of lens, use of adequate viscoelastic device, and double capsulorrhexis technique. The fluctuations in AC and capsular bag seen in myopic and vitrectomized eyes require careful removal of lens material. With a number of anticipated challenges for the case, a careful and thorough pre-operative planning is crucial in producing the best outcomes.

Ocular Oncology & Pathology

En Bloc Resection of a Large Retinal Capillary Hemangioma

*First Author: Vishal **RAVAL***
*Co-Author(s): Srishti **RAMAMURTHY***

Purpose: To demonstrate a unique surgical technique in management of retinal capillary hemangioma.

Methods: A surgical video-based presentation.

Results: A 42-year-old woman was diagnosed with a solitary large retinal capillary hemangioma associated with localized tractional retinal detachment and massive exudation in the macular area. The patient›s workup was negative for Von Hippel-Lindau syndrome.,This video demonstrates a unique surgical technique of 25G chandelier assisted bimanual vitrectomy highlighting feeder vessel ligation, followed by en bloc transcleral endoresection of the tumor with clinicopathological correlation. Surgical pearls during the various steps of surgery are highlighted in this video.

Conclusions: Surgical treatment for large and complex retinal capillary hemangioma is challenging. Bimanual feeder vessel ligation and endoresection of tumor can be an effective treatment in such cases, achieving long term anatomical success.

Pediatric Retina

Improving Diagnostic Accuracy of Pre-Existing Posterior Capsular Defect in Congenital Cataract by using Morphologic and Biometric Testing

*First Author: Madhusmita **MAHAPATRA***
*Co-Author(s): Ankit **AHIR,** Harsha **BHATTACHARJEE,** Nilutparna **DEORI***

Purpose: Analysis of morphologic and biometric markers of pre-existing posterior capsule defects in congenital cataract.

Methods: Children with congenital cataract were included in this study. Diagnostic signs

were analyzed by ophthalmologists. Parameters compared: keratometry, anterior chamber depth, lens thickness, vitreous chamber depth, axial length, corneal diameter and IOP. Predictors of pre-existing posterior capsule defect were determined using univariate analyses.

Results: The study group had reduced lens thickness. Verified by B-scan USG, intra-operative finding of pre-existing PC dehiscence.

Conclusions: Lens thickness is a valuable predictor and presence of morphology is important indicator for pre-existing posterior capsule defect.

Progression of Bilateral Morning Glory Syndrome associated with Unilateral Persistent Fetal Vasculture: A Case Report of Long-Term Follow-Up in an Infant

*First Author: Hongyun **RAN***
*Co-Author(s): Jie **ZHANG***

Purpose: To describe a case of bilateral morning glory syndrome (MGS) associated with unilateral persistent fetal vasculature (PFV) in a 3-day-old neonate.

Methods: A 3-day-old neonate was found with bilateral retinal abnormalities due to neonatal eye screening. Dilated fundus exam showed bilateral optic disc dysplasia with persistent hyaloid vessels in right eye at first. With the progression of the disease, optic disc was enlarged with central umbilication with a similar anomalous radiating peripapillary vascular appearance. The persistent hyaloid vessels in the vitreous cavity of the right eye gradually disappeared. A large amount of exudation could be seen in the posterior pole retina with macular movement in both eyes.

Results: Bilateral vitrectomy was performed in this case. Then the condition of both the neonate's eyes was stable until 1 year old.

Conclusions: This is a rare case that showing the development of MGS and PFV and the relationship between these two diseases. In addition, we completely observed the whole process of the change of persistent hyaloid vessels in the vitreous cavity of a case of MGS associated with PFV.

Salvaging Complications in Stage V Retinopathy of Prematurity

*First Author: Komal **AGARWAL***

Purpose: To demonstrate management of retinal break in a case of stage V retinopathy of prematurity (ROP).

Methods: A 6-month-old child with gestational age of 28 weeks presented with leucocoria in both eyes. Ultrasonography confirmed closed funnel retinal detachment and the child was diagnosed as stage V ROP. Surgery was planned under extremely guarded visual prognosis. After pars plana lensectomy, retrolental membrane was incised. Pre-retinal membrane were carefully dissected bimanually. After sufficient dissection and visualization of disc, a sudden bullous retinal detachment with closure of the funnel was noted towards the pupil. Superonasal break near ora was suspected and careful fluid air exchange was done to open the funnel again. Break was identified near ora and cryopexy was done. Silicon oil was injected and ports were sutured with 8-0 vicryl.

Results: Posterior pole was attached with retinal folds. Silicon oil was removed after 1 month, retina was attached with macular ectopia. On 1 year follow up, retina was attached with macular ectopia. Child showed good visual behavior with following of light.

Conclusions: This video highlights that meticulous dissection is key in preventing complications. In the advent of retinal break, removal of traction, adequate closure by retinopexy and tamponade can salvage these eyes.

Retina (Medical)

Power of Compounding Intravitreal Bevacizumab: Experience from a Tertiary Eye Care Hospital

*First Author: Santosh **SHARMA***
*Co-Author(s): Dr Manavi **SINDAL,** S **SIVARANJANI,** Divya **YADAV,** Dr Nirav **ZALA***

Purpose: To share the long term experience of compounding of intravitreal bevacizumab injections in a tertiary eye care hospital in India.

Methods: Bevacizumab vials that are commercially available are fractionated into smaller quantities into the form of pre-filled syringes in a sterile and aseptic laboratory setting in the tertiary eye care hospital and distributed amongst other affiliated eye care hospitals.

Results: Compounding of bevacizumab was found to be a cost-effective and sustainable practice that benefited more patients at an affordable cost while maintaining high levels of quality and reducing risks of infection.

Conclusions: Compounding of bevacizumab, when done in a sterile and aseptic environment, can be safe and a cost-effective practice, the benefits of which are passed on to needful patients, while also maintaining a low carbon footprint.

Retina (Surgical)

"Lotus Leaf" in Vitreous Cavity: Intra-Operative View of Anomalous PVD

*First Author: Sriharanathan **POOPALARATNAM***

Purpose: To report a case of inactive aplastic anemia presenting with pre-macular fibrosis and vitreous hemorrhage giving rise to «lotus leaf» like appearance during surgery.

Methods: 23G suture-less vitrectomy and partial membrane peeling was done under posterior subtenon anesthesia. There was continuous bleeding which prevented the complete removal of thick fibrous tissue. Fibrous tissue removal was further cumbersome due to tight adherence to papillo-macular bundle region, an impending threat to cause retinal tear at the temporal disc margin.

Results: During the first two postoperative months, there was a persistent vitreous hemorrhage which settled without intervention. Once media cleared, there were scarce improvements in visual acuity. Postoperative OCT and OCTA assessment showed disorganized retinal layers over the fovea with no significant capillary dropouts. Removal of premacular fibrous tissue was decided following motivation of patient as the second bite of the apple.

Conclusions: It is challenging to predict visual outcomes in patients with VH with aplastic anemia due to its chronic and unknown nature. Though the hematologist disregarded blood optimization following assessment of blood panel and clotting profile, we had bleeding, which hindered final membrane removal and vitreous hemorrhage during the postoperative period. Even after re-vitrectomy, central visual acuity didn't improve but anatomical success was achieved. OCT and FA revealed macular ellipsoid and window defects probably due to longterm ischemic or inflammatory events.

A Light in the Dark: A Surgical Approach to Advanced Stage ROP

*First Author: Pormida **KRISTINE***
*Co-Author(s): Jocelyn **SY***

Purpose: To present a surgical approach of stage 5 ROP in a 4-month-old infant.

Methods: Case report.

Results: A 4-month-old infant born at 32 weeks age of gestation with a birthweight of 2.14 kg was brought to our institution for ROP evaluation. On portable slit lamp examination, the right eye was minimally dilating (5mm) with a deep anterior chamber while the left eye was non-dilating with a shallow anterior chamber. Fundus examination of the right eye showed total retinal detachment with no view of the posterior pole while the left eye had poor posterior visualization. B-scan ultrasonography

revealed anterior vitreous opacities with close funnel anterior and posterior retinal detachment of both eyes. Thickened choroid was observed in the left eye. Due to high retinal detachment, the patient underwent scleral buckling, limbal lensectomy and vitrectomy, meticulous bimanual membrane peeling and segmentation, and sodium hyaluronate gel instillation of the right eye. 1 month post-operatively, there was visualization and flattening of the posterior pole but with persistent adherent membranes anteriorly.

Conclusions: Anatomical retinal reattachment rate in stage 5 of ROP is usually low, and hence remains a surgically challenging procedure to a vitreo-retina surgeon and a life-changing process to the patient. However, with the advancement in vitrectomy and a combined surgical technique of scleral buckling, cautious bimanual membrane peeling and viscoelastic gel dissection and tamponade, better anatomical outcomes can be achieved. Long-term monitoring is still warranted to better evaluate the success rate and visual outcomes that can lead to a better quality of life for the child.

A Low Cost Video Endoscope Simulator

*First Author: Ashish **AHUJA***

Purpose: Endoscope-assisted ophthalmic surgery is an old technique, although it has not been widely adopted except for managing difficult cases mostly due to the cost of these devices. We have developed a prototype for a low cost video endoscopic simulator.

Methods: We discuss the utilization of a low cost video endoscope to train physicians. We used the Aurolab Retieye model eyes available for retina laser simulation and endoscopic camera for Android phones available on an e-commerce website. The device is easy to use, 6 mm in diameter, has a built-in light source. You need to download an app on the smart phone after which the function is plug and play.

Results: We used the endoscope camera to capture images inside the Retieye (model eye) after creating an opening for the camera. We also used this device to visualize the optic nerve in a goat's eye in a wet lab.

Conclusions: Our simulator helps to visualize and practice the use of an endoscope for training purposes.

A Novel Cannulated Suture Thread Device for Easy Scleral Fixation of a Multi Piece Intraocular Lens

*First Author: Prabu **BASKARAN***
*Co-Author(s): Simonne **LOBO,** Anand **RAJENDRAN,** Rk **RAMNATH,** Rd **SRIRAM,** Rengaraj **VENKATESH***

Purpose: To describe our novel cannulated suture thread device (SFIX) to achieve adequate intrascleral fixation of the haptic in scleral fixation intraocular surgery (SFIOL).

Methods: The device was used in 30 patients for fixing the haptics in SFIOL procedure. The device primarily consists of three parts: 1. A spatulated needle, 2. A nylon suture, and 3. A polyimide tube. The device is used after exteriorizing the haptics. The haptic is first docked into the lumen of the polyimide tube end of the device. The haptic-tube complex is then pushed intraocularly. The suture end is now used to create a scleral groove transconjunctivally by simply taking a suture bite. The suture thread is then gently pulled. The haptic gets fixed into the suture groove as the device is completely pulled off. The technique does not require any additional forceps, peritomy, flap, flange or glue to fix the haptic, still achieves adequate intrascleral fixation.

Results: The mean postoperative best corrected visual acuity (BCVA) at one month was on par or better than preoperative BCVA. Vision improved beyond 0.5 logMAR in 80% of patients. Two patients had postoperative hypotony, two had dispersed vitreous hemorrhage and one patient had postoperative corneal edema, all of which resolved at 15 days postoperative visit. There were no major complications like retinal detachment, choroidal detachment and dislocation of SFIOL in the postoperative period.

Conclusions: The SFIX may be a simple, safe and cost-effective technique to achieve adequate haptic fixation in SFIOL surgeries.

A Starfish-Story: Surgical Management of Chronic Retinal Detachment with Advanced Proliferative Retinopathy

*First Author: Salvame **ERIKA***

Purpose: To present a video case of chronic retinal detachment with advanced proliferative vitreoretinopathy (PVR) and the intraoperative techniques used to successfully attach retina.

Methods: Video case report/presentation.

Results: A 23-year-old female myope presented with chronic blurring of vision of the left eye. Her right eye is amblyogenic. Visual acuity in the left is light perception. The left eye was hypotonic with occlusio pupillae and no view of the posterior pole. B-scan revealed closed funnel retinal detachment. Patient underwent scleral buckling, lensectomy with aphakia, gauge 23 vitrectomy (pars plana and limbal approach) with retinectomy and silicone oil insertion. A 277 scleral buckle with 240 encircling band was secured and anterior synechiolysis was done with subsequent removal of lens showing membranes near the posterior capsule. The surgery proceeded with posterior capsulectomy and limbal anterior vitrectomy releasing peripheral attachments. G23 trocars were added once adequate space was visualized and proceeded to address PVR membranes. 360 retinectomy was subsequently done, with relaxing incision. Silicone oil was injected after endolaser under air, successfully attaching retina.

Conclusions: Retinal detachment with advanced proliferative retinopathy remains a challenge to vitreo-retina surgeons. Surgical goals should include meticulous removal of membranes to maximize mobility of retina. This video enumerates the intraoperative techniques employed to address surgical challenges associated with advanced proliferative vitreoretinopathy. Despite detailed efforts, retinectomy may be inevitable. This video will also highlight maneuvers used for complex retinectomy.

A Surgical Approach to a Case of Coats Disease with Total Retinal Detachment

*First Author: Paul **SIOPONGCO***

Purpose: To describe the surgical approach to a case of Coats disease with total retinal detachment.

Methods: This is a case of an 18-year-old male who is a diagnosed case of Coats disease in the right eye with total exudative retinal detachment with the retina abutting the posterior lens capsule. He underwent scleral buckling with external drainage of the subretinal fluid, lensectomy and anterior vitrectomy with anterior chamber infusion until it became possible for the insertion of trocars through the pars plana. After which, completion of the vitrectomy was done via pars plans approach. Membrane peeling, internal drainage of the remaining subretinal fluid, silicone oil injection as endotamponade were also done. Endolaser was applied in all areas with visible telangiectatic vessels followed by intravitreal injection of bevacizumab.

Results: From the first post-operative day until the day when the patient last followed up, the retina remained attached with no recurrence of subretinal exudation.

Conclusions: With this case, it was shown that retinal re-attachment is still possible in advanced cases of Coats disease with the use of combined surgical techniques. Laser photocoagulation of the telangiectatic vessels together with the use of intravitreal bevacizumab may be helpful in preventing recurrence of exudation post-operatively.

An Interesting Case of Scleral Buckling Procedure in a Vitectomized Eye

*First Author: Ram **PULIPAKA***
*Co-Author(s): Akhila **SRIDHARAN***

Purpose: The aim of this video is to demonstrate scleral buckling surgery in a vitrectomized eye with iris claw lens.

Methods: A 64-year-old male a known case of diabetes mellitus, hypertension on treatment presented to us with complaints of blurring of vision for distance and near in left eye with a past history of trauma in childhood. He also gave a history of left eye poor vision since childhood. On examination best corrected visual acuity in right eye 20/20, left eye 20/80, intraocular pressure 21 mm Hg and 28 mm Hg. Anterior segment showed cataractous lens changes with superior and temporal zonules lost. Gonioscopy showed angle recession 180 degrees. He was started on anti-glaucoma medication. He underwent left eye lensectomy with vitrectomy with iris claw lens. 6 months later he presented with inferior retinal detachment for which he underwent left eye cryopexy + scleral buckling + subretinal fluid drainage.

Results: This patient underwent buckling surgery, intraoperative surgery was uneventful. Best corrected visual acuity post-operative 1 month improved to 20/60.

Conclusions: In scleral buckling surgery in a vitrecomized eye, challenges due to vitrectomy with gas injection can be avoided.

Battling Fungal Endophthalmitis after Anterior Segment Surgeries with Vitrectomy

First Author: Mae-lynn ***BASTION***
Co-Author(s): Jia Hui ***LEONG,*** *Wan Haslina* ***WAN ABDUL HALIM***

Purpose: To share my surgical experience using vitrectomy to treat fungal endophthalmitis after phacoemulsification and penetrating keratoplasty in which there is a good view (the former) and another in which there was no view due to opaque cornea graft.

Methods: Retrospective review of case notes, surgical records and surgical video recording of two patients with culture positive fungal endophthalmitis.

Results: First case was a healthy 50-year-old lady who underwent uneventful phacoemulsification elsewhere only to develop recurrent hypopyon and intraocular inflammation. Vitreous biopsy at first vitrectomy grew Madurella sp. Second vitrectomy was needed to remove residual fungal hyphae from posterior surface of the iris and capsular remnants. Second case was a 74-year-old lady following right penetrating keratoplasty who developed ulceration at the graft:host interface. The scraping grew a hyaline mould. She needed vitrectomy with KPro temporary keratoprosthesis. Dense anterior inflammatory membranes resulted in iatrogenic tear that was repaired with heavy liquid tamponade for 2 weeks. Both cases had flat retina after 6 months.

Conclusions: Vitrectomy is necessary to win the battle in fungal endophthalmitis after anterior segment surgery. The retina was spared so visual potential can be good. Surgeons should clear all visible fungus with jiggling movements and pay attention to anterior clearance from behind the iris and release of membranes. KPro is excellent for view during vitrectomy. Heavy liquid is a good tamponade agent when dealing with poor retina view under air through a cornea graft. Slow taper of antifungal for up to 3 months post-operatively is helpful in preventing relapse of the disease.

Bug Buster: Reducing the Burden of the Vitreoretinal Surgeon

First Author: Snigdha ***MISHRA***
Co-Author(s): Ayushi ***SINHA,*** *Rengaraj* ***VENKATESH***

Purpose: To highlight the role of intracameral moxifloxacin in reducing the incidence of postoperative endophthalmitis.

Methods: Patients were divided into two groups and postoperative endophthalmitis rate was compared with and without the use of intracameral moxifloxacin.

Results: Historically, most options for antibiotic prophylaxis against bacterial endophthalmitis have been topical and subconjunctival. However, the administration of antibiotics into the anterior chamber after surgery is the most direct method of antibiotic prophylaxis. Cefuroxime and vancomycin were routinely used intracamerally. Although intracameral vancomycin was the most popular antibiotic

in different surveys, its association with hemorrhagic occlusive retinal vasculitis led to many surgeons seeking alternative drugs. Moxifloxacin, being a fourth-generation fluoroquinolone, has a broad spectrum coverage that includes both gram-positive, gram-negative, and anaerobic bacteria. Thus, moxifloxacin was preferred against the other available antibiotics, both because of its commercial availability in India and because of the evidence supporting its safety when injected as an intracameral preparation. It was observed that the rate of post-operative endophthalmitis without intracameral moxifloxacin was 0.08% whereas it was just 0.02% with its use.

Conclusions: With the huge reduction in postoperative endophthalmitis rate, there's also a reduction in the extra cost borne by the provider and the patient. The extra expense of intravitreal injections, vitreo-retina surgeries, multiple investigations, frequent hospital visits and the loss of daily jobs or wages would be much more than the total cost borne by the hospital in their routine IC moxifloxacin prophylaxis and thus offsets the total cost involved in managing postoperative endophthalmitis cases.

Challenges in Management of Giant Retinal Tear with Multiple Subretinal Nuclear Fragments

First Author: Yusra ***ASAD***
Co-Author(s): Avnindra ***GUPTA,*** *Ritesh* ***NARULA,*** *Lalit* ***VERMA***

Purpose: To elucidate the management of multiple small subretinal nuclear fragments without the creation of retinotomies in a case of giant retinal tear.

Methods: A middle-aged male presented to the vitreoretina outpatient department after having undergone an eventful cataract surgery elsewhere with a dropped nucleus and subsequent dimunition of vision. He was found to have a giant retinal tear involving inferior 180 degrees of the retina with an entire nucleus visualized inferiorly and was taken up for vitreoretinal surgery. Upon performing vitrectomy, the nucleus was initially not visible but thereafter seen lurking under the retina on injecting PFCL. Nucleus was then removed using a fragmatome but multiple small fragments still remained under the settled retina. These were then maneuvered from under the settled retina and removed with the help of a diamond duster. Retina was further ironed out followed by laser photocoagulation and direct PFCL-oil exchange with a resultant well settled retina.

Results: Postoperatively the retina was well settled with a stable BCVA.

Conclusions: Successful management of a giant retinal tear with multiple small subretinal nuclear fragments employing the use of a diamond duster in ingenious ways to tackle the challenge.

Chandelier Illumination-Assisted Scleral Buckling: A Boon to New Generation Vitreo-Retinal Surgeons

First Author: Bhavana ***VASUDEV***

Purpose: To demonstrate the usefulness of chandelier in scleral buckling for new generation vitreo-retinal surgeons who don't routinely practice buckling surgery.

Methods: A retrospective surgical case series of 10 eyes of 10 patients who underwent scleral buckling combining the use of chandelier endoillumination and contact wide-angle viewing system with controlled drainage of subretinal fluid using a 26-gauge needle. All of the surgeries were performed by residents being trained in vitreo-retinal surgeries under the supervision of a senior vitreo-retinal surgeon.

Results: Retinal reattachment was achieved after the first surgery in all cases with a mean follow up of 12 months with none of the cases requiring re-surgery. The intra-operative and post-operative complications in these cases were nil.

Conclusions: The chandelier illumination-assisted scleral buckling appears to be a valuable method for managing

rhegmatogenous retinal detachment by a new generation of vitreo-retinal surgeons who have less experience in buckling surgery by aiding in better and easier localization of the retinal breaks. It also aids in overcoming parallaux error thereby achieving a good cryopexy.

Code Red! Surgical Evacuation of Massive Subretinal Hemorrhagic Polypoidal Choroidal Vasculopathy

*First Author: Anand **RAJENDRAN***

Purpose: Massive submacular hemorrhages (SMH), secondary to neovascular age-related macular degeneration (AMD) and polypoidal choroidal vasculopathy (PCV) are one of the most formidable to treat. The rapid rate of photoreceptor debilitation mandates early evacuation of the submacular bleed.

Methods: Fundus evaluation revealed large fresh SMH extending beyond arcades. OCT highlighted large SMH, tall PEDs. FFA/ICG confirmed PCV. Intravitreal ranibizumab (0.5mg) was administered. A week later, vitreous hemorrhage was noted. 3-port 23G pars plana vitrectomy was performed. Temporal to the arcades, utilizing a 40G pipette attached to syringe infusion, multiple localized retinal detachments were created. A curvilinear retinectomy with vitrectomy probe was done. Large submacular clots were evacuated with cutter and soft silicone tip aspirator. Laser photocoagulation, fluid-air exchange was followed by silicone oil infusion.

Results: The immediate postoperative period was uneventful with retina well attached, submacular area having minimal bleed. 2 weeks postoperatively, patient had 6/60 BCVA; well attached retina. 3 months later BCVA improved to 6/18; macula flat with no bleed. 6 months later, BCVA was 6/18 with flat, clear macula; attached retina. OCT ICG/FFA confirmed resolution.

Conclusions: Massive SMHs mandate a surgical solution. The key steps are: a) Use of the 40G pipette infusion allowing atraumatic, controlled retinal detachments; b) A neat curvilinear retinectomy ensures good apposition, minimizing scar tissue; c) 23G vitrectomy probe, along with silicone tip aspirator, is adequate to detach the leathery blood clots. The video demonstrates the nuances and helps demystify a radical procedure that may yield gratifying results as in our case.

Cutting it Close: Surgical Management of Retinal Angioma

*First Author: Aniruddha **AGARWAL***
*Co-Author(s): Vishali **GUPTA,** Jaspreet **SUKHIJA,** Uday **TEKCHANDANI***

Purpose: To report the surgical management of a patient with combined tractional-rhegmatogenous retinal detachment complicating retinal angiomas secondary to Von Hippel Lindau disease.

Methods: Surgical video.

Results: A young Indian girl presented with multiple retinal angiomas and combined retinal detachment. Under local anesthesia, a 240-band (360-degrees) and a segmental 277 buckle (120-degree) was applied inferotemporally. Pars plana vitrectomy with removal of hyaloid and epiretinal proliferation was carefully performed. Perfluorocarbon liquid (PFCL)-assisted peripheral base shaving and inferotemporal retinectomy (with excision of angiomas) was performed. Internal tamponade with silicone oil was done.

Conclusions: Patients with retinal angiomas related to Von Hippel Lindau disease need careful systemic and family screening. Meticulous surgery and postoperative follow-up is needed to improve visual outcomes.

Decoding Failures: Macular Hole Surgery

*First Author: Aayesha **KHANUM***
*Co-Author(s): Thirumalesh M **B***

Purpose: To correlate reconstructive morphological process of macular hole closure with signs seen on optical coherence tomography (OCT) and to determine the factors contributing to failure of macular hole (MH) surgery in post-operative day 1 documented closed hole.

Methods: Retrospective analysis of 19 eyes of 18 patients with large idiopathic MH was done. All patients underwent 23-gauge pars plana vitrectomy with multi inverted internal limiting membrane (ILM) flap technique + ILM peeling up to the arcades (Brilliant blue G assisted) by a single surgeon. Mandatory post-operative prone positioning was given for post-operative day 1. Follow up OCT images on post-operative day 1, 3, 7, 14 and 30 were documented.

Results: All cases reported hole closure on day 1. Failure of surgery was noted for 2 eyes on day 7 with glial plug captured on fundus imaging in one case. Reconstructive morphological changes during closure of hole were documented and it was noted that the integrity of the photoreceptor layer is associated better visual outcomes after MH repair.

Conclusions: Positioning remains the steadfast determinant for favorable outcomes post macular hole surgery. As we noted glial plug in vitreous cavity, it shows that if positioning is discontinued early the chance of ILM plug displacement remains. This is supported by the reconstructive morphological changes noticed on day 3 OCT, showing the active glial proliferative process. It is also concluded that integrity of photoreceptor layer is one of the primary factors determining the visual outcome post reconstructive process.

Epiretinal Membrane: I Find you A-peel-ing

*First Author: Sham **TALATI***
*Co-Author(s): Nivesh **GUPTA,** Navneet **MEHROTRA,** Manish **NAGPAL,** Akansha **SHARMA,** Abhishek **VERMA***

Purpose: To describe various techniques of epiretinal membrane (ERM) removal.

Methods: Nine cases of epiretinal membrane removal surgeries are described.

Results: Epiretinal membrane (ERM) is a fibro-cellular tissue on the inner surface of retina. It may be idiopathic or secondary to trauma, surgery, inflammatory or vascular disease. It may cause no visual symptoms but at times may be symptomatic. In symptomatic patients surgical removal is required for visual gain. This video describes various techniques of epiretinal membrane removal. It also shows the technique of internal limiting membrane removal following ERM removal to prevent recurrences.

Conclusions: Good visualization and proper staining of epiretinal membrane and internal limiting membrane is required for good surgical outcomes.

Fibrin Glue-Assisted Tamponade-Free Macular Hole Closure

*First Author: Mudit **TYAGI***

Purpose: Surgeries for macular hole require the use of intra-operative gases like sulfur hexafluoride (SF6) or perfluoropropane (C3F8). However the use of gases has its own limitations like the risk of elevated intraocular pressure, restriction of air travel and need for post operative positioning. In this video we describe the use of a new surgical technique where fibrin glue was used to help in macular hole closure. No intra-operative gas was used and no post operative positioning was given to the patient.

Methods: Pars plana vitrectomy along with inverted ILM flap surgery was done for a patient with a macular hole of 900 microns basal diameter. After completing the ILM peeling, fibrin glue was placed over the area of peeled ILM to prevent ingress of fluid. No postoperative positioning was given to the patient.

Results: The macular hole had closed at 1 week and the fibrin coagulum had also completely resorbed. The visual acuity of the patient had improved from 20/160 to 20/100 at 1 week.

Conclusions: Fibrin glue-assisted surgery can help in avoiding the use of intra-operative gases and can also prevent the need for post operative positioning in cases of macular holes.

Giant Retinal Detachment: A Sea Shell Configuration

First Author: Vishal ***RAVAL***
Co-Author(s): Ankit ***BHOPALKA***

Purpose: To demonstrate a surgical challenging case of giant retinal detachment with a unique sea shell presentation.

Methods: A surgical video-based presentation.

Results: Giant retinal detachments are defined as full-thickness circumferential tears of more than 90 degrees of the retina associated with vitreous detachment. Their management poses a challenge to vitreoretinal surgeons, as they are unique in their presentation as well as technical difficulties involved. A 25-year-old male with history of blunt trauma to the right eye presented with giant retinal detachment. This video demonstrates a unique 360-degree giant retinal detachment with a closed sea shell presentation. A bimanual 25G chandelier assisted vitrectomy was performed to removed the cortical vitreous adherent along the edges, followed by a direct PFCL-silicone exchange. Surgical pearls during the various steps of surgery are highlighted in this video.

Conclusions: With the advent of wide-angle visualization systems, chandelier assistance, and PFCL, good results can be achieved even in challenging scenarios of giant retinal detachment.

Hide & Seek

First Author: Foo ***MEI LI***
Co-Author(s): Kwong ***KIU***

Purpose: To demonstrate a hidden intraocular foreign body in the anterior chamber.

Methods: Video.

Results: A 65-year-old man was referred to the Vitreoretinal Unit after sustaining a penetrating ocular trauma while cutting grass. There was a paracentral corneal laceration measuring 3 mm. Computed tomography showed a hyperdense intraocular foreign body in the left orbit. Lens extraction was done, and the lens capsule was intact. Pars plana vitrectomy was subsequently performed but no foreign body was found in the posterior chamber. There was a peripheral retina break at 7 o'clock. Further exploration was performed with focal conjunctival peritomy and inspection of the anterior chamber angle with goniolens. An irregular shaped foreign body was seen at the 7 o'clock anterior chamber angle. The metallic foreign body was then removed using intraocular magnet and forceps via anterior approach. Surgery was completed with intraocular lens implantation, endolaser and gas tamponade. Patient recovered uneventfully.

Conclusions: High velocity ocular trauma by projectile objects warrant thorough inspection to locate any foreign body because they may be found in unsuspected sites.

How Big Is Too Big

First Author: Krishnendu ***NANDI***

Purpose: To present a unique case of a large incarcerated intraocular foreign body (IOFB) with traumatic endophthalmitis with retinal detachment.

Methods: A 35-year-old male presented with decrease in vision in left eye after a penetrating trauma. Presenting BCVA was perception of light (PL) in the traumatic left eye. Slit lamp examination revealed evidence of repaired scleral tear at the supero-temporal quadrant (STQ). Posterior subcapsular cataract was present. Fundus examination revealed vitreous exudation and hemorrhages, obscuring the view of retina. CT scan showed a large metallic foreign body lodged in the left eye.

Results: Lensectomy and vitrectomy with intraocular antibiotics was planned. During vitrectomy the main challenge we faced was to induce PVD in the area of IOFB incarceration at SNQ. After core vitrectomy and lensectomy, IOFB was taken out through corneal incision with difficulty. Intraocular foreign body was as large as 22 mm in length. Repeated attempts were made to detach the posterior vitreous in the nasal quadrant but all attempts went in vain. LPFC was used to stabilize posterior retina and further attempts were made to detach posterior

vitreous but were unsuccessful. Ultimately fluid air exchange was performed through the existing superior break and endolaser was done, followed by silicone oil injection. Vitreous biopsy showed Staphylococcus aureus in culture. At 3 weeks postoperative BCVA was CF 4 meters and AT was 18 mm Hg. Fundus revealed an area of bare sclera at supero-nasal area.

Conclusions: At 2 months postoperative vision was improved to 4/60.

Indications and Techniques of Endoscopy-Assisted Pars Plana Vitrectomy in a Tertiary Government Hospital: A Case Series

*First Author: Camille **ZABALA***

Purpose: To identify the indications for the use of endoscopy-assisted pars plana vitrectomy and to describe the intraoperative surgical techniques.

Methods: This is a case series showcasing the different intraoperative uses of endoscopy-assisted vitrectomy in a tertiary government hospital.

Results: The endoscope was used for 2 basic indications. Firstly, it was used to aid posterior segment surgery among patients with media opacities that limit the use of conventional viewing systems: 1) pars plans vitrectomy (PPV) for an anteriorized cataractous lens with intractable intraocular pressure elevation; 2) PPV and panretinal photocoagulation in a patient with advanced peripheral ulcerative keratitis and proliferative diabetic retinopathy in order to optimize the success of a planned penetrating keratoplasty; 3) retinal re-detachment repair and peeling of endocyclitic membranes in a patient with beginning phthisis due to ciliary shutdown; 4) PPV for a pediatric patient with persistent fetal vasculature and anterior segment dysgenesis. The second indication for the use of the endoscope is to visualize the peripheral retina and other structures: 1) to locate a missing glaucoma drainage tube in a post penetrating keratoplasty patient with suboptimal intraocular pressure control ; 2) locating a missing natural lens after severe blunt eye trauma; 3) PPV for a patient with stage IVB retinopathy of prematurity.

Conclusions: The endoscope is a valuable tool as it enables us to perform posterior segment surgery despite compromised visibility and media opacities. It also aids in visualizing peripheral structures, and is very helpful during retinopathy of prematurity detachment and other pediatric vitrectomy surgeries.

Innovative Models for Vitreoretinal Training during COVID Times

*First Author: Roshni **MOHAN***
*Co-Author(s): Mimansaa **AGASTI,** Kanika **CHABBRA,** Sivateja **CHALLA,** Megha **NAIR***

Purpose: Vitreoretinal training has been badly affected during COVID times and hence resident and fellow training in lasers and surgery has taken a backseat. Simulators form a major part of surgical training but are costly and not available in most centers. We propose two cost effective, simple models for laser (RETILAPP) and vitreoretinal surgery training (RETISURGE). We also discuss the merits of these models that we have successfully used during these tough times.

Methods: For the development of laser model eye, we have used a ping pong ball. Retinal diagram has been printed on an A4 sheet using MS Paint and fitted inside the ball and used. For the development of model eye ball for surgery, 3D printing and simple available materials are used to make a cost effective model.

Results: These models are easily available, cost effective and reproducible in contrast to simulators and wet lab training. Surgical skills like endolaser and stereopsis, hand eye foot coordination, non-dominant hand training and flexibility can easily be achieved because these models can be used in the operating room with a BIOM. The same instruments as in the operating room can be used. Laser training for focal, grid and barrage laser can also be attempted and the used film discarded for a new one. The power settings are comparable to the human eye.

Conclusions: RETILAPP and RETISURGE are two simple innovations that are futuristic and would help a lot for vitreoretinal training.

Intraocular Lens Rescue and Intrascleral Fixation using 6'0 Polypropylene Suture

*First Author: Mun Wai **LEE***

Purpose: To illustrate a technique for rescue of subluxated or dislocated intraocular lens and subsequent intrascleral fixation using 6›0 polypropylene suture.

Methods: Surgical video to illustrate the use of this technique in 2 different scenarios involving subluxation of a single piece intraocular lens/ bag complex in one scenario and a dislocated PMMA scleral-fixated intraocular lens in another.

Results: The intraocular lenses were successfully rescued and intrasclerally fixated in each case with good lens centration and stability.

Conclusions: Using 6›0 polypropylene suture to fixate a subluxated or dislocated single piece intraocular lens provides good lens stability and centration.

Large Macular Hole: A Novel Cabbage Closure Technique

*First Author: Ajay **AURORA***

Purpose: To describe a novel technique ensuring consistent type 1 closure of large macular hole.

Methods: We describe eight eyes with large macular holes (more than 800 µm) that underwent multiple leaf inverted ILM (internal limiting membrane) peel that were reposed on the macular hole like cabbage leaves ensuring that the vitreal surface of the flap above adhered to the retinal surface of the flap below ensuring a hook-and-loop fastener closure of the inverted ILM flaps without the need to stuff ILM into the macular hole. The sequential OCT and OCTA images were done to understand the macular hole closure.

Results: All holes had a type 1 closure with improvement of VA by 2-4 lines.

Conclusions: The cabbage closure of macular hole with the inverted ILM flaps uses the principle of hook-and-loop fasteners (Velcro tape) and may be used for all macular holes to achieve consistent type 1 closure. This is based on the electron microscopic characteristics of ILM.

Management of Occult Posterior Globe Rupture

*First Author: Mohd Faizal **ZOKRI***
*Co-Author(s): Dian **ABU TALIB,** Siti Husna **HUSSEIN,** Mushawiahti **MUSTAPHA,** Ainal Adlin **NAFFI,** Othmaliza **OTHMAN***

Purpose: To report the management of occult posterior globe rupture which was detected during vitrectomy.

Methods: A case report.

Results: A 54-year-old man presented with history of right eye poor vision for 3 months with no prior history of trauma. Anterior segment was normal. He was diagnosed with subtotal bullous RRD with no apparent tear seen. Vitrectomy was commenced and upon exploration, there was posterior globe rupture with retinal and vitreous incarceration. Suturing of the scleral wound was done with heavy liquid in situ. Orbital imaging post-surgery revealed the presence of intraorbital foreign body. We will be sharing our video of intraoperative management.

Conclusions: This is an unusual presentation of posterior globe rupture. Not only it was unnoticed by the patient but there was lack of evidence on the anterior segment findings. Detection of posterior globe rupture remains a challenge which requires a high index of suspicion with appropriate management.

Managing Full Thickness Macular Hole in Presence of "Scary Blues": My Multimodal Approach

*First Author: Kushal **DELHIWALA***

Purpose: To demostrate the role of combining different techniques for closure of full thickness macular hole (FTMH) when ILM peeling is limited secondary to inadequate staining.

Methods: A 65-year-old pseudophakic female underwent pars plana vitrectomy for large FTMH in right eye. Intraoperatively pre-existent PVD was noted. ILM was stained with BBG dye initially under air due to low contrast from tessellated background. Following initiation of ILM peel using loop and patchy stain, dye was re-injected twice under fluid for repeat staining. At this stage, dye filled from 2 separate vials turned out to be heavily particulated and did not help in further staining. Hence, limited ILM peel around hole was possible and the raised ILM flap was subsequently inverted over hole. This was followed by overlaying of pre-retinal blood clot from adjacent peel area. Following fluid-air exchange, ILM flap was repositioned and hole edges were massaged under air. Surgery was completed using 14% C3F8 gas.

Results: Following surgery, it was observed that the particulate dye provided accidentally by the assistant was trypan blue 0.06% w/v instead of BBG 0.05% w/v. Despite minimal ILM peel, type 1 FTMH closure was noticed on SS-OCT at postoperative day 9. BCVA improved from 20/200 at baseline to 20/80 at 8 weeks with closed FTMH.

Conclusions: ILM staining dyes should be checked for particulate composition by injecting a few drops outside the eye. Combination of various techniques known for closure of full thickness macular hole can be a savior in scenarios where adequate ILM peeling is not possible.

Managing a Case of Rhegmatous Retinal Detachment with Kissing Choroidals

First Author: Sandeep ***KUMAR***
Co-Author(s): Gagan ***BHATIA,*** *Charu* ***GUPTA,*** *Daraius* ***SHROFF***

Purpose: To demonstrate drainage of kissing choroidals in a case of suprachoroidal hemorrhage (SCH) with rhegmatous retinal detachment (RRD).

Methods: An anterior chamber infusion was placed after tagging the four rectii. A sclerotomy incision was made between equator and muscle insertion. The incision location was decided with the help of preoperative USG B scan and the draining was done at the highest bullous area of choroidal detachment; when this failed other sites of drainage were also performed. 25G vitrectomy was done after draining the choroidals. A bimanual technique for membrane subretinal band removal stripping followed by silicone oil tamponade and a 360-degree endolaser aided in flattening of retina.

Results: Postoperatively the retina was attached. The mild choroidal detachment remaining settled over the next 8 weeks. The patient achieved a BCVA of 20/200.

Conclusions: SCH with RRD is a serious eye situation. Meticulous localization and drainage of kissing choroidals guided by prior ultrasound is helpful. A bimanual technique for membrane stripping helps in management of taut membranes and hyaloid strands and helps in flattening of retina.

Mechanism and Advancements in Subthreshold Laser Treatment for Retinal Pathologies

First Author: Joshua ***ONG***
Co-Author(s): Jay ***CHHABLANI,*** *Amrish* ***SELVAM***

Purpose: Subthreshold laser therapy has regained interest in recent times with advancing technology and newer delivery systems. There is a lack of comprehensive knowledge platforms for current subthreshold laser therapy systems, in addition to many longstanding questions of this laser therapy in clinical practice. An update on this therapeutic option is a timely need. Recent clinical trials and inclination towards retinal restorative therapy is bringing subthreshold laser therapy to the forefront of treatment options for many retinal disorders. This video critically reviews the fundamentals and mechanisms of subthreshold laser treatment, the merits and challenges with available subthreshold laser delivery systems, and reports advancing clinical applications. The video also showcases subthreshold laser therapy in action as well and reviews important laser settings when utilizing

the technology. We aim to provide treatment algorithms for common diseases such as central serous chorioretinopathy and diabetic macular edema. We also clarify common, longstanding questions about subthreshold laser therapy and provide practical tips for clinicians on this advancing technology.

Methods: Video abstract.

Results: Video abstract.

Conclusions: Video abstract.

Modified Illuminated Scleral Depressor: A Cost-Efficient Instrument for Unassisted Peripheral Vitrectomy

*First Author: Wilson **WONG***

Purpose: Multiple reports have described the use of a standard light pipe for simultaneous scleral indentation and transillumination of the retina to enable unassisted peripheral vitrectomy. Specialized light pipe adapter sleeves have been developed to improve the safety and effectiveness of scleral transillumination. However, these commercial adapters are not readily available in all countries and associated with significant cost per unit. To demonstrate a cheaper and more accessible alternative, we assembled a scleral transilluminator device using a modified cotton swab as a disposable light pipe adapter.

Methods: Our device is easy to assemble, consisting of instruments routinely used in vitreoretinal surgery. A sterile cotton swab is trimmed at the base with a pair of sterile scissors to a total length of 30mm. The light pipe is then inserted directly into the back end of the modified cotton tip to create the novel instrument.

Results: To date, we have applied the modified illuminated scleral depressor in more than twenty vitrectomies. We found that our modified device provided adequate transillumination of the peripheral retina that is comparable to other commercially developed products. No complication, such as scleral perforation or conjunctival trauma, were encountered.

Conclusions: Our modified device provided adequate transillumination of the peripheral retina that is comparable to existing commercially developed products.

Not so Minimal for Minimally Invasive Surgery

*First Author: Arpitha **R***
*Co-Author(s): Rajesh **RAMANJULU***

Purpose: Submacular hemorrhage poses a potential threat to vision, if left untreated. Preferred treatment technique includes vitrectomy followed by retinotomy using 41G needle with subsequent injection of recombinant tissue plasminogen activator (r-tPA) followed by air/SF6 injection into subretinal space. Malleable nature, increased resistance and the costs of 41G needle limits its use. We evaluated the safety and efficacy of 26G needle as a supplement for 41G needle.

Methods: In a series of six subjects, we evaluated the efficacy of using 26G needle for retinotomy, with subretinal injection of air followed by r-tPA.

Results: Usage of 26G needle for retinotomy is self-sealing with effective drug delivery.

Conclusions: Our technique of using 26G needle for retinotomy is effective and non-inferior as compared to 41G due to its stable nature and self-sealing properties. Air injection prior to r-tPA allows for increased bioavailability of drug by preventing the efflux by its tamponading effect.

O Magnificent Mag

*First Author: Sherine **DSOUZA***

Purpose: To demonstrate the usefulness of high magnification lens in VR surgery.

Methods: Retrospective case series of 10 patients demonstrating the vitreoretinal surgical steps such as posterior vitreous detachment, internal limiting membrane and epiretinal membrane peeling, dissection and peeling of fibrovascular proliferative membranes in tractional retinal detachment on high

magnification lens as compared to wide field lenses.

Results: Membranes were handled with high accuracy as compared to wide field lens due to better visibility and depth perception. Formation of iatrogenic breaks was less under high magnification lenses as compared to wide field lenses.

Conclusions: Wide field lens has 120-135 degree field and magnification of 0.396 as compared to macular lens with 50-60 degree field of view but 1.0 magnification. High magnification lenses are a better option especially in handling membranes at the macula due to better depth perception, lower risk of iatrogenic break formation and thus higher safety profile in handling complex retinal surgeries.

Pars Plana Vitrectomy and Intraocular Foreign Body Removal through a Temporary Keratoprosthesis

*First Author: Ronald Gonin **PARAAN***

Purpose: To report a case of a 49-year-old male with a scleral perforating injury and a metallic intraocular foreign body (IOFB) who underwent pars plana vitrectomy and foreign body removal with the aid of a temporary keratoprosthesis (T-KPRO).

Methods: The severely opacified cornea prevented the proper visualization of the vitreous cavity during surgery. A 7.0 mm central corneal button was removed and a 7.25 mm T-KPRO was sutured in place with braided polyfilament sutures. A Malyugen ring was also placed to dilate the pupil. Through the clear T-KPRO, 23-gauge pars plana lensectomy and vitrectomy was then done. The location of the IOFB was then determined and extracted anteriorly with a magnet. Endodiathermy was done for hemostasis and applied to the borders of retinal tears. Endolaser was applied around the areas of the tears. Fluid-air exchange was done, and silicone oil injected. A 3-piece sulcus intraocular lens was implanted prior to keratoplasty with the corneal autograft. Air was then injected into the anterior chamber to keep it formed.

Results: Pars plana vitrectomy and foreign body removal were done successfully through the clear view and consistently formed globe provided by the T-KPRO. Long-term assessment was hindered by the COVID-19 pandemic.

Conclusions: The use of a T-KPRO during retinal surgery is a viable way to approach cases wherein the presence of a corneal opacity would otherwise preclude performing such a procedure. The T-KPRO provides a clear view of the vitreous cavity, posterior pole, and even peripheral retina.

Plug it, Fill it and Forget it!

*First Author: Arpitha **R***
*Co-Author(s): Rajesh **RAMANJULU***

Purpose: To evaluate the efficacy of gelatine foam as an alternative to scleral patch graft in cases with perforation of posterior sclera.

Methods: In this case report, we report the case of a double intraocular metallic foreign body with scleral perforation noted post removal of second foreign body, managed with absorbable gelatine based foam to plug the defect as an alternative for scleral patch graft.

Results: Gelatine foam was found to effectively plug the defect, with good anatomical and functional outcome.

Conclusions: Usage of absorbable, readily available gelatine based foam was found to be as effective as sclera patch graft in plugging scleral defect, with advantages of not necessitating its removal. This would be of great use in places where the donor sclera is not readily available.

Potpourri of Surgical Retina Cases

*First Author: Andrew **TSAI***

Purpose: To showcase removal of intraocular foreign bodies (IOFB) using small gauge vitrectomy techniques, and to emphasize the importance of lifting of the posterior hyaloid, with the aid of chromovitrectomy.

Methods: Annotated surgical video presentation of three cases that showcases removal of IOFBs and lifting of the posterior hyaloid with the aid of membrane blue DUAL.

Results: Successful management of IOFB using small gauge vitrectomy techniques.

Conclusions: IOFBs can be removed via small gauge pars plana vitrectomy with minimal damage to other ocular structures. Intraocular dyes are usefel to aid visualization when performing a surgical posterior vitreous detachment.

Refixating Subluxated 3-Piece SFIOL in Vitrectomized Eye: The Road not Taken

First Author: Kushal ***DELHIWALA***

Purpose: To demonstrate surgical approach for refixating subluxated 3-piece scleral fixated IOL in a vitrectomized eye secondary to haptic slippage following presumed breakage and shortening.

Methods: A 46-year-old pseudophakic male presented with left eye blurring and crescentric shadowing for past 1 month. He underwent vitrectomy 2 years before for subluxated IOL-bag complex removal along with sutureless, flapless scleral fixation (tucking) of 3-piece intraocular lens (SFIOL). Presenting BCVA was 20/60. Anterior segment revealed nasal subluxation of SFIOL following temporal haptic slippage due to suspected breakage and shortening. Patient underwent refixation of SFIOL. Limited conjunctival peritomy was done superotemporally and AC maintainer was fixed inferiorly. Placing chandelier illumination inferonasally, max grip forceps was introduced intravitreally via superonasal sclerotomy and subluxated haptic was fed intravitreally into 30G needle introduced superotemporally 1.5 mm from limbus. Haptic was externalized with gradual 30G needle withdrawal. However, additional tip breakage of externalized haptic was noticed as a result of kinking, reducing its length further. Remaining length of externalized haptic was stabilized by making flange using heat cautery and was supported by passing 7-0 vicryl cross suture around it.

Results: SFIOL was refixated and was stable in follow up. However, it was associated with decentration. This could be attributed to suboptimal haptic externalization maneuver which led to further breakage of available haptic length. Creating flange of available haptic seems to be the only alternative in such case scenarios, taking care not to create unnecessary tension at opposite stable optic-haptic junction.

Conclusions: Refixating subluxated SFIOL with shortened haptic can be challenging and needs gentle maneuvering. Creating a haptic flange seems helpful in such scenarios.

Role of Small Gauge Proportionate Reflux (SGPR) Assisted Hydro-dissection in Elevated Symptomatic Vitreo Foveal Traction (VFT)

First Author: Subhendu Kr ***BORAL***

Purpose: To describe a new technique to release the elevated symptomatic Vitreo-Foveal Traction (VFT).

Methods: This was a retrospective, interventional case series where a new technique of hydro-dissection by Proportionate Reflux (PR) property of modern small gauge vitrectomy cutter was used in cases of elevated symptomatic VFT as evident on Optical Coherence Tomography. Quadrant of Maximum Hyaloid-Retina Distance (MHRD) was identified on OCT. Cases were operated by a 27G/25G vitrectomy system. After the vitrectomy, an opening was made in the taut posterior hyaloid face around the foveal elevation in the quadrant showing MHRD. Then the cutter tip was insinuated inside the hyaloid opening and the port opening was directed towards the tip of the fovea at its hyaloid attachment. The PR property of the cutter was then used to cause reflux of cassette fluid. The hydrostatic force thus generated separates the vitreofoveal attachment. The endpoint was the separation of VFT.

Results: Small gauge PR-assisted hydro -dissection in cases of elevated symptomatic VFT resulted in significant flattening of foveal elevation with a significant visual gain after the

intervention. This technique was demonstrated in multiple situations of elevated symptomatic VFTs. No complication was noted after surgery.

Conclusions: Small gauge PR-assisted hydro -dissection is a new, safe technique for the management of elevated symptomatic cases of VFT.

Surgical Management of Traumatic Cataract, Endophthalmitis and Retinal Detachment due to Retained Intraocular Foreign Body

*First Author: Huma **SAIGOL***
*Co-Author(s): Seemab **AKBAR***

Purpose: Intraocular foreign body (IOFB) is a cause of visual disturbance. In addition, it can cause ocular pain, endophthalmitis, cosmetic disfigurement and sympathetic ophthalmitis. It should be managed as an emergency to prevent this cascade of ocular events. This video shows the surgical procedure of corneal repair, phacoemulsification, IOFB removal in the lens followed by 23-gauge pars plana vitrectomy to clear endophthalmitis, retinal reattachment and silicone oil tamponade along with endolaser application. The purpose is to highlight the importance of performing the surgical procedure in one go to get better postoperative results and reduce number of hospital admissions and theatre procedures.

Methods: Surgical procedure performed under general anesthesia. Corneal wound repair with 2 10/0 nylon sutures, followed by phacoemulsification IOFB removal via limbus as localized with CT scan to be in anterior segment. Once IOFB was removed, 23-gauge pars plana vitrectomy for endophthalmitis and epiretinal membrane peeling done. Retinal detachment and localization of the retinal break was done. A round inferior break identified. Heavy liquid was injected to stabilize macula. Fluid-air exchange to drain subretinal fluid through inferior break. Endolaser around the inferior retinal break. Air-silicone oil tamponade was done to stabilize retina. Scleral ports were closed with vicryl 6/0. Sub-coonjunctival injection of antibiotic-steroid was injected and eye pad applied.

Results: Each follow up, retina was attached with no postoperative endophthalmitis.

Conclusions: IOFB is an ocular emergency and requires prompt surgical treatment for removal and prevention of cascade of ocular events. Treatment by combining procedures is tedious and requires surgical expertise.

Surgical Outcomes of Pars Plana Vitrectomy associated with Retropupillary Iris-Claw Intraocular Lens Implantation

*First Author: Linh **PHAN***
*Co-Author(s): Tung **NGO***

Purpose: To assess outcomes of PPV (pars plana vitrectomy) with ICIOL (iris-claw intraocular lens) implanted in the retropupillary position for correction of aphakia in several conditions without adequate capsular support.

Methods: A prospective, non-randomized control study of consecutive 173 eyes of 172 patients in which we performed retropupillary ICIOL implantation in luxated or subluxated crystalline lens (49 eyes, group 1), dislocated intraocular lens (79 eyes, group 2), post-cataract surgery aphakia (17 eyes, group 3) and in cases with prior PPV (28 eyes, group 4). Either prior or same-day PPV procedures were performed with 23-gauge technique for different associated anterior or posterior segment indications. The refractive outcome, anatomical outcome, long-term stability of the implants, and possible long-term complications are reviewed.

Results: The mean patient age was 56.9 years (range, 19–93 years). The mean follow-up time was 9.3 months (range, 3 to 19 months). At the end of the follow-up period, BCVA improved in all patients. The mean post-operative best-corrected LogMAR visual acuity was 0.17. Ten cases had transient elevated intraocular pressure. One eye presented with choroidal hemorrhage and one with hyphema. Disenclavation of one haptic occurred in one case. Neither case of retinal detachment nor uveitis was observed. The lens position was analyzed using UBM and was found to be parallel to the iris plane in all cases at the end of follow-up.

Conclusions: Either primary or secondary retropupillary ICIOL implantation is an effective and safe procedure to correct aphakia in vitrectomized eyes without capsular support.

Surgical Toolkit for Human Amniotic Membrane Graft in Vitreoretinal Surgery

*First Author: Daraius **SHROFF***
*Co-Author(s): Stuti **ASTIR,** Gagan **BHATIA,** Dilraj **GREWAL,** Sandeep **KUMAR,** Cyrus **SHROFF***

Purpose: To propose a simplified technique for implanting human amniotic membrane grafts during vitreoretinal surgery, based on three S's: sizing, staining and sliding.

Methods: The authors illustrate tips and tricks to simplify shaping, handling and placement of cryopreserved human amniotic membranes in vitreoretinal surgery. OCT based sizing of the graft using a dermal trephine, brilliant blue staining for orientation and visualization along with a bimanual sliding technique simplified and added safety and standardization to the surgical procedure.

Results: These simple steps allow predictable control of human amniotic membranes intraoperatively. They also help with accurate and atraumatic graft placement which is key to a good anatomical and functional outcome.

Conclusions: Human amniotic membrane grafting has recently gained popularity among vitreoretinal surgeons for managing challenging cases. However, there is a hesitancy in adopting this technique due to difficulty in handling the graft. Using the simple surgical tips described in our video would allow easy adoption of this technique when indicated using a standardized set of surgical steps described in our surgical toolkit.

Tackling Submacular Hemorrhage: Big, Bigger, Biggest!

*First Author: Mohit **DOGRA***
*Co-Author(s): Ramandeep **SINGH,** Simar Rajan **SINGH***

Purpose: To highlight the surgical technique and outcomes of vitrectomy with subretinal tissue plasminogen activator (tPA)+air injection and partial gas tamponade with propped-up positioning in patients with large to massive sized submacular hemorrhage (SMH).

Methods: 3 patients with varying sizes of SMHs, namely big, 4 disc diameters (DD); bigger, 8DD; and biggest, 16DD; who had undergone 25-gauge vitrectomy with subretinal tPA (0.3ml of 12.5micrograms/0.1ml) and air (0.3-0.4ml) injection followed by partial sulphur hexafluoride (18%) gas tamponade and propped-up postoperative positioning were included.

Results: 2 patients had SMH secondary to a ruptured retinal arterial macroaneurysm (RAM) while the one developed it due to polypoidal choroidal vasculopathy (PCV). All 3 patients had complete displacement of SMH at three months follow-up with visual acuity improving dramatically in both patients with RAM related SMH. The patient with PCV related SMH had a modest improvement in visual acuity. None of the patients had any intraoperative or postoperative complications.

Conclusions: Vitrectomy coupled with submacular pneumatic displacement and tPA is an efficient surgical technique to successfully displace SMHs ranging from 4DD up to 16DD in size.

Tips and Tricks in Intraocular Foreign Body Removal

*First Author: Pormida **KRISTINE***
*Co-Author(s): Jubaida **AQUINO,** Jocelyn **SY***

Purpose: To present surgical approaches in managing intraocular foreign body removal.

Methods: Surgical video.

Results: Intraocular foreign body (IOFB) removal presents surgical challenges and different approaches. Here are some tips and tricks that can serve as a guide in IOFB removal. First, lens removal is done for better posterior visualization. Avoid hydrodissection especially if posterior capsular integrity cannot be assured. Second, complete pars plana vitrectomy by inducing posterior vitreous detachment to prevent retinal tears and traction. Third,

injection of perfluorcarbon liquid to protect the retina. Fourth, gently dislodge the IOFB in embedded or encapsulated foreign body. Fifth and sixth, anteriorize the IOFB using handshake technique by using intraocular magnet or forceps and retrieving it through clear cornea or scleral incision. Seventh, 360 scleral indentation to check for any retinal tears or detachment. Eight, manage the retinal detachment or tears through scleral buckling, endolaser, and tamponade such as silicon oil or gas. Ninth, intraocular lens placement may be done if no retinal detachment was appreciated. Lastly, injection of intravitreal antibiotics and monitoring for signs of ocular sideorisis.

Conclusions: Intraocular foreign body removal is a complex procedure requiring early intervention, patient counseling, careful surgical planning and close post-operative monitoring to achieve better visual outcome and prognosis.

Two-Staged Surgery with Short-Term PFCL Tamponade for Management of RD Secondary to RPE Tear

First Author: Naresh ***KANNAN***
Co-Author(s): Piyush ***KOHLI***

Purpose: To report the outcome of two-staged surgery for the management of retinal detachment (RD) secondary to retinal pigment epithelium (RPE) tear.

Methods: A 43-year-old male presented with metamorphopsia for two months. His bilateral best-corrected visual acuity (BCVA) was 20/20. Right eye examination showed a subfoveal pigment epithelium detachment (PED), measuring 1160 microns on optical coherence tomography (OCT). He received one intravitreal aflibercept (2mg/0.1mL) injection following which his symptoms and height of the PED reduced (1160 microns). However, second intravitreal aflibercept injection led to a grade 3 RPE tear and associated subtotal bullous RD. His BCVA reduced to 20/200. He underwent 23-gauge pars plana vitrectomy, posterior vitreous detachment induction, scrolling of RPE to its normal position with the help of diamond-dusted membrane scraper, internal limiting membrane peeling, fluid air exchange and post-operative perfluorocarbon liquid (PFCL) tamponade. He was advised supine position. Five days later, he underwent PFCL removal and silicone oil tamponade.

Results: One-month post-surgery, his BCVA improved to 20/40. Examination showed an attached retina with complete subretinal fluid resolution and repositioning of the RPE on OCT. There were no post-operative complications like intraocular pressure spike, exaggerated inflammation or cataract progression.

Conclusions: Short-term PFCL tamponade prevents RPE from slipping back and helps iron out subretinal fluid completely. It can safely be used as a short-term post-operative tamponade in complicated RD without increasing the risk of any complications.

Unfolding Falciform Folds and Their Consequences ... To Touch or Not to Touch

First Author: Subhendu Kr ***BORAL***

Purpose: To evaluate the efficacy of a new innovative approach to managing the cases with congenital falciform folds.

Methods: This video will demonstrate the innovative surgical techniques to remove both pre-retinal and sub-retinal adhesions to unfold these folds, managing its consequences and visual recovery. Pre-retinal adhesions can be relieved by vitrectomy with removal of vitreous bands and adhesions, ILM peeling, and mechanical stretching by Tano scraper or Finnesse flex loop. For subretinal adhesions, subretinal stretching by subretinal injection of BSS by 38G/41G subretinal cannulas beside the falciform fold, away from the fovea, can result in flattening of the fold.

Results: This innovative approach resulted in the flattening of the falciform fold. Post-operative retinal detachment due to macular hole formation is a major complication. Silicone oil tamponade is necessary when these cases are associated with retinal detachment. Post-

operatively there is flattening of the falciform fold along with visual recovery.

Conclusions: Falciform folds are congenital tractional retinal folds, having very poor visual potential. This innovative surgical technique to remove both pre-retinal and sub-retinal adhesions to unfold these folds results in considerable visual recovery.

Unfolding the Retinal Fold: Tackling Post Traumatic Retinal Incarceration and Fold in an Attached Retina

First Author: Ritesh ***NARULA***
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Purpose: Tackling fixed retinal folds is a significant surgical challenge for any VR surgeon especially if it occurs in an attached retina. This video highlights the steps taken to manage one such case of post traumatic retinal fold with incarceration following scleral tear repair.

Methods: A 24-year-old male patient presented with history of penetrating trauma and corneo-scleral tear repair done to the right eye. Anterior segment was disorganized and nasally compressed suggestive of tissue loss due to trauma and subsequent tight suturing. Partially absorbed cataractous lens, vitreous hemorrhage was noted. Pars plana approach was used to first to clear the anterior segment and then vitreous hemorrhage. Fundus examination revealed an attached retina with a large retinal fold nasally from disc to the nasal periphery and the fovea was pulled and crumpled close to disc. Scleral tissue loss and tight repair had led to globe shortening and incarcerated vitreous had pulled the nasal retina into a fold. A 38G subretinal cannula was used to induce 360-degree retinal detachment and the fovea was unfolded to its position. After stabilizing the posterior pole with PFCL, the nasal retina was shortened to match the shortened sclera. A 360 degree laser was done and subsequently PFCL-silicon oil exchange was carried out.

Results: At 1 month post operative the patient had an attached retina with flat macula. He had a BCVA of 6/36 with high cylindrical correction.

Conclusions: Retinal folds are tough to handle. Good pars plana vitrectomy with careful unfolding can provide a good result.

Vitreoschisis: Invisible but not Invincible

First Author: Hemanth ***MURTHY***

Purpose: To describe the problem of vitreoschisis in vitreoretinal surgery.

Methods: Vitreoschisis is lamellar separation of the posterior vitreous cortex. This is due to anomalous posterior vitreous detachment and is implicated in various vitreo-retinal interface disorders. This invisible danger is the frequent cause of adverse outcomes in surgery for high myopes and in patients undergoing surgery for vitreous hemorrhage or tractional detachment in diabetics.

Results: This video demonstrates the challenge in detecting vitreoschisis during surgery and elegant methods in detection and removal of the vitreous cortex. In patients of diabetic non resolving vitreous hemorrhage after clearing the hemorrhage and schitic vitreous cortex is frequently found by staining with triamcinolone. In patients of myopic foveoschisis and macular hole detachment, vitreoschisis is frequently detected and needs repeated staining with triamcinolone to identify the vitreous cortex.

Conclusions: Strong suspicion is necessary to detect vitreoschisis during vitreo-retinal surgery. Triamcinolone staining helps identify the invisible cortex especially in cases of high myopia and diabetic vitrectomy.

In-Design Data End