



2020 COS Annual Meeting | Congrès annuel de la SCO 2020
Abstract Booklet | Livre des résumés
Paper (Oral) Presentations | Présentations orales

By subspecialty | Par surspécialité

1. Cataract Surgery | Chirurgie de la cataracte
2. Cornea, External Disease and Refractive Surgery | Cornée, maladies externes et chirurgie réfractive
3. Glaucoma | Glaucome
4. Neuro-ophthalmology | Neuro-ophtalmologie
5. Oculoplastic & Reconstructive Surgery | Oculoplastie et chirurgie reconstructive
6. Paediatric ophthalmology and strabismus | L'ophtalmologie pédiatrique et strabisme
7. Public Health and Global Ophthalmology | Santé publique et ophtalmologie mondiale
8. Retina | Rétine
9. Uveitis | Uvéite

CATARACT SURGERY | CHIRURGIE DE LA CATARACTE

2020 COS Virtual Annual Meeting

Session Title: Cataract 2020: Very different than we expected!

Session Time: Sunday, June 28, 2020, 11:00 AM – 12:00 PM

Title: Three Month Post-Operative Clinical Visual Outcomes of Trifocal IOL Compared to an EDOF IOL Implantation Following Bilateral Cataract Surgery

Author: Marius Anton Scheepers

Abstract Body:

Purpose: The objective of the study was to determine which lens provides binocular best distance corrected near visual acuity at 3 months post-operatively. Secondary outcome measures were binocular best distance corrected intermediate, distance visual acuities, and vision related quality of life assessment using the visual function Questionnaire-14 from the National Eye Institute (as modified by Akman).

Study Design: Randomized, prospective, patient and observer masked study of 136 eyes of 68 patients (34 per group) that underwent cataract surgery with implantation of either PanOptix or Symfony IOLs bilaterally.

Methods: Uncorrected and binocular distance corrected visual acuities were measured at near (40cm), intermediate (60cm), and distance at 3 months postoperatively. Photopic and mesopic contrast sensitivity (with and without glare), and preferred reading distance were also recorded. Refractive accuracy was analyzed in terms of % of eyes within +/- 0.50D MRSE and of eyes within +/- 0.50D cylinder. The VF-14 QOL questionnaire was used, with a grading scale of 1-4, 0: no difficulty; 4: impossible to perform.

Results: Distance and intermediate visual acuities were comparable between the two groups, with most patients having good uncorrected distance and uncorrected intermediate visual acuities. Uncorrected near visual acuities were however slightly better in the Panoptix group.

Conclusions: The Panoptix and the Symfony lenses both appear to be good options for presbyopia correction, with both lenses improving spectacle independent quality of life.

Title: Randomized controlled trial comparing efficacy and safety of loteprednol etabonate 0.5% and dexamethasone 0.1% after cataract surgery

Authors: Saba Samet, Devesh K. Varma, Diamond Y. Tam, Faran Vafaie, Joshua C. Teichman

Abstract Body:

Purpose: To evaluate effectiveness with regards to treatment of postoperative ocular inflammation, complications in terms of intraocular pressure (IOP) elevation and symptomology, and adherence to treatment regimen with use of dexamethasone 0.1% (DEX) versus loteprednol etabonate 0.5% (LE) after routine cataract surgery.

Study Design: Double-blind, randomized controlled trial.

Methods: 60 eyes were randomized to receive either DEX or LE, four times daily, beginning the day of surgery for 4 weeks. 4 study visits at preoperative (V1), day of surgery (V2), 1-week postoperative (V3), and 1-month postoperative (V4) time points were conducted. Primary outcome was summed ocular inflammation score (SOIS). Secondary outcomes were subjective symptomology scores, IOP, and visual acuity (VA). Central retinal thickness (CRT) on OCT was obtained at the preoperative and final visits. An adherence questionnaire was conducted at the final visit. Analysis using independent-samples t-test, Mann-Whitney U and Chi-squared tests were done as appropriate.

Results: LE had higher, though non-significant, median SOIS at each visit (2 (IQR 3) vs. 0 (IQR 2), $p=0.17$ V2; 1 (IQR 2) vs. 0.5 (IQR 1), $p=0.29$ V3; 0 (IQR 0.5) vs. 0 (IQR 0), $p=0.24$ V4). 67% of LE and 88% of DEX had SOIS ≤ 1 by V3 ($p=0.22$), with 100% having SOIS ≤ 1 by V4. IOP and VA were not different between groups at any visit (smallest $p=0.27$). LE had higher preoperative CRT ($p=0.03$), however no difference was found at V4 ($p=0.09$). Symptomology scores of ocular pain, photophobia, itching, tearing, dryness, discharge, and discomfort were not significantly different. Compliance and satisfaction with treatment was the same between groups (lowest $p=0.27$).

Conclusions: DEX and LE have similar outcomes with regards to control of inflammation, with no differences in adverse events, IOP elevation, visual acuity, CRT, or regimen compliance.

Title: Assessing Cataract Surgery Skills through Machine Learning: A Pilot Study

Authors: Jessica Ruzicki, Matthew Holden, Stephanie Cheon, Tamas Ungi, Rylan Egan, Christine Law

Abstract Body:

Purpose: Cataract surgery is a common, high volume, and agile procedure with sequential repetitive and reproducible steps. Our goal is to develop a method for quantitative and objective analysis of the reproducible steps in cataract surgery. This will allow future surgeries to be analyzed with a goal of giving unbiased instructional feedback.

Study Design: Prospective study; machine learning

Methods: This prospective study used consecutive cataract surgeries performed by a faculty or trainee surgeon in an ophthalmology residency program from October 2018 to March 2019. An existing image classification network, ResNet 152, was fine-tuned for tool detection in cataract surgery. This allowed for automatic identification of each instrument in the surgery, and was subsequently used to encode each window of microscope video frames as a vector. We then examined the relation between vector encodings and perceived skill using k-fold user-out validation. The algorithms were evaluated using area under the receiver operating characteristic curve (AUC) and the classification accuracy.

Results: In total, 387 cataract procedures were used. Our model achieved an AUC ranging from 0.93 to 0.99 for tool detection. For skill classification, the AUC was 0.55 (accuracy was 54%) for classification of a single frame, AUC was 0.57 (accuracy was 58%) for classification of a single surgery, and AUC was 0.69 (accuracy was 63%) for classification of a single user given all of their trials.

Conclusions: Machine learning research has gathered increased interest in ophthalmology as an aid for diagnosis and management. Our research provides a method by which individual cataract surgeries can be analyzed on a novice to expert scale, allowing learners to assess their own surgical skills in relation to their perceived skill based on level of training.

Title: The incremental effect of topical moxifloxacin eye drops or oral moxifloxacin on the abatement of intracameral moxifloxacin levels in the anterior chamber

Authors: Albert Hu, Mark Lukewich, Milad Modabber, Steve Arshinoff

Abstract Body:

Purpose: To create a mathematical model for the abatement of combined intracameral and topical or oral moxifloxacin treatment to determine whether topical or oral antibiotics can provide additional intraocular bactericidal activity over intracameral antibiotics alone.

Study Design: A literature review of pharmacokinetic data available for intracameral, topical and oral moxifloxacin was used to inform further development of our previously published mathematical model.

Methods: The mathematical model developed by Arshinoff, Modabber and Felfeli was used to estimate the antimicrobial activity of intracameral moxifloxacin against common ocular pathogens following cataract surgery. The effects on intraocular concentration of moxifloxacin from both topical eye drops and oral intake were estimated using available literature data. Abatement models of total moxifloxacin concentration were created for intracameral plus topical eye drops application at various dosing schedules and intracameral plus oral intake, and analyzed for antimicrobial effectiveness.

Results: Our previously constructed mathematical model of antibiotic abatement of intracamerally injected antibiotics as the final step of cataract surgery demonstrates a high retained dose of moxifloxacin within the anterior chamber and sustained intraocular bactericidal coverage against the most common ocular pathogens for approximately 40 hours, when the 3 hour fluoroquinolone post-antibiotic effect is included. Topical moxifloxacin eye drops alone, administered q1h will sustain an intracameral concentration at about 4 times the MPC (mutant prevention concentration) of methicillin sensitive *Staphylococcus aureus* (MSSA), which is itself 10 times the MIC₉₀. Topical dosing of moxifloxacin drops q4h or q6h added to intracameral administration significantly increase the concentration of moxifloxacin within the anterior chamber beyond that achieved by intracameral injection alone only after 20 hours, at which point the topical drops maintained the intracameral antibiotic level close the MPC for as long as the drops are continued. In contrast, combined treatment with intracameral and oral moxifloxacin did not provide additional intraocular bactericidal coverage over intracameral moxifloxacin alone.

Conclusions: Intracameral moxifloxacin is an effective strategy for postoperative endophthalmitis prophylaxis. The use of adjunct topical or oral moxifloxacin may provide limited intraocular bactericidal benefit over intracameral moxifloxacin alone for specific unusual situations.

Title: Practice patterns of the Canadian Ophthalmological Society members in cataract surgery. Survey 2020

Authors: Lindsay Ong-Tone

Abstract Body:

Purpose: This will be the twelfth annual survey on the practice patterns of the Canadian Ophthalmological Society (COS) members in cataract surgery.

Study Design: Web based

Methods: This survey will be conducted in January 2020 when an e-mail with a link to Red Cap will be sent to all the COS members who have indicated that their practice focus is on Cataract and IOL. Two reminder e-mails will be sent at 2 weeks interval.

Results: In 2019, all the respondents used povidone iodine preoperatively. 33.8% waited 1 minute and 32.4% waited 2 minutes before draping. The most common wound size was 2.2 mm (36.6%) followed by 2.4 mm (33.6%). 60.8% of the respondents corrected astigmatism at the time of cataract surgery. The majority (92.9%) used a Toric IOL to do so. Of these, 80.3% corrected 1 Diopter or more of with the rule astigmatism while 78.5% corrected 1 Diopter or less of against the rule astigmatism. 40% of the respondents used intracameral antibiotics. The most popular one was moxifloxacin (71.4%) followed by cefuroxime (17.9%). 49.3% of the respondents aimed for monovision and 27.3% of them aimed for 1.5 diopter of difference. Presbyopia correcting lenses were used by 56.3% of the respondents. Most would use these lenses up to 10% of the time only.

Conclusions: This survey gives valuable information to the COS membership as to how their peers are practising. Of note, in 2019, over 66% of the respondents waited at least 1 minute for the povidone iodine to dry before applying the drapes. Presbyopia correcting lenses were used by more than 56% of the respondents while monovision was used by nearly 50%.

Title: Prediction Accuracy of Intraoperative Aberrometry Compared to Pre-Operative Biometry Formulas for Intraocular Lens Power Selection

Authors: Jingyi Ma, Sherif El-Defrawy, John Lloyd, Amandeep Rai

Abstract Body:

Purpose: Given modern advances in cataract surgery, patients have higher expectations regarding refractive outcomes and achieving spectacle independence is a major determinant of patient satisfaction. This study aims to compare the accuracy of intraoperative wavefront aberrometry with seven pre-operative formulas for predicting intraocular lens (IOL) power.

Study Design: Consecutive, retrospective case series. This study follows the tenants of the Declaration of Helsinki and has been approved by the University of Toronto's Research Ethics Board.

Methods: Two hundred and nine eyes underwent cataract extraction with monofocal, trifocal or toric IOL implantation from November 1, 2017 to September 30, 2019. Exclusion criteria included previous corneal refractive surgery and other ocular diseases. One of three surgeons performed all surgeries. For each eye, an IOL power was selected based on pre-operative biometry measurements from the IOL Master 500. The spherical equivalent was predicted pre-operatively with the Barrett Universal II, Hill-RBF, SRKT, Holladay I, Holladay II, Haigis, and HofferQ formulas and intraoperatively with wavefront aberrometry. The primary outcomes were the mean prediction error and proportion of eyes with a spherical equivalent within 0.5D of the refractive target at the one month post-operative visit.

Results: The analysis included 126 eyes. Formulas with the lowest mean prediction error were Barrett Universal II (0.31D), Hill-RBF (0.32D), SRKT (0.32D), intraoperative aberrometry (0.32D), Holladay I (0.36D), Holladay II (0.38D), Haigis (0.38D), and HofferQ (0.43D). Formulas with the highest proportion of eyes with a spherical equivalent within 0.5D of the refractive target were intraoperative aberrometry (82%), Hill-RBF (80%), Barrett Universal II (80%), SRKT (80%), Holladay II (74%), Holladay I (73%), Haigis (70%), and HofferQ (67%). In 63% of eyes, intraoperative aberrometry recommended a different IOL spherical or toric power than the surgeon previously chose. In 34% of eyes, the IOL implanted differed from the surgeon's pre-operative choice.

Conclusions: Based on preliminary results, Barrett Universal II, intraoperative aberrometry, Hill-RBF, and SRKT all had similar mean prediction errors. Intraoperative aberrometry was slightly more effective than pre-operative biometry formulas at achieving the refractive target. Data collection is ongoing and will be complete prior to the meeting.

Title: Comparison of toric IOL prediction accuracy using Pentacam, OPD, IOLMaster 700 TK and their median measurements

Authors: Mark Kenneth Lukewich, Soheli Somani, Eric S. Tam, Hannah H. Chiu

Abstract Body:

Purpose: The purpose of this study was to compare the prediction errors of toric IOL calculations made using topography and biometry measurements from Pentacam, OPD, IOLMaster 700 with total keratometry (IOLM) and median measurements from all three of these devices.

Study Design: Prospective cohort study.

Methods: Patients with corneal astigmatism and no other ocular comorbidities that underwent uneventful refractive laser assisted cataract surgery with toric IOL implantation between May 2019 to September 2019 were recruited. A total of 25 eyes from 25 patients were included in this study. The Barrett toric calculator was used to predict preoperative corneal astigmatism using measurements from Pentacam, OPD, IOLM and median measurements from all devices. The prediction error for each method was calculated at postoperative month 1 using the Astigmatism Double Angle Plot Tool developed by Abulafia et al.

Results: Centroid preoperative corneal astigmatism was $0.77D@87^\circ$ for with the rule (WTR) and $1.38D@2^\circ$ for against the rule (ATR) eyes. Centroid prediction errors were $0.21D@14^\circ$, $0.19D@7^\circ$, $0.25D@11^\circ$ and $0.22D@14^\circ$ for IOLM, Pentacam, OPD and median measurements, respectively in WTR astigmatism ($p>0.05$). In ATR astigmatism, centroid prediction errors were $0.25D@132^\circ$, $0.23D@136^\circ$, $0.25D@131^\circ$ and $0.25D@129^\circ$ for IOLM, Pentacam, OPD and median measurements, respectively ($p>0.05$). Prediction errors $<0.5D$ were observed in 69% of calculations using IOLM, OPD and median measurements, and 77% using Pentacam in WTR eyes ($p>0.05$). In ATR eyes, 50%, 67%, 42% and 58% of calculations using IOLM, Pentacam, OPD and median measurements, respectively, had prediction errors $<0.5D$ ($p>0.05$).

Conclusions: Compared with our previous study where IOLM demonstrated the highest centroid prediction error, IOLM Tk demonstrated similar centroid prediction error with other measurement tools. The incorporation of median measurements from IOLM, Pentacam and OPD into the Barrett toric calculation did not improve calculation accuracy.

Title: The Effect of Brimonidine 0.15% on the development of subconjunctival hemorrhage following femtosecond laser assisted cataract surgery

Authors: Eric S. Tam, Nistha Jaki, Hannah Chiu, Sohel Somani

Abstract Body:

Purpose: To assess the vasoconstrictive effect of Brimonidine 0.15% on reducing subconjunctival hemorrhage after suction ring application during Femtosecond laser assisted cataract surgery (FLACS).

Study Design: This was a masked prospective randomized controlled study.

Methods: Inclusion criteria included all FLACS cases between June and August 2019. Exclusion criteria included anticoagulation therapy, prior conjunctival surgery, intraop complications, Analyzed Area $<25\text{mm}^2$ or $>10\%$ difference between postop vs. preop values. All subjects in Control and Study groups underwent baseline images with the Oculus Keratograph M5. Bulbar Redness Score and Analyzed Area were recorded. All operated eyes then received the usual preop eye drops. Subjects in the Study group received an additional drop of Brimonidine 0.15%. All subjects then underwent FLACS. Comparison images were repeated 15 minutes postop in both groups.

Results: A total of 62 eyes (25 in study group, 37 in control group) met all inclusion and exclusion criteria and were analyzed. Preop Bulbar Redness Score (BRS) (Study= 1.62 ± 0.52 ; Control= 1.40 ± 0.34 ; $P=0.07$) and Analyzed Area (AA) (Study= 28.86 ± 2.86 ; Control= 26.04 ± 2.93 ; $P=0.28$) were not statistically significant between Study and Control groups. Postop BRS (Study= 1.42 ± 0.44 ; Control= 1.46 ± 0.43 ; $P=0.70$) and AA (Study= 26.96 ± 2.82 ; Control= 26.40 ± 2.98 ; $P=0.46$) were also not statistically significant between the two groups. However, the change in BRS between preop and postop was statistically significantly greater in the control group (0.06 ± 0.43) compared to the study group (-0.12 ± 0.56) ($P=0.03$). The change in AA in the postop vs. preop (Study= $0.40\%\pm 3.60\%$; Control= $1.40\%\pm 4.30\%$; $P=0.33$) was not statistically significant.

Conclusions: Preoperative application of Brimonidine 0.15% can significantly decrease the severity of subconjunctival hemorrhage in eyes undergoing FLACS.

CORNEA, EXTERNAL DISEASE AND REFRACTIVE SURGERY
CORNÉE, MALADIES EXTERNES ET CHIRURGIE RÉFRACTIVE

2020 COS Virtual Annual Meeting

Title: Early visual outcomes of 2500 eyes that underwent Small Incision Lenticule Extraction (SMILE) for the treatment of myopia and myopic astigmatism in a Canadian setting

Authors: Weronika Jakubowska, Sheldon Herzig, Kashif Baig

Abstract Body:

Purpose: Small incision lenticule extraction is a minimally invasive refractive surgery technique, which relies on the use of a femtosecond laser to create an intrastromal lenticule circumventing the need for a flap. The purpose of this study is to review the early clinical outcomes of 2500 eyes that had laser vision correction by SMILE for the treatment of myopia and myopic astigmatism. This analysis aims at gaining insight into safety and outcomes of SMILE surgery in a Canadian setting since its approval by Health Canada in 2015.

Study Design: This is a single-center retrospective chart review of consecutive SMILE cases performed by a single surgeon between January 2016 and July 2019.

Methods: All patients that had SMILE using a Zeiss Visumax laser system (Carl Zeiss Meditec, Germany) in this time period with at least one week of follow-up were included in the study. Data was collected from the preoperative evaluations, operative notes and clinical notes from 1 day, 1 week, 1 month and up to 12 months after surgery as available. The primary outcome is logMAR visual acuity and secondary outcomes include the accuracy of postoperative spherical equivalent (SEQ) refraction to the intended target, intraoperative complications, postoperative refractive astigmatism and number of eyes that needed enhancement.

Results: A preliminary analysis conducted on 986 eyes revealed an average manifest SEQ of -4.45 ± 1.98 diopters (D) before surgery with 50% of eyes with a myopia ranging between -3 and -6D. Average uncorrected distance vision acuity (UDVA) before the procedure was 1.54 ± 0.62 (logMAR), which improved to 0.02 ± 0.09 (logMAR) 1 month after SMILE for patients with target of emmetropia. 71% of patients had an UDVA of 20/25 or better 1 day after surgery, 85% and 89.30% at 1 week and 1 month, respectively. The mean difference between attempted and achieved SE refraction in eyes with a target of plano at one month after surgery was -0.019 ± 0.374 D, where 79% and 98.63% of eyes achieved a SEQ within 0.5 D and 1.0 D of intended refraction, respectively. Mean postoperative refractive astigmatism at 1 month was 0.16 ± 0.26 D. Of the 986 procedures, three procedures were aborted and converted to either LASIK or photorefractive keratectomy (PRK). Intraoperative complication rates were 1.22% for suction loss, 2.13% for corneal abrasion and 1.22% for subconjunctival hemorrhage. Postoperatively, there was no infection reported. In addition, 5.88% of eyes showed signs of diffuse lamellar keratitis in the first week. The prevalence of SMILE enhancement rate was 3.55% within one year of surgery with 70% of redos performed by PRK.

Conclusions: SMILE surgery for the treatment of myopia and myopic astigmatism yields stable predictable results over the early postoperative period. The procedure is safe with low rates of complications.

Title: Rates of post-operative LASIK in manual versus femto laser assisted cataract surgery

Authors: Alexander Soon, Bruce Nichols

Abstract Body:

Purpose: To investigate whether the rates of post-operative laser-assisted in situ keratomileusis (LASIK) differ between patients undergoing manual cataract extraction surgery (MCS) versus femto assisted cataract surgery (FLACS)s

Study Design: Retrospective chart review of 1443 cataract surgery cases at a private centre in London, Ontario. Patients with prior LASIK correction at initial consultation, or any other concurrent ocular pathology precluding them from a visual potential of 20/20 were excluded.

Methods: 743 FLACS and 700 MCS cases were reviewed, and qualified patients who underwent LASIK correction post-cataract extraction (post-CE) were included in the study. The modified student's t-test was utilized to determine baseline demographic equivalence, as well as the Chi-squared test for statistical analysis. Baseline demographics were analyzed prior to cataract extraction, and pre- and post-LASIK correction visual acuity and refraction were compared.

Results: Baseline characteristics of both groups were equivocal for average age, gender, central corneal thickness, axial length, anterior chamber depth, pre-op best-corrected visual acuity, pre-op mean keratometry, per-op spherical equivalent, and pre-op refractive cylinder ($P > 0.1$). Out of 743 FLACS cases, approximately 2.8% of patients (21 cases) had post-operative LASIK correction. Of the 700 MCS cases, 6.2% (44 cases) also underwent post-operative LASIK correction. Chi-squared analysis yielded a markedly significant difference between expected and observed rates of post-operative LASIK between the FLACS and MCS groups ($P < 0.0001$). Pre-LASIK uncorrected visual acuity ($P < 0.039$) and cylinder ($P < 0.004$) were significantly different between the FLACS and MCS groups.

Conclusions: Patients in the MCS group had significantly higher rates of post-CE LASIK compared to the FLACS group. The rates of post-CE LASIK may serve as an indirect marker of patient satisfaction, following cataract surgery. Further, pre-LASIK differences in cylinder may be the pivotal factor when accounting for this finding. To the best of our knowledge, our study is the first in the literature to examine the rates of post-CE LASIK in FLACS versus MCS.

Title: Impact of dry eye treatment on biometry for cataract surgery planning

Authors: Yelin Yang, Alexandre Telli, Gisella Santaella, Michael Mimouni, Tanya Trinh, Allan Slomovic

Abstract Body:

Purpose: Dry eye is one of the most prevalent ocular surface diseases worldwide. Poor ocular surface affects preoperative planning for cataract surgery including intraocular lens power calculation, keratometry and topography measurements. We aim to determine the impact of dry eye treatment on IOL biometry measurements and postoperative refractive outcome.

Study Design: Prospective interventional study

Methods: Patients undergoing cataract surgery with symptoms of dry eye and otherwise normal ocular exam were recruited. IOL measurement using IOLMaster 700, topography and baseline dry eye testing were performed including tear meniscus, NiBUT, tear osmolarity, schirmer's test, corneal and conjunctival staining. Symptoms were assessed through ocular surface disease questionnaire (OSDI). Diagnosis of dry eye was made according to Dry Eye Workshop II with one of the following criteria: NIBUT < 10 seconds, tear osmolarity > 308 mOsm/L in either eye or interocular difference > 8 mOsm/L, or ocular surface staining (>5 corneal spots, or > 9 conjunctival spots). Patients with dry eye received 6 weeks treatment of lifitegrast and preservative free artificial tear eye drops, and had repeat IOL measurement and dry eye parameters. The change in biometry measurements and difference in target and postoperative refraction before and after dry eye treatment is compared. Ethics approval was obtained from University Health Network and University of Toronto.

Results: 19 eyes (10 patients) were included in the study with 2 mild, 16 moderate and 1 severe dry eye. Mean BCVA preoperatively was 0.47 logMAR. 42% (8/19) of eyes had corneal staining and 63% (12/19) had conjunctival staining. After dry eye treatment, mean OSDI, NIBUT and schirmer's improved from 27 to 22, 6.8 to 7.4 s, and 7.6 to 8.7 mm respectively. Repeated biometry after dry eye treatment showed a change in IOL power difference of 0.5 D in 37% (7/19) of eyes. Compared to the eyes whose IOL power did not change, the group whose IOL power changed had greater proportion of conjunctival staining (100% vs. 42%), lower mean NIBUT (5.9 vs. 7.2 s) and lower schirmer's (7 vs. 8.1). There was no significant difference in higher order aberrations prior and after treatment including total HOA (p=0.59), spherical aberration (p=0.54), coma (p=0.28) and trefoil (p=0.98).

Conclusions: Dry eye treatment leads to significant changes in biometry and IOL power calculations. Assessing and treating patients for dry eyes prior to cataract surgery is important in maximizing refractive outcome.

Title: Fellow Eye as a Predictor for Keratoconus Progression following Corneal Crosslinking

Authors: Michael Mimouni, Nir Sorkin, Wendy Hatch, Neera Singal

Abstract Body:

Purpose: To assess fellow eye as a predictor for keratoconus progression following corneal crosslinking (CXL).

Study Design: Cohort study.

Methods: Included were patients with progressive keratoconus that underwent simultaneous CXL in both eyes. A post-hoc analysis of data collected from a prospective study of CXL for progressive keratoconus between the years 2013 and 2015 at the Kensington Eye Institute, Toronto, Canada. Preoperative manifest refraction, corneal cylinder, maximal keratometry (Kmax), central and minimal corneal thickness and coma levels were recorded. The primary outcome measures were absolute change in Kmax (D), relative change in Kmax (%) and CXL failure (increase in Kmax >1D). Responses in both eyes were measured by change in Kmax with the right eye serving as the “predictor” of progression for the left eye.

Results: Three-hundred-ninety-two eyes of 196 patients with a mean age of 26.8 ± 7.7 years (range, 14.2-58.0) of which 71.9% were of male gender, were included. Overall CXL failure rate at one year was 16.2% (63 eyes). There was a significant positive correlation between right and left eyes in both absolute and relative Kmax change ($r=0.26$, $p<0.001$ and $r=0.32$, $p<0.001$, respectively). Combining absolute and relative Kmax change with preoperative left eye factors increased R^2 to 23.24 and 23.55, respectively with the only significant factors being preoperative left eye Kmax ($R^2=8.25$, $p=0.02$ and $R^2=7.51$, $p=0.01$ respectively) and change in Kmax of the right eye ($R^2=8.33$, $p<0.001$ and $R^2=9.74$, $p<0.001$ respectively). Eyes that progressed in the right eye were more likely to progress in the left eye (32.4% vs 11.2%, $OR=3.80$, $R^2=5.12$, $p<0.001$). Addition of preoperative left eye factors led to a minimal increase of R^2 to 8.69 with none of the additional factors being a significant predictor of left eye progression.

Conclusions: This large-scale study of keratoconus progression following CXL reveals a significant correlation between eyes in response to CXL. Patients who progressed in the right eye were 3-4 times more likely to progress in the left eye and this parameter correlated better than preoperative left eye parameters assessed.

Title: Indications, clinical outcomes, and surgical techniques of corneal transplantation in an academic centre in Canada

Authors: Nancy Chen, Henry Liu, Fargol Mostofian, Reginald Tan, Pablo Morales, Mona Keaik, George Mintsioulis, Setareh Ziai, Kashif Baig

Abstract Body:

Purpose: To analyze the changes in techniques, outcomes, complications and indications of cornea transplantation in a span of 8 years at a tertiary care center in North America.

Study Design: Retrospective chart review

Methods: All corneal transplantation at a Canadian academic hospital from 2008-2019 was reviewed. Number of corneal grafts for various keratoplasties, their surgical indications and complications were compared. Procedures were classified as penetrating keratoplasty (PKP); Descemet's Membrane Endothelial Keratoplasty (DMEK); Descemet's stripping automated endothelial keratoplasty (DSAEK) or ultra-thin DSAEK; or deep anterior lamellar keratoplasty (DALK).

Results: A total of 1349 corneal transplants were performed in 12 years. Of these, 468 were DSAEK (34.7%); 408 PKPs (30.2%); 374 DMEKs (27.7%); 56 DALKs (4.2%); and 43 ultra-thin DSAEKs (3.2%). The most common reason for transplantation was previously failed graft, 31.1% (419/1349) of corneal transplants. Corneal dystrophy, including Fuchs dystrophy, was the most common pathology requiring transplantation (381/1349, 28.2%). Overall graft survival rate was 76.9%; with the mean time to graft failure of 11.8 ± 14.1 months. Elevated intraocular pressure was the most observed post-operative complication.

Conclusions: This 12-year review showed DSAEK was the most commonly performed transplant. Regrafting was the most common indication for corneal transplantation with overall graft survival of 76.9%.

Title: Clinical outcomes and complications of Descemet's membrane endothelial keratoplasty vs Descemet's stripping automated endothelial keratoplasty

Authors: Yufeng Chen, Henry Liu, Fargol Mostofian, Reginald Tan, Pablo Morales, Mona Keaik, George Mintsoulis, Setareh Ziai, Kashif Baig

Abstract Body:

Purpose: To compare the short-term and long-term visual outcomes and postoperative complications after Descemet stripping automated endothelial keratoplasty (DSAEK) versus Descemet membrane endothelial keratoplasty (DMEK).

Study Design: Retrospective chart review

Methods: Consecutive patients who underwent DMEK (374 eyes) and DSAEK (468 eyes) at a Canadian academic hospital from January 2008 to June 2019 were included. Student t-test was used to compare best corrected visual acuity (BCVA), visual acuity gained compared to baseline and graft survival rate at baseline, 1, 3, 6 months and 2-5 year follow-up.

Results: Baseline BCVA of patients who underwent DMEK was significantly better compared to those who underwent DSAEK (0.80 vs. 1.3 logMAR, $p < 0.01$). At one month follow-up, vision gained with DSAEK (15.0 letters) was significantly higher compared to DMEK (8.2 letters, $p = 0.02$). However, this difference was not observed at all other evaluated time points after ($p > 0.05$). Early graft failure in the first 3 months was similar in both groups (10.6% DMEK vs. 12.2% DSAEK). The overall graft failure rate was higher in DSAEK compared to DMEK (19.5% DMEK vs. 29.7% DSAEK, $p < 0.01$).

Conclusions: No long-term difference was observed between DMEK and DSAEK in visual acuity gained. Although both techniques had similar graft failure rates in the first 3 months, DSAEK showed higher rates of graft failure in the long-term compared to DMEK.

Title: Outcomes of Descemet Membrane Endothelial Keratoplasty in Aphakic and Aniridic patients

Authors: Gisella Santaella, Michael Mimouni, Nir Sorkin, Tanya Trinh, Eyal Cohen, Clara Chan, David Rootman

Abstract Body:

Purpose: Purpose: To evaluate outcomes of Descemet Membrane Endothelial Keratoplasty (DMEK) in aphakic and aniridic eyes.

Study Design: Retrospective chart review.

Methods: Methods: A retrospective chart review of either aphakic or aniridic patients that underwent DMEK at Toronto Western Hospital, Canada, between 2015 and 2019 was performed. Demographic characteristics, intra-operative and post-operative complications, and best-corrected visual acuity (BCVA) were analyzed.

Results: Results: Nine eyes of nine patients, aged 51.0 ± 8.6 years, were included (3 aniridic, 5 aphakic and 1 aniridic & aphakic). Average follow up was 30.2 ± 12.2 months. BCVA prior to surgery 6 and 12 months after surgery were 1.28 ± 0.47 , 1.22 ± 0.84 and $1.42, \pm 0.91 \log \text{MAR}$, respectively. Six eyes (67%) had graft detachment, with 3 of them (33%) larger than 30% of the graft diameter. One eye (11%) developed hyphema. Primary graft failure was seen in 4 eyes (44%) - 3 of those due to detachment and 1 due to intraoperative hyphema. Secondary failure occurred in 4 eyes (44%), at 7, 12, 30 and 36 months. The secondary failure at 30 months was following rejection. Three failures were managed with PKP, 1 with DSAEK and 3 with repeat DMEK. The rest were observed due to poor vision potential.

Conclusions: Conclusions: DMEK surgery had a high detachment and failure rate in aphakic and aniridic eyes. Performing DMEK surgery in these scenarios may not be advised.

Title: Outcomes of Descemetorhexis Without Endothelial Keratoplasty for the Treatment of Fuchs Endothelial Dystrophy

Authors: Solin Saleh, Henry Liu, Fargol Mostofian, Setareh Ziai, Kashif Baig

Abstract Body:

Purpose: Descemetorhexis Without Endothelial Keratoplasty (DWEK) is a novel treatment option for mild to moderate Fuchs Endothelial Dystrophy (FED), which involves scoring and stripping the central 4 mm of diseased endothelium and Descemet membrane without subsequent transplantation of donor cells. The purpose of this study is to assess the visual and safety outcomes in patients who received DWEK for treatment of mild to moderate FED at the University of Ottawa Eye Institute.

Study Design: Single-center descriptive retrospective chart review.

Methods: Five patients (3 females; mean age: 69.9 ± 12.1 years; range: 60-87 years) underwent DWEK for the treatment of FED by a single surgeon. All patients had central confluent guttae and healthy peripheral corneal endothelium. In one patient, the procedure was combined with phacoemulsification and intraocular lens implantation. Best-corrected visual acuity (BCVA) was measured using a Snellen chart and pachymetry was obtained using the Oculus Pentacam.

Results: All 5 patients completed at least 6 months of postoperative follow-up. Baseline central pachymetry available from 3 patients was $640.0 \pm 95.3\mu\text{m}$. Four out of 5 patients achieved BCVA of 20/40 or better, with an improvement of 1 line or more in 3 out of 5 patients. Post-operative intraocular pressure at 6 months was 19.0 ± 5.9 (baseline = 17.75 ± 2.2), with 1 patient experiencing elevated post-operative intraocular pressures requiring pressure-lowering medical therapy. Corneal clarity was achieved in 3 out of 5 patients (between 3-6 months). For the remaining 2 patients with persistent central corneal edema, 1 underwent eventual DMEK and the other underwent DSAEK at post-operative months 7 and 8, respectively.

Conclusions: Preliminary results of DWEK in FED appear to be variable with 60% of patients experiencing improvement in BCVA. We did not observe a correlation between higher central pachymetry measures and risk of post-operative corneal edema as described in a previous report. Further large-scale studies are required to establish factors that may aid in proper selection of patients undergoing this procedure.

Title: Risk Factors Predicting Graft Failure in Descemet's Membrane Endothelial Keratoplasty (DMEK)

Authors: Henry Liu, Yufeng Chen, Setareh Ziai, George Mintsoulis, Kashif Baig

Abstract Body:

Purpose: Over the past decade there has been rapid advancement in techniques and methods of corneal transplantation, especially endothelial keratoplasties including Descemet Stripping Automated Endothelial Keratoplasty (DSAEK) and Descemet's Membrane Endothelial Keratoplasty (DMEK). While there have been published reports examining the determinants of graft failure in DSAEK, no studies to date have investigated these risk factors in the context of DMEK. The objective of this study is to assess various donor, recipient and operative factors on the risk of DMEK graft failure.

Study Design: This is a single-center, retrospective cohort study

Methods: We analyzed 308 eyes undergoing primary DMEK between January 2012 and June 2019 at a single North American tertiary care centre (i.e. the University of Ottawa Eye Institute). Graft failure was defined as signs of corneal allograft rejection that does not clear within 3 months of treatment and requiring subsequent repeat grafting. Clinical data on the following were collected and analyzed: demographic details, pre-operative best-corrected visual acuity (BCVA), indications for DMEK surgery, ocular preoperative status (i.e. glaucoma and glaucoma surgery), donor endothelial cell density (ECD), donor graft size, death to enucleation time, death to graft time, intra-operative complications and surgeon experience (i.e. cases performed within the first year). Statistical analysis was performed using univariable and multiple logistic regression with a significance level of 0.05.

Results: Overall rate of graft failure was 16.9% (52/308 eyes) with an average pre-operative BCVA of 0.71 ± 0.59 LogMAR. In the univariable regression, prior glaucoma surgery including trabeculectomy and tube shunts (odds ratio [OR]= 2.7, 95% confidence interval [CI] 1.2-5.7, P= 0.012), intra-operative complications (OR= 5.4, 95% CI 1.7-17.6, P= 0.005) and surgeon experience (OR= 3.8, 95% CI 1.2-12.4, P= 0.028) were all associated with a greater risk of requiring repeat DMEK. Furthermore, a diagnosis of PBK was associated with a higher rate of graft failure (OR= 2.8, 95% CI 1.4-5.6, P= 0.003), while a diagnosis of Fuchs' was a protective factor (OR= 0.4, 98% CI 0.2-0.7, P= 0.002). Donor graft size, ECD and death to enucleation and graft times were not associated with higher rates of failure. Multiple regression analysis showed that only a diagnosis of Fuchs' (OR= 0.2, 95% CI 0.04-0.86, P= 0.032) was an independent predictor of graft failure.

Conclusions: An indication of PBK portends a higher risk of graft failure compared to Fuchs'. Donor factors are not significantly associated with a higher risk of graft failure, with the exception of increased donor age being an independent predictor. Results from this study may benefit future patients by allowing better risk stratification and patient counseling prior to undergoing DMEK.

Title: Randomized controlled trial of fresh versus frozen corneal donor carriers in Boston Keratoprosthesis type 1 surgery: 10-year outcomes

Authors: Saama Sabeti, Roy Daoud, Marie-Claude Robert, Mona Harissi-Dagher

Abstract Body:

Purpose: This study aims to compare the 10-year clinical outcomes of fresh versus frozen corneal graft carriers for the Boston Keratoprosthesis type 1 (KPro).

Study Design: Prospective, non-masked, randomized controlled trial with 10-year follow-up.

Methods: Patients undergoing KPro implantation received either a fresh or frozen corneal allograft carrier depending on the availability of fresh tissue on the day of surgery. Surgeries were performed between October 2008 and December 2009 by a single experienced surgeon at the Centre Hospitalier de l'Université de Montréal. Patients were excluded if they had previously undergone KPro implantation or if they elected to use a corneal autograft when deemed appropriate. The primary outcome measure was device retention at 10 years; secondary outcome measures included best corrected visual acuity (BCVA) and complications.

Results: Thirty-seven eyes of 37 patients were enrolled in the initial protocol of 24-months duration; of these, 22 patients consented to be followed through to 10 years, with 13 from the fresh group and 9 from the frozen group. At 10-year follow-up, device retention was 92% (12 of 13 eyes) and 78% (7 of 9 eyes), and the incidence of complications per patient was 2.07 (total of 27) and 2.33 (total of 21) for the fresh and frozen groups, respectively ($p>0.05$ for both analyses). Mean BCVA had increased from counting fingers in both groups to 20/320 and 20/125 in the fresh and frozen groups respectively ($p>0.05$). There were no statistically significant differences between the two groups for any outcome measures.

Conclusions: Fresh and frozen corneal donor graft carriers offer similar clinical outcomes for KPro implantation, with no statistically significant differences in device retention, visual outcomes, or rates of complications at 10 years.

Title: Glaucoma Outcomes Following Boston Keratoprosthesis Type 1 Surgery

Authors: Dominique Geoffrion, Mona Harissi-Dagher

Abstract Body:

Purpose: To evaluate and understand glaucoma visual outcomes of the Boston Keratoprosthesis type I (KPro), including risk factors and protective factors against glaucoma development.

Study Design: Retrospective observational cohort study

Methods: Single surgeon retrospective cohort study of 137 eyes in 118 patients with KPro implantation in Montreal, Canada, between October 2008 and March 2017, with at least 6 months of follow-up. Patients without glaucoma were compared to those diagnosed with glaucoma, which included treatment with intraocular pressure (IOP)-lowering drops or glaucoma surgery. The main outcomes were glaucoma onset, indications for KPro implantation and for previous corneal grafts, and postoperative complications. Demographics, as well as visual acuity (VA), IOP and cup-to-disc ratio collected preoperatively and every 6 months postoperatively, were recorded. Descriptive statistics and incidence rates were used to compare the outcome variables.

Results: Mean age at surgery was 61.5 ± 15.9 years, with mean follow-up of 67.7 ± 31.3 months. The most common indication for KPro surgery was failed graft ($n=70$, 51%). Of the 137 eyes, 22 (16%) did not have glaucoma. 84 (73%) of the 115 eyes with glaucoma had glaucoma prior to surgery. Of the 53 eyes undergoing KPro without prior glaucoma, 31 (59%) developed glaucoma after surgery. Post-KPro glaucoma incidence was 4.0 cases per 100 eye-years, with average onset at 2.2 ± 1.9 years after surgery. Patients without final outcome of glaucoma were younger ($P=0.049$) and of male gender ($P=0.012$). Eyes with non-aniridic limbal stem cell deficiency (LSCD) were at lower risk of glaucoma ($RR=0.2$, 95% CI 0.1-0.5, $P=0.013$). Best postoperative LogMAR VA of the overall cohort was 1.0 ± 1.3 at 1.2 ± 1.8 years and mean LogMAR VA was 2.0 ± 2.1 at last follow-up (5.7 ± 2.7 years), with no difference between KPro eyes with and without glaucoma ($P>0.05$).

However, mean LogMAR VA at last follow-up was worse for pre-KPro (2.1 ± 2.1 at 5.5 ± 2.8 years) compared to post-KPro glaucoma eyes (1.7 ± 2.0 at 6.2 ± 2.6 years, $P=0.001$). Cumulative incidence of postoperative complications at 9 years was higher in KPro eyes with glaucoma (92%) than without glaucoma (77%, $P=0.035$).

Conclusions: Glaucoma is a common complication following KPro implantation. Younger patients with non-aniridic LSCD appear at decreased risk for glaucoma. Non-glaucomatous eyes do not achieve better VA, however, have less postoperative complications compared to those with glaucoma.

Title: Management of corneal melt in patients with Boston Keratoprosthesis type I: repair versus replacement

Authors: Saama Sabeti, Roy Daoud, Mona Harissi-Dagher

Abstract Body:

Purpose: To evaluate outcomes of corneal repair versus replacement of the Boston keratoprosthesis (KPro) as treatment for corneal melt in KPro patients.

Study Design: Retrospective study

Methods: Retrospective study of adult KPro patients with melt managed by repair or KPro replacement by one surgeon (MHD). Recurrent episodes were considered as separate cases when melt recurred after the first episode was treated and healed. Incidence of sight- or globe-threatening complications and change in BCVA before and 3 months after the procedure were compared between both treatment groups, and between primary versus secondary KPro replacement after repair attempts. Recurrence of melt after repair or replacement was also compared.

Results: This study included 19 eyes of 19 patients with 28 episodes of melt and mean follow-up of 8.7 years. Primary KPro replacement was performed in 6 eyes (32%) and corneal repair in 13 eyes (68%). There were no significant differences in gender, age, or incidence of complications after repair versus after KPro replacement (86% and 64% complication rate respectively, $p>0.05$), nor after primary versus secondary KPro replacement post-repair (83% and 62% complication rate respectively, $p>0.05$). Change in BCVA was not significantly different in repair versus replacement or in primary versus secondary KPro replacement ($p>0.05$). The odds ratio for melt recurrence after corneal repair versus KPro replacement was 36 (95% CI 4,299).

Conclusions: KPro replacement offers a lower risk of recurrence of melt compared to repair. However, repair may be considered when timely access to a new KPro and corneal graft is not possible. Delaying KPro replacement does not significantly affect BCVA. Finally, KPro replacement is the only effective treatment when melt has led to extrusion or uncontrollable infection.

Title: Trends in Fungal Keratitis in Canada: A Retrospective Comparison Study

Authors: Jennifer Ling, Grace Qiao, Mark Fava, Mona Harissi-Dagher, Sonia Yeung, Alfonso Iovieno

Abstract Body:

Purpose: The purpose of this study is to analyse the epidemiological trends and describe the clinical features of fungal keratitis in tertiary academic centers in Canada over a 16-year period.

Study Design: This multicentric retrospective case series reviewed the medical charts of patients that had a microbiologically confirmed diagnosis of fungal keratitis from 2003 to 2019. The tertiary-care centres included were from Vancouver, BC, Montréal, QC, and Hamilton, ON.

Methods: Information extracted from patient charts includes incidence, patient demographics, risk factors, fungal species, medical and surgical interventions, and visual acuity outcomes of fungal keratitis. Data are expressed as mean \pm standard deviation.

Results: The study identified 29 *Candida* and 25 filamentary cases; there was an increasing incidence of both over time. The mean patient age was 60 years (range 9 - 87 years), and 57% were female (43% male).

Subspecies of *Candida* identified

included *albicans* (52%), *parapsilosis* (31%), *tropicalis* (7%), *guilliermondii*, *krusei*, and “non-*albicans*” (3% each, respectively). Filamentary species

included *Aspergillus* (60%), *Fusarium* (20%), *Paecilomyces*, *Cryptococcus*, *Penicillium*, *Scedosporium*, *Pseudoall*

escheria, and *Beauveria* (4% each, respectively). The main risk factors were ocular surface disease (71%) and

previous ocular surgery (71%) for *Candida*, and contact lens use in filamentary fungi (32%). *Candida* keratitis

required 100 ± 75 days to clinical resolution, while filamentary keratitis required 65 ± 50 days. Final visual

acuties tended to be worse for filamentary cases, as only 39% of patients achieved 20/200 or better, as

compared to 67% in *Candida* cases. Of *Candida* cases, 24% required therapeutic keratoplasty (TK), 3.4%

required optical keratoplasty and 17% required enucleation/evisceration. Of filamentary cases, 20% required

TK, 4% required optical keratoplasty and 16% required enucleation/evisceration. Partial susceptibility data

was gathered. The available data suggest that *Candida* species were universally susceptible to 5-

fluorocytosine and almost universally susceptible to fluconazole, with the exception of *C. krusei*.

Fusarium species tended to be pan-resistant to antifungal agents.

Conclusions: Similar to other geographic areas with more temperate climates, fungal keratitis in Canada

appears to be on the rise. *Candida* species account for approximately half of identified cases. Contact lens

usage was identified as the main risk factor for filamentary fungi infections. One quarter to one fifth of all

cases required therapeutic keratoplasty for resolution. In general, *Candida* tended to be more susceptible to

antifungal agents while filamentary species were more resistant. Fungal keratitis continues to be a serious

cause of blindness, and increased awareness regarding local epidemiology may improve future patient

outcomes.

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2020 COS Virtual Annual Meeting

Session Title: Glaucoma Care in Canada: State of Affairs

Session Time: Friday, June 26, 2020, 3:45 – 4:00 PM

Title: Longitudinal trends in interdisciplinary care for new glaucoma patients in Ontario

Authors: Matthew P. Quinn, Marlo Whitehead, Sudeep Gill, Erica de L.P. Campbell, Robert J. Campbell

Abstract Body:

Purpose: To examine trends in the distribution of new glaucoma patients and new glaucoma suspects between ophthalmologists and optometrists in Ontario; and, to determine patient-level predictors of provider type.

Study Design: Longitudinal, retrospective, population-based study using provincial health care databases.

Methods: Ontario Health Insurance Plan beneficiaries over 65 years of age were included. Population-based rates of new diagnosis of glaucoma or glaucoma suspect status with and without therapy initiation (i.e. first-ever medication or laser trabeculoplasty) were obtained using population-wide databases from 2007 to 2017. Logistic regression was used to assess factors associated with type of provider. Institutional REB approval was obtained.

Results: A total of 362,174 persons were diagnosed with and/or initiated therapy for glaucoma. Over the study period, the rate of diagnosis without therapy initiation by an ophthalmologist increased from 366 to 503 per 100,000 population, and by an optometrist from 367 to 433 per 100,000 population. Over the same period, the rate of glaucoma therapy initiation by an ophthalmologist declined from 1003 to 725 per 100,000 population. Before 2011, optometrists in Ontario did not prescribe medications. Subsequently, the rate of glaucoma therapy initiation by an optometrist increased to 94 per 100,000 population in 2017. In this final year of the study, ophthalmologists provided care to 53% of persons receiving a glaucoma diagnosis without therapy initiation and to 88% of persons initiating glaucoma therapy. Predictors for receipt of care from an ophthalmologist included greater age, increasing comorbidity score, female sex, and previous cataract, cornea, or retina surgery. Patients living in rural areas were less likely to receive care from an ophthalmologist (all $P < 0.0001$).

Conclusions: While the majority of care for new glaucoma patients in Ontario is delivered by ophthalmologists, optometrists are playing a growing role. This appears to be predominantly in the diagnosis of glaucoma suspects, especially those who are younger and healthier. Since extension of prescribing privileges in 2011, optometrists in Ontario have been initiating therapy at an increasing rate. Nevertheless, nearly 9 out of 10 patients receiving first-line therapy for glaucoma are treated by ophthalmologists. Overall, the rate of treatment initiation by ophthalmologists in persons over 65 has been declining and this finding bears exploration in subsequent work.

2020 COS Virtual Annual Meeting

Session Title: Glaucoma Diagnostics: 2020 and Beyond

Session Time: Friday, June 26, 2020, 4:00 – 5:15 PM

Title: Comparison of Five Criteria for Detecting Glaucomatous Visual Field Damage**Authors:** Herman Stubeda, Jack Quach, Jennifer Gao, Marcelo T. Nicolela, Balwantray C. Chauhan, Jayme R. Vianna**Abstract Body:**

Purpose: There is currently no consensus on visual field (VF) criteria that define glaucoma. The purpose of this study was to compare the hit rates and overlap of 5 VF criteria for glaucoma: Glaucoma Hemifield Test (GHT), Hoddap-Anderson-Parrish 2 (HAP2), Foster, United Kingdom Glaucoma Treatment Study (UKGTS), and Low-pressure Glaucoma Treatment Study (LoGTS).

Study Design: Cross-sectional comparison.

Methods: We retrospectively included VF (Humphrey 24-2 SITA) and OCT (Spectralis) examinations from a 2-year period in the Glaucoma Clinic of the Queen Elizabeth II Health Science Centre, Halifax. VF and OCT exams were paired when performed within 4 months. One VF-OCT pair per randomised eye per patient was included. Eye pathologies other than glaucoma were excluded. Global and sectoral averages of optic nerve head minimum rim width, circumpapillary retinal nerve fiber layer thickness, and macular ganglion cell layer thickness were measured with OCT and considered abnormal if thinner than the 1% percentile of an age-adjusted normative value. An OCT abnormality score was created ranging from 0 (no average abnormal in any structure) to 6 (all three structures with 2 or more averages abnormal). Criteria hit rates and overlap were determined at each score. With the assumption that patients with OCT score of 0 do not have glaucoma, the criteria hit rates in this population could be an indicator of criteria specificity. The criteria hit rates in patients with higher OCT scores could be an indicator of criteria sensitivity.

Results: We included 1230 eyes, which had a mean (\pm standard deviation) age of 67.1 ± 12.28 years, and a mean VF mean deviation of -3.34 ± 4.78 dB. In patients with OCT score of 0 ($n = 490$), HAP2 (64%) and UKGTS (52%) had higher hit rates, while GHT (29%), Foster (29%), and LOGTS (16%) had lower hit rates. In patients with OCT score of 6 ($n = 138$), HAP2 (100%) and UKGTS (99%) had higher hit rates, while GHT (93%), Foster (83%), and LOGTS (85%) had lower hit rates. The hit rates on patients with other OCT scores followed the same trend. Of the 1030 patients flagged by at least one criterion, 428 (41%) were flagged by all the criteria.

Conclusions: Among the 5 criteria, HAP2 and UKGTS had low specificity and high sensitivity. LOGTS had a high specificity but low sensitivity. GHT had intermediary specificity and sensitivity, while Foster had intermediary specificity but low sensitivity. These results can inform the choice of VF criteria for glaucoma studies.

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🏆 DEUXIÈME PRIX, PRIX D'EXCELLENCE DE LA SCO 🏆

Title: Multi-centre comparison of the Toronto Portable Perimeter to the Humphrey Field Analyzer

Authors: Yusuf Ahmed, Austin Pereira, Sylvie Bowden, Runjie B. Shi, Yan Li, Iqbal Ike K. Ahmed, Steve A. Arshinoff

Abstract Body:

Purpose: Visual Field (VF) testing is an integral part of the management and monitoring of glaucomatous change. Current VF testing technology is expensive, non-portable, and requires supervision by a trained technician. The Toronto Portable Perimeter (TPP) is an inexpensive, portable alternative perimeter that utilizes a personal smartphone and a virtual reality viewer to conduct VF tests. The purpose of this study is to compare the performance of the TPP with the Humphrey Field Analyzer (HFA) in VF testing.

Study Design: Multi-centre prospective cohort analysis.

Methods: Patients with suspected or confirmed glaucoma at Prism Eye Institute (Oakville, Ontario), York Finch Eye Associates (North York, Ontario) or the CNIB Mobile Eye Care Unit (Cochrane, Ontario) were considered for inclusion. Each patient performed consecutive VF tests on the same eye using the HFA SITA-Standard 24-2 test and TPP-Standard 24-2 test in random order. Bland Altman analysis and paired t-tests were used to compare the performance of the TPP to the HFA. The primary outcome was the mean difference in mean deviation (MD) between cohorts.

Results: 123 eyes from 77 patients were included in analysis. Average MD (\pm standard deviation) of the overall cohort using HFA and TPP VF testing was -3.99 ± 4.93 dB and -4.27 ± 4.68 dB, respectively. Bland Altman analysis showed good agreement between HFA and TPP tests of the same patient eye. The mean differences (95% confidence interval) between HFA and TPP for MD, Pattern Standard Deviation (PSD), Visual Field Index (VFI) and test duration were 0.28 dB (-4.19 to 4.75dB), -0.08 dB (-3.56 to 3.39dB), 0.5% (-11.3 to 12.3%), and 5.88 seconds (-87.6 to 99.4 seconds), respectively. Mean difference between the HFA and TPP tests for MD, PSD, VFI and test durations were not statistically significantly different. False positive rates on the TPP and HFA were statistically similar (TPP: 2.6%, HFA: 3.0%, $p = 0.42$); however, percentages of fixation losses were significantly lower (TPP: 12.8%, HFA: 20.8%, $p < 0.01$) and false negatives were significantly higher (TPP: 10.1%, HFA: 4.3%, $p < 0.01$) on the TPP.

Conclusions: The results of this study demonstrate that MD, PSD, and VFI test results on the TPP are statistically similar to those measured on the HFA. Test time duration did not significantly differ between TPP and HFA tests. These results suggest that the TPP may offer a more accessible, lower-cost alternative to HFA visual field testing.

Title: Aqueous humor lipidomic profile in glaucoma patients

Authors: David J. Mathew, Izhar Livne-Bar, Darren Chan, Yvonne M. Buys, Graham E. Trope, Marisa Sit, Becca Flitter, Karsten Gronert, Jeremy M. Sivak.

Abstract Body:

Purpose: To identify the aqueous humor (AH) lipidomic profile in glaucomatous eyes compared to those without glaucoma

Study Design: Prospective comparative study

Methods: AH samples from eyes with and without glaucoma underwent lipidomic analyses using liquid chromatography-mass spectrometry (LC-MS). The glaucoma samples were obtained from 60-80-year-old primary open angle glaucoma patients undergoing a glaucoma surgery with or without cataract surgery and the control samples were obtained from patients undergoing routine cataract surgery. Patients with diabetes mellitus, systemic inflammatory disease, uveitis, retinopathy and age-related macular degeneration were excluded. From each eye, 100 μ L of AH was collected using a 30 Gauge needle mounted on a 1-mL syringe, introduced into the anterior chamber anterior to the limbus, prior to any surgical intraocular entry. The samples were snap frozen on dry ice and transported for lipidomic analyses of a panel of 40 polyunsaturated fatty acids (PUFA), metabolites and lipid mediators. All participating patients signed an informed consent form and the study was approved by the University Health Network and Kensington Eye Institute Research and Ethics Boards.

Results: AH was collected from 16 and 18 eyes with and without glaucoma, respectively. The mean age was 68.7 ± 6.4 years for the glaucoma group and 71.0 ± 4.7 years for the control group ($p=0.25$). The mean preoperative intraocular pressure 14.1 ± 3.1 and 15.2 ± 1.6 mmHg for the glaucoma and control groups, respectively ($p=0.24$). The cup-to-disc ratios were 0.9 ± 0.1 and 0.3 ± 0.1 for the glaucoma and control groups, respectively ($p < 0.001$). All 16 glaucoma eyes received prostaglandin analogue eye drops prior to surgery; 15 were on beta-blocker eye drops. There were statistically significant differences between glaucomatous and control eyes for arachidonic acid (1328.0 ± 322.0 vs 643.1 ± 130.6 , $p=0.001$), lipoxin A₄ (0.79 ± 0.14 vs 0.32 ± 0.10 , $p=0.01$) and 12-hydroxyeicosapentanoic acid (0.35 ± 0.17 vs undetected, $p=0.04$). Substantial levels, but no significant differences, were identified for docosahexanoic acid (212.0 ± 46.33 vs 131.1 ± 22.36 , $p=0.11$), eicosapentanoic acid (6.21 ± 1.40 vs 3.76 ± 0.32 , $p=0.08$), prostaglandin E₂ (2.83 ± 1.92 vs undetected, $p=0.13$) and prostaglandin D₂ (2.43 ± 1.49 vs 0, $p=0.09$). All other analytes were below detection limits.

Conclusions: Increased levels of lipid mediators are present in glaucomatous eyes. Arachidonic acid metabolites may be modulated in response to anti-glaucoma drops and play a role in glaucoma pathogenesis.

Title: A Canadian Single Centre Retrospective Evaluation of Iridociliary Cysts using Ultrasound Biomicroscopy

Author: Daisy Liu

Abstract Body:

Purpose: To evaluate the incidence and progression of iridociliary cysts presenting to a Canadian tertiary care centre using Ultrasound Biomicroscopy (UBM).

Study Design: Retrospective chart review.

Methods: Charts of patients referred for iris elevation between March 2016 and October 2019 were reviewed. All included patients received a diagnosis of an iridociliary cyst using UBM. Data was collected on age, sex, type (iris versus ciliary body), laterality, size, location in clock hours, and additional features including multicystic or multiloculated cysts on initial appointments and subsequent follow ups.

Results: 154 eyes with iris cysts were seen between March 2016 to October 2019. Of these, more were found in females compared to males (63.8% and 36.2%). The highest incidence of iris cysts occurred in females of 21-30 years of age (17.0%) and in males aged 11-20 (9.2%). 82.2% involved iris pigment epithelium and 14.9% involved the ciliary body. The size of cysts ranged between 0.5-4.41mm in diameter. Cysts larger than 1mm in diameter were more common (78.7%). 90% of cysts occurred unilaterally. 12% were multi-cystic and 8.5% were described as multiloculated and 1% showed both features. All patients were told to follow up in 1 year to reassess. Of the 141 subjects, a total of 30 (21.3%) attended follow up appointments with UBM. 43.3% (13) of iris cysts were stable, with no appreciable change in size, while 16.7% (5) had increased in size and 6.7% (2) saw a reduction in size on UBM. Iris cyst growth was found at 4 months in one patient, while the rest were found in follow up appointments after one or two years. Temporal iris cysts were the most common, consisting of 48.3% and 37.7% in the right and left eyes, respectively.

Conclusions: Evidence for the incidence and risk of progression for iris cysts is scarce. These otherwise benign cysts can grow in size and cause corneal touch and narrowed angles. Given the low rates of progression, the risk of significant growth of iris cysts is rare. Iris cysts likely do not require annual follow up in asymptomatic patients.

2020 COS Virtual Annual Meeting

Session Title: Glaucoma Therapeutics & Intervention: Future Outlook

Session Time: Saturday, June 27, 2020, 4:00 – 5:30 PM

Title: Incidence of Glaucoma Surgeries Related to Anti-VEGF Injections

Authors: Natalia Maes, John Liu, Steven Schendel, Gavin Docherty, Carol Tadrous

Abstract Body:

Purpose: To highlight the elevated number of Glaucoma surgeries related to the use of intravitreal antivascular endothelial growth factor (anti-VEGF) over a period of 18 months (from January/2016 to July/2017), under the care of one glaucoma surgeon in Vancouver, British Columbia.

Study Design: Observational-descriptive-case series

Methods: All Glaucoma surgeries performed during this period were retrospectively reviewed. The patients who were undergoing intravitreal Anti-VEGF treatment at the time of surgery were included in this analysis. Those who developed Neovascular Glaucoma or required intravitreal steroid, at any point over 18 months, were excluded. Patient's age and gender were collected, as well as lens status, previous diagnosis of Glaucoma, previous SLT (selective laser trabeculoplasty), glaucoma surgery performed, subtype of anti-VEGF and retinal disease. The mean drops required for pressure treatment, visual acuity and intraocular pressure (IOP) before, 6 and 12 months after the surgery were also assessed.

Results: A total of 430 Glaucoma surgeries were performed. From which 121 (28.14%) were carried out in the context of anti-VEGF treatment. The mean age of the subjects was 75.61 years. The mean interval time between the first consult with the glaucoma specialist and the date of surgery was 3.8 months. Of the cases, 41 (33.88%) were previously known to have glaucoma or were glaucoma suspects and 80 (66.11%) did not have glaucoma or ocular hypertension before starting the Anti-VEGF treatment. The mean IOP before surgery was 37.18 mmHg. There was a decline of 63.28% after 12 months, leading to a final mean pressure of 13.65 mmHg.

Conclusions: A surprisingly elevated rate of Glaucoma surgeries has been observed among patients on anti-VEGF treatment in Vancouver. To the best of our knowledge, this inflated number of surgeries has not been reported worldwide. Additional data on Visual outcomes and Visual Fields are being collected.

Title: Development of an injectable, space-filling thermosensitive hydrogel as a subconjunctival bleb scaffold and sustained release drug depot

Authors: James J. Armstrong, Richard Zhang, Liu Hong, Cindy M. L. Hutnik

Abstract Body:

Purpose: The subconjunctival injection of anti-metabolites prior to glaucoma microstent insertion has become a popular technique. Essentially, this “pre-forms” the filtration bleb allowing the insertion of the microstent into the preformed bleb, ab interno. Currently, aqueous preparations of Mitomycin C are used. However, aqueous solvents cause rapid dispersion of drugs and provide no lasting physical support to the bleb walls - contributing to inconsistent results. Thermosensitive chitosan hydrogels transform from an injectable liquid state at room temperature, into a gelled state at temperatures approximating the subconjunctival space. The purpose of this study was to engineer a thermosensitive hydrogel for injection into the subconjunctival physiological environment to serve as a depot for sustained drug delivery after glaucoma surgery.

Study Design: Experimental materials synthesis, in vitro biocompatibility and in vitro efficacy experiments using glaucoma patient derived Tenon’s capsule fibroblasts.

Methods: High molecular weight chitosan was solubilized at various concentrations in 1% acetic acid. Next, the solution was dialyzed against 300 volumes of double-distilled H₂O to remove the remaining acetic acid. Beta-glycerophosphate (β -GP) was then added dropwise, on ice, until a pH of 7, 7.1 and 7.2 was reached and samples collected. Tube inversion tests within a heated water bath were used to assess gelation time vs temperature. Acetylsalicylic acid (ASA) was loaded into gel samples as a test compound. A perfusion system was used to perfuse PBS through ASA-loaded chitosan gels at the rate of aqueous humor production (2.6ul/min) in order to estimate the release of ASA over time under physiological conditions. Human Tenon’s capsule fibroblasts were cultured on chitosan gels at 37°C to assess cytotoxicity, as well as in collagen matrices to evaluate cell-mediated collagen contraction as a measure of in vitro scarring activity.

Results: Chitosan and β -GP solutions of pH 7, 7.1 and 7.2 were prepared successfully as described. Tube inversion tests revealed that time to gelation and the temperature of gelation were adjustable by pH. Samples of pH 7.2 underwent gelation the quickest, in under two minutes at temperatures ranging from 34 to 40°C. ASA was successfully loaded into the chitosan gels and exhibited a delayed release profile upon perfusion. Cytotoxic effects of the gel on human Tenon’s capsule fibroblasts were minimal and ASA loaded gels inhibited cell-mediated collagen contraction compared to vehicle control.

Conclusions: Chitosan and beta-glycerophosphate hydrogels possess thermosensitive characteristics and can deliver small molecule therapeutics such as ASA in a delayed release manner. These properties would make chitosan-based drug delivery systems highly desirable for glaucoma surgery, specifically for bleb formation and stabilization.

NEURO-OPHTHALMOLOGY | NEURO-OPHTHALMOLOGIE

2020 COS Virtual Annual Meeting

Title: Intravenous tissue-type plasminogen activator thrombolysis for acute central retinal artery occlusion: a meta-analysis

Authors: Ying Wang, Yong Liu, Xiaotang Wang

Abstract Body:

Purpose: Central retinal artery occlusion (CRAO), an ocular stroke, causes severe and permanent visual impairment. Once the central retinal artery is occluded, irreversible apoptosis of the retina occurs depending on the duration of retinal ischemia. Certainly, there is no consensus about optimal or standard therapeutic treatment for CRAO endorsed by ophthalmological guidelines. Intravenous thrombolysis with recombinant tissue-type plasminogen activator (rt-PA) has been extensively applied in the treatment of CRAO with the proven advantages of feasibility and safety. This study aimed to assess the efficacy of intravenous rt-PA thrombolysis for the management of CRAO by evaluating the pooled evidence.

Study Design: Meta - analysis.

Methods: A comprehensive literature search of electronic databases including PubMed, OVID, and Cochrane Library was conducted up to and including March 2019. All studies reporting visual outcomes after CRAO (with thrombolytic therapy) were collected. Patient-level data on visual acuity (VA) and adverse events were recorded and assessed in this analysis. Data were inputted into the statistical software of STATA. The studies were weighted by the inverse of the variance and merged in a random-effects model.

Results: The systematic review process yielded seven eligible studies including 121 patients with CRAO who received the intravenous rt-PA treatment. 62 patients showed improvement in VA (52.0%; 95% CI, 34.0%>70.0%) following rt-PA intravenous thrombolytic therapy. The observed improvement rate in the intravenous rt-PA treatment group was significantly higher than the conservative treatment group (40.4% vs. 13.0%; OR, =5.16; 95% CI, 1.90-14.05). The incidence rate of complications was relatively low (11 out of the 121 patients). Hemorrhage (9/11) was the major reported complication. Mortality was zero.

Conclusions: This meta - analysis indicated that intravenous rt-PA thrombolysis could be an effective and safe strategy for the management of CRAO. However, a more detailed large-scale clinical trial is warranted to strengthen the evidence-based therapeutic guidance.

Title: Comparing the value of different formulas for calculating ocular perfusion pressure in ischemic ocular fundus disease

Authors: Xiaotang Wang, Runsheng Wang, Ying Wang

Abstract Body:

Purpose: To assess the accuracy of different formulas for measuring 24-hour ocular perfusion pressure (OPP) and the applied value for the diagnosis and treatment of ischemic ocular fundus diseases. To compare the relations between different calculative formulas and ischemic ocular fundus diseases.

Study Design: Retrospective study

Methods: 361 patients (381 eyes) with ischemic ocular fundus diseases from July 2010 to December 2016 in our hospital were retrospectively analyzed. Patients were diagnosed by Optic nerve thickness analysis, visual field examination, visual electrophysiology, and Fundus fluorescence angiography. The 24-hour intraocular pressure (IOP) in sitting position of all the patients were measured through non-contact tonometer. The systolic blood pressure (SBP) and diastolic blood pressure (DBP) of brachial artery and heart rate were measured by electrocardiogram monitor simultaneously. As we know, the mean artery pressure (MAP) equals $DBP + 1/3(SBP - DBP)$. OPP can be calculated by four formulas: OPP A = $(45\%DBP - IOP)$, OPP B = $2/3MAP - IOP$, OPP C = $95/140MAP - IOP$, OPP D = $MAP - IOP$. The alarming value of OPP for ischemic ocular fundus disease is 10mmHg. OPP less than 10mmHg was regarded as hypoperfusion.

Results: 241 patients (67%) had more than twice time-point of hypoperfusion. The onset of ischemic ocular fundus diseases in 236 patients (62%) was in accord with the time-point of hypoperfusion. Improvement of OPP and ocular hemodynamics was observed in 231 patients (64%) after treatment. Mean OPP by formula A, B, C and D were (32.63 ± 7.04) mmHg, (49.40 ± 10.53) mmHg, (43.49 ± 10.71) mmHg and (71.86 ± 13.80) mmHg, respectively. The OPP calculated by different formulas was statistically significant ($F=23.508, P=0.000$). There was significantly different between formula A and D ($t=-8.009, P=0.000$). There was no significant difference between formula B and C ($t=1.244, P=0.229$). OPP calculated by formula A is closest to the alarming value of 10mmHg and is the most credible method to measure OPP. The ranking of formulas by the closeness degree was $A > C > B > D$.

Conclusions: 24-hour OPP reflected the situation of IOP, blood Pressure, and retinal hemodynamics, providing the evidence of the diagnosis and treatment of ischemic ocular fundus diseases. Though the OPP obtained from these methods are all higher than the alarming value of 10mmHg, the OPP obtained through formula A are closest to the alerting value in accord with the ischemic ocular fundus diseases. We suggest that formula A is the optimal calculate for OPP.

Title: Homonymous Macular Ganglion Cell Complex Atrophy on Optical Coherence Tomography without Significant Visual Field Changes

Authors: Mark K. Lukewich, Matthew B. Schlenker, Jonathan A. Micieli

Abstract Body:

Purpose: Neuro-ophthalmologists may discover homonymous thinning of the optical coherence tomography (OCT) macular-ganglion cell complex (GCC) without significant visual field defects in the workup of patients with suspected optic neuropathies or visual field defects. The differential diagnosis for this finding remains unknown. The goal of this study was to determine the causes of homonymous thinning of the OCT macular-GCC without significant visual field changes.

Study Design: A retrospective chart review was performed on 1000 consecutive patients that underwent OCT retinal nerve fiber layer (RNFL) and macular-GCC with Humphrey visual fields.

Methods: Patients were included in the study if they had high quality OCT scans, MRI brain, Humphrey visual fields and homonymous macular-GCC atrophy without significant visual field changes. A normalized asymmetry score (NAS) and the degree of bow-tie atrophy were quantified.

Results: A total of 6 patients, 3 females and 3 males, with a mean age of 40.3 (range 27 to 57) years were included in the study. Homonymous OCT macular-GCC thinning was secondary to demyelination of the optic tract in 4 patients (3 with multiple sclerosis and 1 with clinically isolated syndrome) and traumatic brain injury (TBI) in 2 patients. Three patients with demyelinating disease had a documented prior homonymous visual field defect that resolved. One TBI patient experienced a subjective visual field defect, but did not have this documented. There was a higher mean NAS among TBI patients (0.33) compared to those with demyelination (0.20, $p=0.07$). No significant difference in the degree of bow-tie atrophy was observed between groups (TBI 0.49, demyelination 0.50, $p=0.55$).

Conclusions: Homonymous thinning of the OCT macular-GCC with essentially normal visual fields is mainly a result of previous demyelination involving the optic tract and TBI. OCT macular-GCC represents a novel method for establishing previous optic tract involvement in multiple sclerosis, which can help in establishing dissemination in time and space.

Title: Evaluation of Neural and Vascular Structural Degeneration of the Retina and Optic Nerve Head following Retro-Geniculate Ischemic Stroke Using OCT

Authors: Amit V. Mishra, Michael West, Rebecca George, Corey Smith, Charles Maxner, Balwantray Chauhan, Brennan Eadie

Abstract Body:

Purpose: To determine the time course of retinal vascular degeneration that appears to occur as a result of retrograde trans-synaptic degeneration. This study is based on our recent observation that attenuation of the retinal vasculature can occur several years after a retro-geniculate insult in a manner that matches retrograde trans-synaptic degeneration of the retinal ganglion cell layer.

Study Design: Prospective, cross-sectional study.

Methods: Patients with an ischemic stroke to the retro-geniculate visual pathway causing a homonymous visual field defect were recruited. Patients were classified based on the time between their stroke and testing (2 to 6 months; 6 months to 1 year; 1 year to 2 years, greater than 2 years). Patients were excluded if they had a history of previous neurologic/ophthalmologic disease causing a visual field deficit. Each patient underwent optical coherence tomography (OCT) and OCT-angiography (OCTA) of the peripapillary and macular regions, disc photos, and visual field (Humphrey 24-2) at a single time point.

Results: Atrophy of the ganglion cell layer and superficial vascular plexus was noted in our patient population consistent with retrograde trans-synaptic degeneration. These deficits matched the pattern of visual field loss and showed a respect of the vertical midline. Vascular degeneration was noted within the first year of a retro-geniculate insult.

Conclusions: In this study, using OCTA, we show, in vivo, that retrograde trans-synaptic degeneration is associated with vascular degeneration. Further, we show that this vascular degeneration occurs within the first year following a retro-geniculate insult. This cross-sectional study helps better elucidate the time course of retinal changes post retro-geniculate stroke; however, prospective studies are needed to better characterize these changes.

Title: Is there an association between herpetic infections and giant cell arteritis? A population-based study

Authors: Dong-ho Lee, Alfonso Iovieno, Claire A. Sheldon

Abstract Body:

Purpose: Recent data suggests herpes zoster (HZ) and herpes simplex virus (HSV) may be one of the underlying immunological triggers for giant cell arteritis (GCA). However, there is limited population-based data to support this hypothesis. Our goal was to determine if infection by HZ increases the likelihood of GCA in the British Columbia (BC) population.

Study Design: Comparative descriptive study using population database analysis.

Methods: All BC residents ≥ 30 years old at the time of either diagnosis from January 2000 - January 2019 were included. The background prevalence of GCA was compared to the prevalence of GCA in subjects with HZ and HSV using diagnostic billing code data from an online BC database (Population Data BC, <https://www.popdata.bc.ca/>). To identify cases of GCA, the relevant International Classification of Disease (ICD) was used and combined with the codes for ischemic optic neuropathy OR retinal arteriolar occlusion AND having had a temporal artery biopsy. To identify cases of HZ or HSV, the relevant ICD codes were used. All comparisons were made using 2-sample Z tests.

Results: There were 4 315 GCA diagnoses from a total population of 3 026 005 subjects. The prevalence of GCA was 143 per 100 000 population ≥ 30 years of age. Looking at subjects with herpetic infections, 850 GCA cases were identified in 249 900 subjects with HZ versus 310 diagnoses of GCA in 163 170 subjects with HSV. The prevalence of GCA in subjects with HZ (0.340%) was significantly higher than the prevalence of GCA (0.143%) in the general population ($p < 0.00001$). The prevalence of GCA in HSV subjects (0.190%) was also significantly higher ($p < 0.00001$) than the population prevalence but lower than ($p < 0.00001$) the GCA with HZ prevalence.

Conclusions: Using a provincial population database, we identify a prevalence of GCA of 143 per 100 000 people ≥ 30 years of age. The likelihood of developing GCA seems to increase with herpetic infections. It appears that herpes infections in general, but more specifically HZ, may increase the risk of developing GCA. Further study is required to gain insight into this potential association.

Title: Magnetic resonance or computed tomography venography in the evaluation of overweight women with papilledema

Authors: Jovi Chau-Yee Wong, Anna Kabanovski, Edward A. Margolin, Jonathan A. Micieli

Abstract Body:

Purpose: Magnetic Resonance Venography (MRV) or Computer Tomography Venography (CTV) is routinely obtained to rule-out dural venous sinus thrombosis (DVST) in patients with papilledema, but the urgency and necessity of these tests is still debated. Our goal was to determine the utility of MRV/CTV in overweight women with incidentally discovered papilledema and patients presenting due to symptomatic intracranial hypertension (IC-HTN) to neuro-ophthalmology.

Study Design: Retrospective study of consecutive female patients with papilledema seen at tertiary neuro-ophthalmology clinics at the University of Toronto.

Methods: Female patients with papilledema were included in the study if they met the inclusion criteria of: i) age 16-50 years ii) papilledema iii) Optical coherence tomography (OCT) Retinal Nerve Fibre Layer (RNFL) thickness of greater than 100 μm iv) Body mass index (BMI) greater than 25 kg/m^2 based on self-reported weight and height v) MRV or CTV of the head. Exclusion criteria: personal or family history of venous thrombosis, rheumatological disease, cancer or pregnancy. Patients were divided into Group-1 (incidentally discovered papilledema) and Group-2 (sought medical attention due to symptoms of IC-HTN).

Results: 103 patients (n=45 Group-1, n=58 Group-2) were included with a final diagnosis of idiopathic intracranial hypertension (IIH; n=94), drug-induced IC-HTN (n=4), DVST (n=2), intracranial mass (n=2) and POEMS (n=1). Group-2 patients were significantly more likely to have pulsatile tinnitus ($p=0.017$), transient visual obscurations ($p=0.007$) and showed a trend for increasing headache ($p=0.058$). Group-2 patients had a higher lumbar puncture opening pressure (38.5 vs. 33.0, $p=0.013$), but there was no difference in age, BMI, OCT-RNFL thickness or mean deviation between groups. MRV/CTV revealed distal transverse sinus stenosis in 42/45 (93%) of Group-1 patients and 57/58 (98%) of Group-2 patients. DVST was initially reported in 2 Group-1 patients and 2 Group-2 patients; however, false positive results were found in both Group-1 patients after further imaging review or repeat imaging and the 2 confirmed DVST patients had significant neurological symptoms.

Conclusions: DVST is rare among overweight women with papilledema without risk factors. No patient with incidentally discovered papilledema was ultimately diagnosed with DVST and MRV/CTV may be interpreted incorrectly leading to false positive results. Therefore, there is room for clinical judgment when deciding to perform MRV/CTV in the workup in overweight women with incidentally discovered papilledema without risk factors.

Title: Retinal manifestations of idiopathic intracranial hypertension

Authors: Prem Nichani, Jonathan Micieli

Abstract Body:

Purpose: The well-known ophthalmological manifestations of idiopathic intracranial hypertension (IIH) are papilledema and abducens nerve palsy, but less commonly recognized retinal manifestations may occur. The goal of this study was to identify significant IIH retinal changes that may occur in a group of patients with high-quality retinal photographs and optical coherence tomography (OCT) of the macula. A detailed literature review was also undertaken to provide comprehensive data on this topic.

Study Design: Retrospective case series and literature review.

Methods: Consecutive IIH patients presenting from July 2018 to October 2019 to a tertiary neuro-ophthalmology practice at Kensington Vision and Research Centre (KVRC) at the University of Toronto were included in the study. High-quality fundus photographs were routinely obtained for all patients referred for IIH at this centre. Patients were included if they met the modified Dandy Criteria for diagnosis and clinical characteristics were retrieved for each patient. A comprehensive literature review was conducted using Ovid MEDLINE and EMBASE using keywords and medical subject headings.

Results: Ninety-six patients were included in the study and four patients (two women, two men) had significant retinal findings: bilateral venous stasis retinopathy secondary to severe papilledema, choroidal neovascularization from adjacent papilledema, bilateral macular exudate, and bilateral subfoveal fluid. At presentation, amongst the four patients, average age was 35.8 ± 11.5 years (range: 23-49), body mass index was 46.1 ± 6.2 kg/m², visual acuity ranged from 20/20 to 20/500 in either eye, and the average mean deviation on Humphrey visual field testing was -11.6 ± 11.5 dB. The patient with venous stasis retinopathy secondary to severe papilledema was treated with VP-shunting whereas all others were treated with weight loss and acetazolamide. The patient with significant macular exudate had elevated blood pressure which was also treated. Retinal manifestations of IIH reported in the literature include choroidal infarction (n=1), choroidal neovascular membranes (n=31), macular exudate from associated papilledema (n=3), venous stasis retinopathy (n=8), subfoveal fluid from adjacent papilledema (n=20). Retinal and choroidal folds were studied prospectively in the IIH treatment trial and found in 19% and 1% of patients, respectively.

Conclusions: Significant retinal manifestations associated with IIH include venous stasis retinopathy, choroidal neovascularization, macular exudate and subretinal fluid. These changes may result in a reduction in visual acuity or a visual field defect distinct from that caused by papilledema.

Title: Neuro-Ophthalmic Manifestations of Lymphomas

Authors: Amirthan Sothivannan, Amadeo R. Rodriguez

Abstract Body:

Purpose: To describe the neuro-ophthalmic manifestations of lymphoma.

Study Design: Retrospective review of patient charts.

Methods: Between January 2016 and October 2019, we identified five patients whose neuro-ophthalmic manifestations led to either the initial diagnosis of lymphoma, or the identification of recurrent disease. The clinical and radiological findings will be presented.

Results: 1) Hemianopsia as initial manifestation: 74 y.o man with 3 weeks history of blurry vision and missing the left side of sentences from complete left homonymous hemianopia. CT showed large right-sided occipital mass. Biopsy revealed primary CNS diffuse large B-cell lymphoma. 2) Diplopia as initial manifestation: 76 y.o. hypertense woman. Seen for one month history of right pupil-involving CN III. CT-CTA elsewhere no aneurysm, right sided sinusitis. Progressed to diffuse ophthalmoplegia. MRI extensive sphenoid-ethmoidal-maxillary sinus involvement extending to cavernous sinus-skull base, suggestive of osteomyelitis. Started on polymicrobial coverage. Biopsy showed large B-cell lymphoma. 3) Diplopia as first manifestation of recurrent disease: 66 y.o. man. Previous history of Non-Hodgkin'S B-cell lymphoma, diagnosed 9 months prior, treated with CHOP-R. Three months after completing treatment, developed painful right CN III palsy which progressed to complete right-sided ophthalmoplegia and optic neuropathy (orbital apex-cavernous sinus syndrome). MRI showed right cavernous sinus involvement. 4) Intraocular involvement as manifestation of recurrent disease. 62 y.o. woman who had previous diagnosis of diffuse large B-cell lymphoma 6 years before. Previously treated and doing well until August 2019 when she had a seizure and subsequently complained of decreased vision in the right eye. Exam revealed right eye vitreitis and retinal infiltrates in keeping with lymphomatous involvement. 5) Optic neuropathy in the context of widespread disease subsequently diagnosed as lymphoma. 63 y.o. man: 3 months history of fatigue, leg weakness, weight loss, and leptomeningeal enhancement on MRI. Developed sudden vision loss in the left eye, and there was a nodule compressing the optic nerve, which was being considered for a biopsy but in the meantime, developed bilateral weakness, and numbness in both hands. New MRI showed a mass-like focus of leptomeningeal-dural disease at C6-C7 with significant mass effect on the spinal cord, and resection of this lesion was done instead. Pathology revealed ALK anaplastic large cell lymphoma.

Conclusions: Lymphomas can involve the afferent and efferent visual system. The neuro-ophthalmic manifestations can be isolated or part of a more generalized presentation and this can occur at any time during the course of the disease. This case series emphasizes the ophthalmologist's role in identifying this condition and the importance of being aware of the potential manifestations.

Title: Prevalence of Mitochondrial Mutations in British Columbia

Authors: Heidi M. Britton, Colton Wendell, Hillary Vallance, Andre Mattman, Claire Sheldon

Abstract Body:

Purpose: Ocular manifestations of mitochondrial disease are often under recognized. This study aims to i) estimate the prevalence mitochondrial disease, including LHON, MELAS, MERRF, NARP, and CPEO + KSS in British Columbia, Canada, ii) provide an expanded description of the clinical presentation of these diseases. Together these data will provide an unmatched picture of the clinical burden of mitochondrial disease and ultimately inform future studies.

Study Design: Retrospective chart review involving three tertiary institutions in Vancouver, British Columbia.

Methods: The Biochemical Genetics Lab at BCCH/Women's Hospital and the Adult Metabolic Disease Clinic at Vancouver General Hospital coordinate and document all clinical genetic analyses in British Columbia. Charts of subjects diagnosed with mtDNA point mutations between January 1st 1996 - June 18th 2019 (LHON, MELAS, MERRF, NARP) and for CPEO (Chronic Progressive External Ophthalmoplegia) January 1st 2016 - June 18th 2019 were reviewed. Phenotypic and genotypic information were collected using a secure, custom-make REDCap database.

Results: For subjects with any mtDNA point mutations, the overall prevalence was 3.60 per 100,000 (95% CI 3.04 to 4.27 per 100,000). Of these, we identified 49 subjects with genetically confirmed LHON yielding a minimum point prevalence (MPP) of 1.32 per 100,000 (95% CI 1.00-1.74 per 100,000). Overall, subjects ranged in age from 7.5-89.4yrs, were 51.0% male, with heteroplasmy found in 25% of subjects. Those with confirmed symptomatic LHON were 67% male, below the previously-reported 75% preponderance. The majority (n=47/49) were LHON primary mutations (n=29, m.11778G>A; n=16, m.14484T>C; n= 2, m.3460G>A). Genetically-confirmed MELAS (m.A3243G) was identified in 69 subjects, with a MPP = 1.86 per 100,000 (95% CI 1.47-2.35 per 100,000); MERRF in 12 subjects, MPP = 0.32 per 100,000 (95% CI 0.18-0.56 per 100,000); NARP in 4 subjects, MPP = 0.11 per 100,000 (95% CI 0.04-0.28 per 100,000). For subjects with mtDNA depletions, CPEO was found in 30 subjects, MPP = 0.74 per 100,000 (95% CI 0.52-1.06 per 100,000) and Kearns-Sayre syndrome in 4 subjects, MPP 0.10 per 100,000 (95% CI 0.04-0.25 per 100,000). Statistics on mutation /deletion location, heteroplasmy, gender, and ages at diagnosis are further presented.

Conclusions: In British Columbia, approximately 1 in 25,000 people possess mitochondrial DNA point mutations, a prevalence greater than all ocular cancers combined. However, ocular manifestations of these diseases are under-recognized. Although descriptive, this study provides clarity into the epidemiology of these varied genotypes and their diverse ocular phenotypes.

Title: The Assessment of Quality of Life in Patients with a Diagnosis of Uveal Melanoma

Authors: Sonia Anchoche, Jiaru Liu, Georges Nassrallah, Jean Deschenes

Abstract Body:

Purpose: Uveal melanoma is the most common adult intraocular malignancy in the United States. At present, there exists a multitude of uveal melanoma treatment options ranging from globe-preserving methods like plaque radiotherapy to enucleation. Although there have been significant advances in the treatment of primary uveal melanoma, none of the available treatment modalities have been shown to have a significantly superior impact on mortality. Hence, the quality of life and visual functioning post treatment serve as key factors in selecting the appropriate management plan for these patients. The aim of this study is to examine the quality of life of patients treated for uveal melanomas and to review the assessment tools used in the literature.

Study Design: Systematic Review

Methods: A search strategy was employed using the National Library of Medicine (PubMed), Embase, Ovid online, and Cochrane databases to identify all articles addressing the quality of life of patients with uveal melanoma. We included all English, original retrospective or prospective studies published between January 2003 to September 2019 in which the primary outcome was the health-related quality of life (HRQOL) of patients with treated or untreated uveal melanoma, with or without metastasis.

Results: Our search strategy resulted in 69 articles, of which 39 articles were retrieved following title and abstract screening. Twenty articles were included in this study. A total of 3618 patients with iris, ciliary body or choroidal melanoma were included in this review. On average, each study employed 2 different assessment tools to quantify the quality of life of uveal melanoma patients. Overall, physical functioning and mental well-being are impaired in uveal melanoma patients after treatment compared to the general population. The extent of the impairment decreases with time, and HRQOL is comparable to the general population as early as 6 months post-treatment. 6/12 studies comparing treatment options reported no statistical difference in physical functioning between treatments. 5/12 studies reported better visual function with radiation therapy compared to enucleation, two of which described no difference between the two options at long term. Anxiety is more prevalent than depression after most types of treatment, and both decrease to less than 10% at 1-year follow-up.

Conclusions: Overall, there is no significant difference in the long-term quality of life of patients with uveal melanoma between different treatment groups. At short term, there is better physical functioning and emotional well-being associated with radiotherapy compared to enucleation. A combination of QoL assessment tools is commonly used in order to adequately address the physical limitations of vision impairment as well as the psychosocial impact of the disease and treatment on patients.

Title: A Systematic Review of the Role of Eyelid Wipes in the Management of Blepharitis and Meibomian Gland Dysfunction

Authors: Mišo Gostimir, Larry Allen

Abstract Body:

Purpose: Eyelid hygiene is the mainstay of blepharitis management and while eyelid wipes are routinely recommended, the wide range of options available and remarkable variability in their use can be confusing for patients and physicians. Furthermore, routine and potentially life-long treatment with eyelid wipes does not come without financial cost and potential adverse effects. The purpose of this review was to provide a comprehensive summary of all existing evidence for the efficacy of eyelid wipes in the management of blepharitis.

Study Design: Systematic review.

Methods: A search of Medline and Embase (1946 to 2019) was conducted to identify all relevant studies which assessed the efficacy of eyelid wipes in patients with blepharitis. Studies of patients with demodex-associated blepharitis were also included. Studies that included other interventions as a combination treatment were excluded, as well as studies that evaluated warm compresses. Risk of bias was assessed using the Cochrane Risk of Bias tool for RCTs, the MINORS tool for nonrandomized studies, and the modified Delphi tool for case series studies. An adverse effect analysis was performed as well as a cost (CAD) and availability (in Canada) assessment.

Results: Following the review of 1650 search results, 16 studies were included. Of these, 10 studies pertained to patients with blepharitis and 6 pertained to patients with demodex-associated blepharitis. A variety of eyelid wipes were studied among both groups of patients and included generic household products, tea tree oil (TTO)-based products, commercial solutions, and commercial wipes. Some degree of improvement was demonstrated within 1 or 2 months for all options that were studied. There was not enough evidence to determine the relative effectiveness of different options. There was significant heterogeneity and all non-generic options were limited to 1 study, which precluded meta-analysis. The risk of bias assessment revealed concerns regarding the quality of evidence, and notably, almost half of the studies were industry-supported or reported potential conflicts of interest.

Conclusions: While some efficacy has been demonstrated for several eyelid wipe options, including generic ones, there remains a lack of robust evidence to support their routine recommendation and there are concerns about the quality of evidence currently available. Long-term costs and potential adverse effects should not be overlooked. There is also not enough evidence to suggest the superiority of one option over others.

Title: The Kissing Puncta: an underreported cause of epiphora and presentation of a three-pronged approach to improving tear clearance

Author: Harleen Bedi

Abstract Body:

Purpose: ‘Kissing puncta’ (KP) or punctal apposition is an anatomical phenomenon that is sparsely reported as a cause of epiphora in the ophthalmic literature. We review our three-pronged approach to managing the three distinct components implicated in contributing to chronic epiphora in patients with medial canthal crowding.

Study Design: A prospective review of seven patients (fourteen eyes) with KP associated with epiphora was conducted.

Methods: Each patient’s presenting symptoms, eye examination, and surgical outcomes were collected. Pre- and post-intervention photos were collected with patient’s consent. An epiphora symptom questionnaire (MUNK scale) was completed at the time of initial consult and at post-operative follow-up visits.

Results: Seven patients aged with average age 74 years (± 3.5) were reviewed. Megalocaruncle, medial orbital fat prolapse, and involutional eyelid laxity were noted to be common clinical features. Punctal narrowing was observed in four patients. All patients were free to nasolacrimal duct irrigation with a hard stop and absence of any strictures on lacrimal probing. Seven patients underwent our three-pronged approach to restore the medial canthal architecture. A combined carunclectomy, medial elliptical skin incision with transcutaneous orbital fat decompression and lateral tarsal strip procedure was performed to successfully alleviate punctal apposition. Additionally, four patients underwent puntoplasty as an adjunctive procedure for punctal narrowing. At three month follow-up, all patients reported improvement in their symptoms as denoted by a median MUNK score of 0 (median pre-intervention MUNK score of 4).

Conclusions: Our study illustrates the significance of a thorough medial canthal exam as an essential part of the workup and management of epiphora. Kissing puncta can cause poor tear propagation along the eyelid margin due to medial canthal crowding and mechanical obstruction of the upper and lower puncta during the entire blink cycle. Restoration of normal punctal position with our three-pronged approach conferred significant clinical improvement in epiphora.

Title: Modified Endoscopic Dacryocystorhinostomy using the Jansen - Middleton forceps

Authors: Kailun Jiang, Sarah Simpson, Karim G. Punja

Abstract Body:

Purpose: To describe the safety and efficacy of a novel modified dacryocystorhinostomy (DCR) technique using the Jansen - Middleton forceps (JMF) to facilitate removal of the frontal process of the maxilla.

Study Design: Retrospective chart review.

Methods: Charts of consecutive DCR by one surgeon done between March 2016 to February 2019 were reviewed. Patients with less than 6 months of follow up were excluded. Success was classified as Munk score of <2.

Results: 82 DCR surgeries were done on 72 lacrimal systems of 50 patients. 64% of patients were female and 83% had complete nasolacrimal duct obstruction (NLDO). 22 patients (44%) had bilateral lacrimal drainage surgery. The average duration of post-surgical follow up was 16.6 months. Success in all corners was 83%. The rate of success in those who underwent primary DCR surgery was 88%. 6 lacrimal systems from 6 patients had prior DCR performed elsewhere. JMF was used in all revision DCR and was successful in 4 out of 6 patients. 2 patients had previously treated unilateral NLDO which went on to fail several more revision DCRs. Of the remaining 66 lacrimal systems that had undergone primary DCRs, 8 lacrimal systems failed. 2 patient did not wish for any additional surgery (JMF was used in both). The 6 remaining failed DCRs were treated successfully with revision DCRs. JMF was used in 2 of these 6 primary failed DCRs, and was used in all revision DCRs. 58 lacrimal systems were successfully treated with primary DCR (JMF was used in 72% of these cases). In primary DCR, the success rate was 91% in cases using JMF and 80% in those where the JMF was not used. This was not statistically significant (Fisher's exact test, $p=0.23$). There were no intraoperative complications and no cases of postoperative CSF leak. 2 patients developed hyposmia which improved over time.

Conclusions: This modified technique for DCR is safe and effective for treatment of NLDO. While, the JMF did not affect rates of success, the design and angulation of the forceps better facilitates engagement and removal of the thicker and more challenging frontal process of the maxilla.

Title: Assessment of the postoperative follow-up visit after routine lacrimal probing and irrigation for congenital nasolacrimal duct obstruction

Authors: Danyal Saeed, Zayd Khan, Yasser Khan

Abstract Body:

Purpose: To assess the necessity of the traditional postoperative visit after routine probing and irrigation of the nasolacrimal duct through a single-center prospective randomized trial.

Study Design: Prospective randomized controlled trial

Methods: Fifty serial patients undergoing routine probing and irrigation at a private ophthalmology clinic were randomly assigned to the follow-up group or no follow-up group. The parents or guardians of patients in both groups were provided with standard verbal postoperative instructions and precautions. Patients assigned to the follow-up group were seen in the office for a follow-up visit one week after the procedure. Parents or guardians of the patients assigned to the no follow-up group were provided with a detailed written instruction sheet which summarized the verbal postoperative instructions, provided office and pager numbers to contact if a follow-up visit was desired, and instructed patients to proceed to the nearest emergency department in the event of a need for emergent care. All parents participating in the study received a telephone survey three months after the procedure. Information was collected concerning the incidence of complications related to the procedure, the helpfulness and necessity of the follow-up visit or written instruction sheet, and overall satisfaction with the health care received.

Results: 23 of the 25 patients in the follow-up group attended their follow-up visit and no complications were identified. One patient of 25 patients in the no follow-up group requested a clinic visit. In the follow-up group, 61% found the follow-up visit “helpful” and 45% felt it was “necessary”. In the no follow-up group, 94% felt the postoperative instruction sheet was helpful, 6% stated a postoperative visit would have been helpful, and 6% felt a visit was necessary. There was no statistically significant difference between the two groups in overall satisfaction with the care received on a 5-point scale (4.65 in follow-up group vs. 4.62 in no follow-up group). There were no postoperative complications identified in either group.

Conclusions: The results of this study demonstrate that the postoperative visit after routine probing and irrigation of the nasolacrimal duct can be substituted by detailed written and verbal postoperative instructions, with no statistical difference in patient satisfaction or outcomes. The provision of unnecessary health care has recently been investigated by organizations such as Choosing Wisely Canada and it is important to continue to assess traditional practices for their cost and impact on patient outcomes.

Title: Unexpected Complications of Endonasal DCR: A case series of post-operative pneumocephalus

Authors: Prima Moinul, Harleen Bedi, Sara Nunez Marquez, Ran Stein, Yasser Khan

Abstract Body:

Purpose: Cerebrospinal fluid (CSF) leak is an uncommon complication of routine dacryocystorhinostomy (DCR) surgery. Occult and clinically asymptomatic CSF leaks are often under-diagnosed, although they are estimated to occur in 0.2 to 13% of patients following functional endoscopic sinus surgery. In this case series, we describe pneumocephalus and CSF leak following non-endoscopic endonasal DCR surgery. We present an approach to diagnose this post-operative complication and its clinical management.

Study Design: This is a retrospective review of three patients who underwent non-endoscopic endonasal DCR surgery between June 2018-May 2019 and had a postoperative course complicated with CSF leakage.

Methods: Each patient's surgical notes, post-operative course and treatment outcomes were collected. In addition, we review the mechanisms, diagnostic techniques and management of CSF leaks.

Results: Three patients underwent an uneventful non-endoscopic endonasal DCR surgery and presented with CSF leak complicated with pneumocephalus within the first 24 hours after surgery. Common clinical symptoms included sudden onset severe headache and rhinorrhea the following morning. Additionally, one of the three patients endorsed unilateral paresthesia. A high-resolution computed tomography (CT) of the head showed pneumocephalus and confirmed the locations of the small ethmoidal bone fractures. In consultation with Neurosurgery, surgical repair was deferred and the patients were admitted to the hospital for close neurological monitoring. Two patients were managed conservatively with nasal packing, bedrest with head elevation, intravenous antibiotics, and systemic support. The CSF leaks and associated paresthesia resolved within one week for two patients following spontaneous absorption of endocranial emphysema. The third patient developed severe shortness of breath in the Emergency Department leading to acute respiratory distress requiring admission to the intensive care unit to achieve stability.

Conclusions: CSF leak following orbital or lacrimal surgery is likely under-diagnosed and underreported in the ophthalmic literature. During DCR surgery, vigorous rotational movement during the creation of an osteotomy or infraction of the middle turbinate can transmit forces to the cribriform plate, leading to cranial bone fractures, violation of the dura mater, and CSF leak. Prompt clinical imaging and diagnosis are imperative to prevent life-threatening complications and strategize staged management. This case series emphasizes the importance of careful surgical technique and a thorough knowledge of regional anatomy, during DCR procedures.

Title: Open-book Technique - a surgical approach to the fornix

Authors: Jorge Agi, Ezekiel Weis

Abstract Body:

Purpose: To describe a surgical approach for advanced conjunctival lesions involving the fornix and/or palpebral conjunctiva.

Study Design: A retrospective review of cases

Methods: Clinical and radiological data of patients with conjunctival lesions involving the fornix that underwent surgery via the open-book technique between 2013 and 2018 were reviewed.

Results: Four patients (3 female and 1 male) met the inclusion criteria, and, consequently had their records analyzed, with a mean age of 73.5 years (SD \pm 11.8 years). The follow-up range was 6-32 months (mean of 18.5; SD \pm 10.8 months). Histopathological results revealed 2 cases of conjunctival squamous cell carcinoma (patients 1 and 3), 1 case of conjunctival sebaceous cell carcinoma (patient 2) and 1 case of conjunctival melanoma (patient 4). All patients had complete resection with clear margins. Overall, all tumors were completely resected with no recurrence.

Conclusions: The open-book technique demonstrated to be an effective method to expose tumors involving the fornix and palpebral conjunctiva. All patients had successful complete excision with no recurrence.

Title: Paramedian Forehead Flap for Reconstruction of Periocular Defects: a series of 10 cases

Authors: Sarah M. Simpson, Kailun Jiang, Karim G. Punja

Abstract Body:

Purpose: The paramedian forehead flap is traditionally used for reconstruction of nasal defects. Reconstruction of the periocular area has also been described and typically involves 2 surgical stages. We describe 10 cases of paramedian forehead flap used to reconstruct complex periocular facial defects following Mohs micrographic surgery (MMS) with 40% of patients undergoing a single stage surgery. Pearls and pitfalls of surgical technique, post-operative wound management, and revisions will be presented with video/photo series.

Study Design: Retrospective case series.

Methods: All patients who underwent paramedian forehead flap, alone or in combination with other local/regional flaps or grafts, for reconstruction of periocular defects between 2011 and 2019 were reviewed. We included all patients with clinical and photo documentation of pre-operative and post-operative assessments. Follow-up ranged from 9-88 months (mean \pm SE = 24.35 \pm 5.6 month).

Results: Ten patients (7 females and 3 males) with a mean age of 66.2 \pm 2.88 years underwent paramedian forehead flap reconstruction for periocular defects. Six patients underwent staged surgery while 4 had a single surgery. Six patients underwent additional local/regional flaps during reconstruction. All defects were a result of MMS for malignant skin tumor (9 basal cell carcinoma and 1 squamous cell carcinoma). Defects ranged in size from 25 x 28 mm to 58 x 52 mm in maximum dimension (mean \pm SE = 39.70 \pm 2.99 mm x 34.60 \pm 2.68 mm). The medial canthus was the most commonly affected area, requiring reconstruction in nine patients. Defect were located on the left side in 7 patients and the right side in 3 patients, $p = 0.21$. Four patients were active smokers. Two patients underwent additional surgery for flap thinning; one patient after single stage surgery and 1 patient after two-stage surgery. Partial flap failure occurred in 1 patient following revision secondary to hematoma development despite surgical evacuation of the hematoma.

Conclusions: The paramedian forehead flap is a reliable, useful technique providing excellent functional and cosmetic results for reconstruction of complex periocular facial defects. Success can be achieved without the need for a second stage with careful flap inseting in select patients.

Title: The Role of Post-Operative Bandage Contact Lens in Patients Undergoing Fasanella-Servat Ptosis Repair

Authors: Robert S. Adam, John T. Harvey, **Jonah N. Gould**, Sivisan Suntheralingam, Forough Farrokhyar

Abstract Body:

Purpose: To determine whether a bandage contact lens (BCL) improves patient comfort in the post-operative period in patients undergoing ptosis repair using the Fasanella-Servat technique, compared to no BCL.

Study Design: This is a prospective, randomized, double-masked, comparison study.

Methods: In this study, all patients had bilateral Fasanella-Servat surgery for ptosis repair. A total of 30 patients were randomized to receive a BCL in one eye and no treatment in the other eye. The surgeries were performed at two surgical sites by two surgeons (JT and RA). At the end of the procedure during cleanup and dressing, the surgeon placed the lens on one eye, ensuring the patient did not know which eye was receiving it. Patient discomfort was measured as the primary outcome using the Eye Sensation Scale (ESS). Blurred vision was measured as a secondary outcome using selected questions from the Ocular Surface Disease Index. Outcomes were measured one week following the procedure. The person administering the questionnaire did not know which eye received the contact lens. Ethics approval was obtained by the Hamilton Integrated Research Ethics Board.

Results: Patients reported significantly less discomfort in the eye receiving a BCL, with only 13.3% ranking discomfort as “moderate” or “severe,” compared to the eye not receiving BCL, where 63.3% of patients rated discomfort as “moderate” or “severe” ($P < 0.001$). There was no significant difference in patient reported blurred vision between the two groups ($P = 0.520$).

Conclusions: The use of a bandage contact lens after Fasanella-Servat procedure for ptosis repair is recommended as it improves patient comfort. In addition, it has no detrimental effect on patient reported blurring of vision.

Title: Outcomes of modified Lateral wall decompression technique for thyroid eye disease: Results and complications of a case series

Authors: Kailun Jiang, Shirin Hamed-Azzam, Swan Kang, Jimmy Uddin

Abstract Body:

Purpose: In this retrospective study we aimed to describe the outcomes of modified lateral orbital wall decompression technique for thyroid eye disease (TED), its safety and effectiveness.

Study Design: Retrospective chart review.

Methods: File of consecutive lateral orbital wall decompressions by one surgeon done between February 2012 to April 2019 were reviewed. The purpose of the surgery was for functional and aesthetic rehabilitation of patients with TED. We analyzed the change in proptosis, diplopia and post-operative complications.

Results: 308 lateral orbital wall decompression cases of 185 patients were analyzed. 73% of patients were female. 54 patients were operated on for hydrostatic congestion without optic neuropathy and the remainder were for aesthetics. 74 orbits were inactive for greater than 2 years prior to surgery. Of the remaining 234 orbits, the average lead time to surgery after clinical stability was 7.5 months for hydrostatic congestion and 18.1 months for aesthetic decompression. The average age at time of surgery was 47.5 years old and patient on average achieved a mean 2.8mm reduction in exophthalmometry. 62 patients had unilateral decompression and 71% of these patients post-operatively achieved symmetry of +/- 1mm exophthalmometry to contralateral orbit. There were no intraoperative complications. The most common postoperative complication was temporal numbness. Masticatory oscillopsia was uncommon and short-lived (1 patient with symptoms improving over the course of 14 months). There were no cases with new postoperative diplopia.

Conclusions: This modified technique of lateral orbital wall decompression is safe, and effective for mild to moderate proptosis. It carries a low complication rate and is effective in functional and aesthetic rehabilitation of TED patients with proptosis.

Title: Thyroid eye disease with elevated serum immunoglobulin G4 levels: A case series

Authors: Patrick Daigle, Navdeep Nijhawan

Abstract Body:

Purpose: To report the clinical features of 3 individuals presenting with thyroid eye disease and high serum levels of immunoglobulin G4 (IgG4).

Study Design: Retrospective case series

Methods: We reviewed the clinical data of all patients who presented to the same ophthalmologist (Toronto, Ontario, Canada) with thyroid eye disease and high serum levels of IgG4 between 2018 and 2019.

Results: A total of three patients were identified. Two of them were male and the mean age at diagnosis was 63 years old (range, 55-69 years old). One of the three patients had been formally diagnosed with Graves' disease prior initial presentation and two of the three patients showed high serum levels of thyroid circulating antibodies. All patients showed radiographic evidences and classic orbital signs of thyroid eye disease. More specifically, unilateral or bilateral proptosis was present in all patients, lid retraction and restrictive strabismus were present in two of the three patients, and chemosis, fluctuating eyelid edema, and compressive optic neuropathy were present in one of the three patients. All patients showed high serum levels of IgG4 on initial presentation. The mean serum level was 3.00 g/L (range, 1.47-3.97 g/L), whereas the normal range is between 0.039-0.864 g/L. Orbital biopsies were performed in one of the three patients and showed a mild focal increase in IgG4+ plasma cells.

Conclusions: The prevalence of elevated serum IgG4 in patients with thyroid eye disease is likely underestimated. These patients with overlapping biochemical and clinical markers may represent a distinct subset of patients with orbital inflammatory disease. Ophthalmologists should be aware of this relationship and further studies should aim at clarifying its clinical significance.

Title: A case of fibrous dysplasia mimicking preseptal cellulitis

Authors: Catherine Liu, Marcele Falcao

Abstract Body:

Purpose: To report a pediatric patient diagnosed with preseptal cellulitis who was subsequently found to have craniofacial monostotic fibrous dysplasia.

Study Design: Observational case report

Methods: The patient's chart was reviewed including clinical and surgical records. A literature review was performed.

Results: An 8-year-old healthy girl presented to the ER with a 4-day history of progressive right upper eyelid erythema and swelling. She had concurrent nasal congestion and a temperature of 38 degrees. On examination, she had a mild deficit in elevation on the affected side. There was marked swelling and a palpable lesion superior to the inner canthus. On dilated fundus exam, she had retinal folds, but no swelling or pallor of the optic nerve. The rest of the exam was unremarkable. She was given a dose of IV ceftriaxone which improved the swelling. Magnetic resonance imaging was performed the next day and revealed a large heterogeneous mass in the right anterior ethmoid measuring 3.3 x 2.9 x 3.1 cm. A secondary aneurysmal bone cyst was found. Initial impression included fibrous dysplasia with a differential diagnosis of osteoblastoma and chondroblastoma. Radiologic findings supporting a diagnosis of fibrous dysplasia included: a low to isointense density on both T1 and T2-weighted images with faint enhancement post gadolinium administration; a cystic component (described in the literature to be an early manifestation of the disease); and a CT scan showing the classic appearance of "ground-glass" representing areas of fibrous stroma and opaque osseous changes. Malignancies important to consider included: osteogenic sarcoma, fibrosarcoma, chondrosarcoma and malignant fibrous histiocytoma. A subsequent bone scan ruled out such a neoplastic process.

Otorhinolaryngology was consulted and performed an endoscopic resection of the tumour. More than a week later, the patient remained with an anisometropia of +5.00 OD and +1.00 OS.

Conclusions: Primary bone tumors of the orbit are rare and only represent 0.6-2% of all orbital tumors.

Fibrous dysplasia is one of the benign disorders of the bone and is composed of three forms: monostotic, polyostotic and McCunes Albright Syndrome. Although fibrous dysplasia is a benign developmental disorder, it is important not to miss the diagnosis as it has been reported to cause hearing loss and significant visual impairment.

Title: Orbital rhabdomyosarcoma presenting as incidental trauma

Authors: Patrick Daigle, Kate Leahy, Jason Kwok, Amrit Rai, Dan DeAngelis

Abstract Body:

Purpose: To report a case of orbital rhabdomyosarcoma that presented shortly after an incidental trauma.

Study Design: Retrospective case report.

Methods: We reviewed all the clinical data of the case (Toronto, Ontario, Canada) and the relevant literature.

Results: A healthy 5-year-old boy presented to the eye clinic one week after being hit in the right eye by another kindergarten student. The periorbital swelling progressively worsened over the course of a few days. On clinical examination, the patient was well, and a small painless hematoma was noted in the medial portion of the right lower lid. Vision was 20/25 in both eyes. Pupils were equal, round and reactive to light. Extraocular movements were full. It was decided to observe the patient at this point. No improvement was noted on the follow-up appointment one week later. A low-dose CT scan showed a heterogeneously enhancing soft tissue lesion in the right inferomedial orbit. The lesion measured 24x11x10 mm (APxCCxTS) and displaced the right globe superiorly. Neuroradiologists suspected a vascular tumor but a CT angiography showed similar findings. A few days later, the patient presented with signs of progression. He was brought to the operative room for orbital exploration. A solid mass was found and biopsied. The pathologic examination was consistent with rhabdomyosarcoma. The patient was referred to the oncology service for discussion regarding chemotherapy and radiation therapy.

Conclusions: A high index of suspicion for rhabdomyosarcoma should be maintained in healthy children presenting with a painless orbital mass. In this population, the presentation of a tumor can sometimes be associated to an incidental trauma.

Title: Rapid onset orbital compartment syndrome in the setting of a subperiosteal supraorbital abscess

Authors: Patrick Wang, Jake Rullo, Yao Wang, Vladimir Kratky

Abstract Body:

Purpose: To report a rare case of acute orbital compartment syndrome (OCS) caused by a subperiosteal abscess masked by a history of trauma.

Study Design: Observational case report in the setting of a tertiary care ophthalmology referral centre.

Methods: The patient's clinical records were reviewed including history, clinical examinations, imaging, and investigations. A thorough literature review was conducted.

Results: A 54-year-old male with a history of head trauma one week ago presented with a subacute headache and sudden onset proptosis and vision loss. Orbital CT scan revealed a well-delineated supraorbital hemorrhage exerting mass effect on the levator complex and superior rectus and oblique muscles. Examination of the left eye demonstrated a visual acuity of no light perception, intraocular pressure of 48 mmHg, fixed pupil, highly restricted extraocular movements and gross proptosis and chemosis. A clinical diagnosis of orbital compartment syndrome was made and a prompt lateral canthotomy and cantholysis was performed. Intraocular pressure was lowered initially to 20 mmHg but re-elevated to 40mmHg shortly thereafter. Further inferior septostomy and needle aspiration of the supraorbital space was required to stabilize the intraocular pressure to 25 mmHg. The patient was reassessed by the oculoplastic service within twelve hours and closer review of the CT scan suggested a suspicious infectious process given complete opacification of the bilateral frontal sinuses. Intraoperative exploration was undertaken and dissection to the subperiosteal plane yielded copious purulent discharge. Microbiology testing of the abscess sample showed largely Staphylococcus epidermidis and Propionibacterium acnes species.

Conclusions: The case presented highlights a rare clinical presentation of OCS caused by a subperiosteal abscess. Although the occurrence of OCS secondary to infectious processes is relatively uncommon, it should not be ruled out despite presentations typical of trauma as demonstrated in this case. A fulminant infection with rapidly progressing orbital inflammation requires clinical suspicion to diagnosis and can save a patient from blindness.

Title: Risk Factors for Urgent Ophthalmologic Pathology in Orbital Fractures at a Level I Trauma Center

Authors: Georges Nassrallah, Judy Gaffar, Matthew Kondoff, Michael Ross, Jean Deschênes

Abstract Body:

Purpose: This study aims to estimate the most significant risk factors on presentation of a patient with orbital fracture to a Level 1 trauma center associated with ophthalmologic pathology.

Study Design: This is a retrospective case-control study.

Methods: 244 patients with 278 fractured orbits over a 2-year period at a Level I trauma center were reviewed. The primary outcome was any ophthalmologic pathology. Secondary outcomes included urgent pathology (globe rupture and orbital compartment syndrome), defined as requiring attention without delay, as well as semi-urgent pathology, defined as requiring attention but with acceptable delay of at least one day, and non-urgent pathology. Patient demographics, history, findings on radiographic imaging, and physical exam findings at initial and follow-up exam were recorded and odds ratios with 95% confidence intervals were calculated.

Results: Of the 278 orbits, 251 (90.3%) did not have any ophthalmologic pathology on initial consultation and none were found on follow-up. Only 3 (1.1%) patients had urgent pathology, while 22 (7.9%) had semi-urgent pathology and 4 (1.4%) had non-urgent pathology. Elements on history that had statistically significant odds ratios associated with pathology included subjective decreased vision (3.2, CI 1.13-9.25, $p=0.028$), assault as mechanism of injury (2.4, CI 1.08-5.36, $p=0.033$) and work-related injuries (7.9, CI 2.32-27.04, $p=0.001$). Patient gender, eye involved, intoxication, anticoagulation and antiplatelet as well as previous ocular surgery were not associated with pathology. Mean logMAR visual acuity and intraocular pressure were not significantly different between patients with pathology and patients without pathology. Features on exam associated with pathology included afferent pupillary defect (19.2, CI 1.68-219.31, $p=0.017$), fixed pupil (16.9, CI 4.91-58.00, $p<0.001$), anisocoria (7.8, CI 2.29-26.71, $p=0.001$) and symmetrical extraocular movement limitation (5.2, CI 1.76-15.63, $p=0.003$). Degree of subconjunctival hemorrhage, Hertel measurements, radiographic evidence of retrobulbar hemorrhage and the number of orbital walls fractured were not associated with increased risk of pathology.

Conclusions: The majority of orbital fractures do not present with ophthalmologic pathology. Subjective vision loss, history of assault or work trauma as well as pupil abnormalities on exam were the greatest risk factors for pathology. Our results highlight the most important factors on patient presentation that should prompt first responders to seek urgent ophthalmologic consultation.

PAEDIATRIC OPHTHALMOLOGY AND STRABISMUS
L'OPHTHALMOLOGIE PÉDIATRIQUE ET STRABISME

2020 COS Virtual Annual Meeting

Title: Comparison of the G-ROP Versus WINROP Algorithm in Predicting Sight-Threatening Retinopathy of Prematurity

Authors: Dan Ni Wang, Kyla Lavery, Emi Sanders, Ayman Abou Mehrem, Stephanie Dotchin

Abstract Body:

Purpose: Retinopathy of prematurity (ROP) is a potentially sight-threatening disease in preterm infants. Current Canadian guidelines have high sensitivity and low specificity for detecting ROP. In an attempt to reduce the number of unnecessary screening exams several models based on postnatal weight gain have been developed. WINROP (weight, insulin-like growth factor 1, neonatal, retinopathy of prematurity) is one model based on postnatal weight gain that has been widely discussed but validation studies have shown variable sensitivity. G-ROP is a newer algorithm utilizing 6 specific criteria, and initial validation studies have shown higher sensitivity than WINROP. As G-ROP has not yet been validated in a Canadian population, the purpose of this study was to validate G-ROP and compare its sensitivity and specificity to WINROP in detecting infants with sight-threatening ROP who require treatment.

Study Design: Retrospective cohort study including infants admitted to Calgary NICUs between January 2013 and December 2017.

Methods: A retrospective chart review was performed to identify all infants who had undergone ROP screening at any one of the five neonatal intensive care units in Calgary, Alberta. Infants and their weekly weights were entered into the online WINROP algorithm, and then the G-ROP criteria was applied to the same infants. The study adhered to the tenets of the Declaration of Helsinki. Ethics was approved by the Institutional Ethics Review Board.

Results: 1057 infants were included (mean gestational age 28.4 weeks, mean birth weight 1092 grams). The sensitivity of WINROP in detecting infants requiring treatment (Type 1 and some Type 2 ROP) was 95.2%, compared to 100% sensitivity for G-ROP.

Conclusions: G-ROP was able to detect 100% of infants requiring treatment for ROP in our large Canadian sample compared to 95.2% for WINROP. Further validation studies are needed but G-ROP has good sensitivity for detecting sight-threatening ROP at our site.

Title: Six year outcomes of Bevacizumab Treatment for Type 1 Retinopathy of Prematurity (ROP)

Authors: Nasrin Tehrani, Maram Isaac, kamiar Mireskandari

Abstract Body:

Purpose: To report long-term structural, visual and refractive outcomes of type 1 ROP after monotherapy with 0.625 mg intravitreal bevacizumab injection (IVB).

Study Design: Retrospective case-series.

Methods: We reviewed all infants treated with IVB at our institution between January 2010 and December 2014. Infants with follow up of at least five years \pm 6 months were included. Primary outcome measure was structural outcome as defined by ETROP criteria. Secondary outcomes were monocular visual acuity (VA) reported in logMAR and refractive errors reported in spherical equivalent (SE) at last follow up. Data on demographics and ROP parameters were collected.

Results: A total of 32 infants (57 eyes) were treated. Twenty-six infants (45 eyes) met inclusion criteria and had type 1 ROP in zone I (5 eyes; 12%) or zone II (40 eyes; 88%). Nineteen infants (73%) were treated in both eyes. Mean gestational age was 25.1 ± 1.3 (range 23.3-27.7) weeks, birth weight 694 ± 166 (range 420-1170) grams, post-menstrual age (PMA) at treatment 37.7 ± 2.0 (range 34.9-42) weeks. All eyes had favourable structural outcome with no recurrence that required treatment. One eye did not regress fully post injection and received supplemental laser for a persistent vascular band in anterior zone II at 58 weeks PMA. Mean monocular VA was 0.3 ± 0.3 logMAR (median 0.22, range 0.0 to 1.3; n=35/45 eyes) at a mean of 6.2 ± 0.8 years (median 6.1, range 5.0-7.5) post treatment. Favourable visual outcomes were achieved in 91% (32/35) of the eyes in infants who complied with visual acuity testing. Mean refractive error was -2.5 ± 5.9 (median 0.0, range -17.0 to +8.3 D, n=45 eyes) at a mean 6.1 ± 1.1 years (median 6.0, range 4.5-9.0) post treatment. Prevalence of emmetropia (>-1.0 to ≤ 1 D) was 51% (23/45 eyes), low myopia (≥ 1.0 to <5 D) was 11% (5/45 eyes), high myopia (≥ 5 to <8 D) was 11% (5/45 eyes), very high myopia (≥ 8.0 D) 16% (7/45 eyes), low hyperopia (>1 to ≤ 4 D) was 7.0% (3/45 eyes), and high hyperopia >4 D was 4.0% (2/45 eyes).

Conclusions: In this cohort of infants, at an extended mean follow up of 6 years, all eyes had favourable structural outcome with no recurrence requiring treatment. Ninety-one percent of testable eyes had favourable visual outcome. Half the eyes were emmetropic. Higher degrees of myopia occurred in comparison to the BEAT-ROP refractive outcomes. Future studies to further evaluate visual function including visual field testing are planned.

Title: Reducing Neonatal Pain Scores During Retinopathy of Prematurity (ROP) Screening Exams

Authors: Dan Ni Wang, Kyla Lavery, Vivian E. Hill, Stephanie A. Dotchin

Abstract Body:

Purpose: ROP examinations are typically carried out using one of two methods. The more common method employs the use of a lid speculum, while the alternative uses a technique where an ophthalmologist's fingers are used to position the eyelid. We hypothesized that the use of the finger method would result in reduced infant pain scores during an ROP exam.

Study Design: Quality Improvement

Methods: The study adhered to the tenets of the Declaration of Helsinki. Ethics was approved by the Institutional Ethics Review Board. Preterm infants being screened for ROP in the NICU were randomized to examination with lid speculum or finger technique. A repeated measures design was employed whereby ROP examiners would then alternate between the two techniques on subsequent ROP exams for all infants enrolled in the study. Pain was assessed using the Premature Infant Pain Profile, which provides a validated objective measure of non-verbal pain on a scale of 0-21 and incorporates PMA, heart rate, and oxygen saturation. Statistical analysis was carried out on SPSS version 23.0 (IBM).

Results: This study included 78 ROP examinations (56% female, mean birth weight 688 grams, mean PMA 35.4 weeks). The mean PIPP score of infants examined with lid speculum increased from 2.2 (SD=1.2) to 11.2 (SD=2.3) during the examination, compared to an increase from 2.5 (SD=0.95) to 6.3 (SD=3.1) for examinations with finger technique. A significantly lower mean pain score was observed in the finger technique group ($p < 0.001$). There was no significant difference in length of examination, ease of exam and exam view between the lid speculum and finger technique groups.

Conclusions: Infants screened with finger method resulted in lower pain scores compared to infants screened with lid speculum. The finger technique is not suitable for infants with significant eyelid swelling or if ROP is in anterior zone 2 or zone 3, and may be more difficult if the infant is on certain types of CPAP circuits. The finger technique is more difficult to learn than lid speculum. If the lid opening is not done correctly the lids can be everted and prevent a good view of the fundus. Practitioners can use the 'finger technique' on most infants to decrease procedural pain during ROP screening

Title: Pediatric glaucoma suspects: characteristics and outcomes

Authors: Stephanie N. Kletke, Lauren A. Tomlinson, Gil Binenbaum, Yinxi Yu, Gui-shuang Ying, Monte D. Mills

Abstract Body:

Purpose: We sought to determine characteristics, outcomes, and glaucoma risk factors of pediatric glaucoma suspects (GS).

Study Design: Retrospective sequential cohort study of children under 18 years diagnosed as GS between September 2013 to July 2019.

Methods: Steroid-induced, congenital, aphakic, and uveitic glaucoma were excluded. Primary outcomes included diagnosis of glaucoma, treated ocular hypertension, and non-glaucomatous cupping. Multiple risk factors for glaucoma were assessed.

Results: 887 children (mean age 9.3 years, SD 4.7) were diagnosed as GS, due to optic nerve appearance (83%), ocular hypertension (15%), family history (25%), periocular lesion (e.g., Sturge-Weber) (4%), blunt-trauma history (3%), ocular anomaly (2%), and systemic/genetic syndrome (1.5%). Outcomes among 487 children with one or more follow-up visits (mean 1.7 years, SD 1.6) included 14(3%) glaucoma, 98(20%) physiologic cupping, 50(10%) prematurity-associated pseudoglaucomatous cupping, and 1(0.2%) treated ocular hypertension; 324(67%) remained GS. Of children lost to follow-up, 116(29%) were considered physiologic or pseudoglaucomatous. Glaucoma diagnosis occurred at mean age 8.4 years, SD 5.5; diagnosis was based on elevated IOP (79%), disc change (21%), field defect (14%), OCT changes (43%). Mean pachymetry was 598(SD45) in glaucoma, 579(SD46) in GS. Risk factors for glaucoma were baseline IOP>24 ($p=0.01$) and periocular lesion ($p=0.008$).

Conclusions: Baseline C/D ratio and family history of glaucoma were not predictive of glaucoma diagnosis. Risk of glaucoma among pediatric glaucoma suspects appears low. Baseline IOP>24 and presence of a periocular lesion carry higher risk.

Title: Yield of "clinical" genetic testing in inherited retinal disease: experience at the Hospital for Sick Children, Toronto, Canada

Authors: Caberry W. Yu, Vaishnavi Batmanabane, Alexander Pearson, Ajoy Vincent, Elise Héon

Abstract Body:

Purpose: Inherited Retinal Dystrophies (IRDs) are genetically heterogeneous with over 250 genes being implicated. They affect 1 in 3500 individuals in North America and Europe and are an important cause of blindness in children and adults. With potential therapies to treat IRDs on the horizon, it is becoming increasingly important to molecularly characterize afflicted individuals. In literature, the diagnostic yield of genetic testing for IRDs is ~50%. This study evaluates the proportion of IRD patients seen at the Hospital for Sick Children, including probands and carriers from families with dominant and recessive IRDs, having conclusive genetic test results. It identifies the clinical subgroups of patients with higher likelihood of having causative mutations identified.

Study Design: Retrospective study.

Methods: Patients who had attended the Ocular Genetics program in 2016 or 2017 at the Hospital for Sick Children in Toronto, Canada were identified. Baseline information such as gender, clinical diagnosis, and mode of inheritance were recorded. Data analysis was performed to determine genetic diagnosis, genetic testing outcome - mutation identified, not identified, variants of unknown significance (VUSs), and influence of genetic result or counselling on clinical diagnosis.

Results: A total of 647 participants were included in the study - 64% were probands and 36% were carriers. Mutations considered pathogenic or VUS were identified in 79% of participants. Amongst IRDs probands, conditions with highest genetic testing yield (pathogenic or VUS) were Leber congenital amaurosis (100%), macular dystrophy (89%), and retinitis pigmentosa (86%). Mutations were not identified in 69 probands, and of these, 39 (57%) had a generic diagnosis of retinal dystrophy. There were 29 (7.25%) probands whose clinical diagnosis were modified based on the genetic results or counseling, 21 of which had retinal dystrophy.

Conclusions: Results show that while mutations were identified in 79% of study participants, they were labelled causative in 57%. While diagnostic accuracy was high in clinical presentations such as LCA, macular dystrophy, and retinitis pigmentosa, others such as generic retinal dystrophies required further investigation. Genetic testing and counseling changed the clinical diagnosis of 7% of patients, most commonly for those with retinal dystrophy. The yield of genetic testing is expected to increase, as more VUSs are re-categorized as pathogenic variants and newer technologies are used for genetic testing.

Title: Missed Appointments in a Canadian Tertiary Care, Academic Centre Pediatric Ophthalmology and Adult Strabismus Service: Rates and Financial Impact

Authors: Gregory D. Hawley, Christine Law, Yi Ning J. Strube

Abstract Body:

Purpose: Missed appointments are substantial barriers to healthcare delivery impacting patients, and providers, resulting in increased operating costs and lost revenue to our healthcare system. They may disrupt physician-patient relationships through decreased productivity, inefficient use of healthcare resources, and overall reduced patient access to care. This is a well-known problem amongst pediatric ophthalmologists, however there is limited data describing missed appointment rates and impact on the healthcare system. We aimed to describe our no-show appointment rate and its financial impact, and describe factors that may contribute to this problem.

Study Design: A retrospective medical record review of all booked clinic patients in a Canadian tertiary care, academic hospital-based Pediatric Ophthalmology and Adult Strabismus Service covered by two pediatric ophthalmologists, over a one-year period (June 1, 2018 - May 31, 2019). Patients seen in orthoptic clinics, add-on/emergency patients, and inpatients were excluded.

Methods: 3,922 patient appointments were reviewed for number of missed appointments, defined as no shows and last-minute cancellations (defined as cancellation within 24 hours). Data collected included: patient age and demographics; day, month and time of clinic appointment; and referral source. Data analysis of categorical variables was calculated using chi-square tests given the large sample size (SPSS v25).

Results: In one year, there were 724 missed appointments (18.46%). New patients were significantly more likely than repeat patients to miss appointments (22.90% vs. 16.72%, $p < 0.0001$). There was no significant difference between patient age ($p = 0.46$) or day of the week ($p = 0.16$). There was a significant difference in missed appointments between months of the year ($p = 0.001$), the highest rates in January (26.39%) and February (23.11%). Based on the Ontario Health Insurance Plan Physician Schedule of Benefits, physician total billing loss was \$90,941-\$154,700 and \$81,552-\$162,540 for new and repeat patients respectively, translating into yearly lost physician billings of \$172,493-\$317,240.

Conclusions: Our study describes high rates of missed appointments in a Canadian tertiary-care, academic centre pediatric ophthalmology service. If a fully-booked clinic day on average consists of 27 patients, the 724 missed appointments corresponds to 5 weeks of missed clinics. The calculated physician financial loss from missed appointments is only a fraction of the total lost revenue and decreased efficiency to our healthcare system. Given the limited number of pediatric ophthalmologists, and the subsequent long wait-times, research aimed to reduce no-show rates and improve clinic attendance are critical to maximize our limited healthcare resources to provide timely, high-quality care for our patients.

Title: Photoscreening for amblyogenic refractive errors in children: Results from the iSee Study in Southwestern Ontario

Authors: Inas Makar, Efstathia Kiatos, James J. Armstrong

Abstract Body:

Purpose: The purpose of this work is to provide the final results from a community wide photo-screening program in Southwestern Ontario for children aged 18 to 72 months, and to estimate the prevalence of amblyogenic refractive errors.

Study Design: Prospective, multisite photo-screening program.

Methods: 5959 children aged 18-72 months were recruited and screened in Southwestern Ontario at 210 locations over a period of 3-years and 4-months. Measurements were performed with the Plusoptix S12 photo-screener. The threshold for the referral criteria used was the manufacturer's criteria on receiver operating characteristics (ROC) 4.

Results: The screening was negative in 5,386 children (90.4%), positive in 403 (6.8%), unreadable in 170 (2.8%). 42% of all screened children were <36 months. The estimated prevalence of anisometropia was 4.1%, astigmatism was 3.1%, hyperopia was 1.2%, myopia was 0.4%, and strabismus was 0.4%. Of the 403 referred children, 111 (28%) completed a formal eye examination.

Conclusions: This is the first Canadian study that provides data on amblyogenic refractive errors based on a volunteer-led photo-screening program. Photo-screening is an effective tool, particularly for pre-school aged children, however, there is a lack of mandatory follow-up to ensure children receive proper treatment.

Title: Wright Hang-back Recession with Fibrin Glue Compared to Standard Fixed Suture Recession for the Treatment of Horizontal Strabismus

Authors: Yi Ning J. Strube, Mike Zein, Maid Arow, Kenneth W. Wright

Abstract Body:

Purpose: To evaluate the clinical safety and efficacy of the novel Wright hang-back recession with fibrin glue for the treatment of horizontal strabismus in humans. Scleral / retinal perforation is a known serious complication of rectus muscle recessions. Hang-back recession reduces this complication, but the muscle may not adhere at the desired position, increasing the risk of late posterior slippage and over-correction or anterior muscle creep and under-correction.

Study Design: Retrospective, case-controlled clinical study comparing the surgical outcome of the novel Wright hang-back rectus recession with fibrin glue (WHBG) versus standard fixed suture rectus recession (SFR) in the treatment of horizontal strabismus.

Methods: The medical records of all patients who underwent strabismus surgery by one skilled strabismus surgeon between 2016-2018 for horizontal deviations only, including cases of WHBG (Group 1) or SFR (Group 2), were reviewed. Post-operative follow-up periods were divided into early (1-7 days) and intermediate (2-8 months). The main outcome measure was surgical outcomes of each group. Good surgical outcome was defined as a post-operative deviation less than or equal to 10 PD at a minimum follow-up of 2 months.

Results: 32 eyes of 17 patients underwent WHBG and 32 eyes of 17 patients underwent SFR. Patient demographics were similar and non-significantly different between groups. Patients ranged from 2.5 - 77 years of age. In each group, 35% of patients had an esotropia and 65% had an exotropia. Preoperative deviations in the two groups were similar with mean esotropia 25.5 PD and mean exotropia 26.6 PD in the WHBG group, and mean esotropia 28.3 PD and mean exotropia 23.8 PD in the SFR group. The mean post-operative deviation was less than 7 PD for both groups. Median intermediate follow-up was 4 months for both groups. Good surgical outcomes were similar between groups, 16/17 (94%) in the WHBG and 15/17 (88%) in the SFR. There were no complications in either group.

Conclusions: WHBG recession was safe and effective with post-operative results not significantly different than SFR. WHBG has an important advantage as it eliminates the complication of retinal perforation that can occur with SFR whilst avoiding under- or overcorrection that can occur with traditional hang-back recession. WHBG resulted in as good surgical results as SFR, with no complications.

Title: Use of Neuromuscular Blocking Drugs during Strabismus Surgery

Authors: Caberry W. Yu, Christine Law, Yi Ning J. Strube

Abstract Body:

Purpose: Extraocular muscle paralysis via non-depolarizing neuromuscular blocking drugs intraoperatively during general anesthesia strabismus surgery has been advocated historically to ensure accurate forced duction testing (FDT) and subsequently influence surgical planning. However, this practice is controversial and may significantly prolong surgery. The purpose of our study was to conduct a formal systematic review examining the literature on the use of non-depolarizing muscle relaxants during strabismus surgery and to report on any evidence to support its use. Additionally, we sought to evaluate the current practice patterns of pediatric ophthalmologists and anesthesiologists in Canada and the USA on the use of neuromuscular blocking drugs in strabismus surgery.

Study Design: Systematic review of the literature and survey study.

Methods: A literature search of trials was performed using MEDLINE (1946 to Aug 2019), EMBASE (1947 to Aug 2019), and Cochrane Controlled Register of Trials (CENTRAL). Grey literature was searched (Web of Science, OpenGrey). Randomized control trials, observational studies (cohort, case-control, and case reports), and surveys examining the use of depolarizing or non-depolarizing muscle relaxants in both adults and children undergoing strabismus surgery were included. English- and non-English language articles were included. Two reviewers independently screened all titles and abstracts. Risk of bias was assessed regarding randomization, allocation sequence concealment, blinding, completeness of outcome data, selective outcome reporting and other biases. Two anonymized surveys, one each for anesthesiologists and pediatric ophthalmologists, were designed using Qualtrics Software. Participants were recruited via professional association email lists. Data collected included physician's surgical or anesthesia experience, practice setting, use of neuromuscular blocking agents in strabismus surgery to maintain paralysis, and reported benefits and drawbacks. Data was analyzed using SPSSv25.

Results: Our literature search revealed 9 papers, 3 of which met our inclusion criteria; none directly studied non-depolarizing muscle relaxants to help FDT during strabismus surgery. There is minimal evidence supporting non-depolarizing muscle relaxant use during strabismus surgery to improve FDT. Our initial survey data collection reveals limited use of neuromuscular blocking agents to specifically maintain paralysis during strabismus surgery, although it is still practiced in some locations. Main drawbacks include lower operating room efficiency due to slower patient turnover.

Conclusions: Inadequate evidence exists in the literature to support the use of non-depolarizing muscle relaxants to maintain paralysis during strabismus surgery. Improved communication between anesthesiologists and pediatric ophthalmologists practicing strabismus, and evidence-based data to guide practice patterns is needed and important to ensure the best care for our strabismus patients.

PUBLIC HEALTH AND GLOBAL OPHTHALMOLOGY
SANTÉ PUBLIQUE ET OPHTALMOLOGIE MONDIALE

Session Title: Moving beyond 2020 – Focusing on impact and sustainability

Session Time: Friday, June 26, 2020, 2:30 – 3:30 PM

Title: Outreach screening to address socioeconomic barriers to Diabetic Retinopathy screening in China

Authors: Gareth D. Mercer, Baixiang Xiao, Han Lin Lee, Congyao Wang, Alastair Denniston, Cathy Egan, Nathan Congdon

Abstract Body:

Purpose: Social inequities in access to screening for Diabetic Retinopathy (DR) limit the effectiveness of this important public health intervention. We examined whether community-level outreach screening in China would improve equity in access.

Study Design: Comparison of three cross-sectional studies of diabetic adults aged ≥ 50 years from Guangdong province, China.

Methods: Using multinomial logistic regression we compared the distribution of indicators of socioeconomic disadvantage (female sex, older age, lower educational attainment) and sight-threatening diabetic retinopathy (STDR, severe non-proliferative or proliferative retinopathy and/or macular edema) between the following three groups: people with diabetes presenting spontaneously for eye examinations at secondary-level hospitals ($n=193$); those screened through a primary-level DR outreach program ($n=178$); and individuals with newly- or previously-diagnosed diabetes examined as part of a population-based survey ($n=579$). The population-based cohort was used as the reference group, reflecting the “ideal” reach of a screening program. All studies received approval from the Ethics Committee of the Zhongshan Ophthalmic Center, Guangzhou, China.

Results: Routine eye care through secondary-level hospitals, as compared to population-based screening, appeared to be less likely to reach older adults (75 years and older vs. younger than 75, $OR=0.30$, 95% CI: 0.16-0.55) and those with lower educational attainment (primary school or lower vs. middle school or higher, $OR=0.08$, 95% CI: 0.05-0.12), but not less likely to reach women ($OR=1.09$, 95% CI: 0.74-1.61). Similar patterns were observed when comparing community-level outreach screening to population-based screening, however, this strategy appeared to improve access when compared to spontaneous hospital presentation for older adults (75 years and older vs. younger than 75, $OR=0.55$, 95% CI: 0.35-0.89) and those with lower educational attainment (primary school or lower vs. middle school or higher, $OR=0.27$, 95% CI: 0.18-0.42). Again, women were as likely to be reached by community-level screening as by population-based screening after accounting for age and educational attainment ($OR=1.18$, 95% CI: 0.82-1.62). Compared to the population-based screening sample, the risk of having STDR was higher in the primary-level hospital screening sample ($OR=2.32$, 95% CI: 1.13-4.75), and lower in the tertiary-level hospital sample ($OR=0.23$, 95% CI: 0.05-1.01).

Conclusions: Community-level outreach screening for DR may improve access for older adults and those with lower educational attainment. Such screening may also detect greater numbers of individuals with sight threatening retinopathy.

2020 COS Virtual Annual Meeting

⌘ THIRD PRIZE, COS AWARDS OF EXCELLENCE ⌘
⌘ TROISIÈME PRIX, PRIX D'EXCELLENCE DE LA SCO ⌘

Title: Smartphone compatible versus conventional ophthalmoscope: a randomized crossover educational trial

Authors: Rachel Curtis, Mark Xu, Daisy Liu, Jason Kwok, Isabella Irrcher, Wilma Hopman, Stephanie Baxter

Abstract Body:

Purpose: To compare the performance and ease-of-use in optic disc assessment using a smartphone direct ophthalmoscope attachment (D-EYE) and the gold standard conventional direct ophthalmoscope in first year medical students.

Study Design: Prospective, randomized, crossover educational trial.

Methods: Participants were first year medical students naïve to ophthalmoscopy, and were exposed to a standardized training session using both devices on the same day as the study. Optic discs of standardized patients and patient volunteers were examined in a randomized, crossover design using a smartphone attachment ophthalmoscope (D-EYE) and a conventional direct ophthalmoscope (DO). Optic disc identification using an online fundus matching program, ease-of-use (EOU) ratings of the devices, self-reported confidence level in their exam with the devices, and the student's estimation of vertical cup-to-disc ratio (VCDR) were used to compare ophthalmoscopes.

Results: Forty-four medical students voluntarily participated in the study. Students using the DO required more attempts to match the patient's fundus to the correct photograph when compared to the D-EYE device (3.57 vs. 2.69, $p=0.010$, t-test), and more time to correctly select the proper fundus photograph (197.00 vs. 168.02 seconds, $p=0.043$, t-test). Multivariable linear regression controlling for eye, dilation and repeated student measurements showed that students needed on average one more attempt to correctly match the fundus using the DO compared to the D-EYE device ($B=0.879$, $p=0.009$), and that the DO took on average 30 seconds longer (29.222, $p=0.041$). Participants reported being able to see the right and left optic discs of the patient using the D-EYE, 75.8% and 87.1% of the time, respectively, compared to 61.3% and 59.7% when using the DO ($p=0.082$ right eye, $p=0.001$ left eye, Chi-square test). Overall reported EOU when examining the right eye (5.94 vs. 5.13, $p=0.005$, t-test), left eye (5.95 vs. 5.15, $p=0.002$, t-test), overall device EOU (6.40 vs. 4.79, $p<0.001$, t-test) and overall confidence in exam (5.65 vs. 4.49, $p=0.003$, t-test) was greater when using the D-EYE compared to the DO. There were no statistically significant differences in accuracy of VCDR estimations between the D-EYE and the DO.

Conclusions: Smartphone ophthalmoscopy creates additional learning opportunities in medical education given its greater ease-of-use and increased success in visualizing the optic disc. Given that smartphone compatible technologies are becoming progressively more relevant in the clinical setting, medical training programs should consider ensuring that trainees are exposed to these new and advancing technologies to prepare them for the changing realities of medical practice.

Title: Undergraduate ophthalmic education: A survey of Canadian medical schools

Authors: Jeffrey Matthew Mah, Lorne Bellan, Stephanie Baxter

Abstract Body:

Purpose: In recent years, concerns have been raised about the adequacy of ophthalmology education in Canadian medical schools. In order to identify avenues to improve undergraduate ophthalmology training, it is necessary to have an understanding of the current curricula in Canadian medical schools. The last study to comprehensively describe undergraduate ophthalmology training in Canada was conducted over 20 years ago. The objectives of this study were (1) to quantify the amount of mandatory ophthalmology training currently provided in pre-clerkship and clerkship in Canadian medical schools, (2) to further describe the training provided in terms of style of teaching and content.

Study Design: Cross-sectional survey.

Methods: An online survey was distributed via email to undergraduate ophthalmology program representatives at each of the 17 Canadian medical schools. Follow-up was performed with repeat emails and phone calls when required. Means and standard deviations were used to describe normally distributed variables and medians and interquartile ranges were used for variables with non-normal distributions.

Results: The survey was completed by 14 of 17 Canadian medical schools (82%). The median number of hours devoted to ophthalmology in pre-clerkship was 20 with considerable variability between schools (range 0-100). The most common teaching style in pre-clerkship was lecture followed by clinical experience and small group/problem-based learning. Seven schools (50%) offered an ophthalmology rotation as part of the core clerkship, however the percentage of students at those schools who participated in the rotation was variable (median 100%, range 10%-100%). The most common duration was 1 week (median 1 week, range 0.2 weeks - 4 weeks) and the most common teaching settings were general clinics and emergency clinics. Twelve of 14 schools covered all of the five ophthalmology-related Medical Council of Canada (MCC) learning objectives of eye redness, strabismus and amblyopia, acute vision loss, chronic vision loss, and diplopia. One school covered all but diplopia and the final school did not cover any of the five.

Conclusions: The amount of curricular time devoted to ophthalmology in Canadian medical schools has remained stable over the past 20 years and the five ophthalmology-related MCC learning objectives are being addressed well. However, the majority of Canadian medical students are not being exposed to ophthalmology in a clinical environment. The effectiveness of ophthalmology undergraduate education could potentially be improved by adopting a short, standardized ophthalmology clinical rotation in clerkship.

Title: Validating the use of a Stereoscopic Robotized Teleophthalmic Drone Slit Lamp

Authors: Gabriela Lahaie Luna, Jean-Marie Parel, Alex Gonzalez, Cornelis Rowaan, Wilma Hopman, Sarit Khimdas, Martin tenHove

Abstract Body:

Purpose: To validate the use of a mechanized remotely operated stereoscopic drone slit lamp (DSL) in assessing anterior segment pathology in ophthalmology patients, comparing it to a conventional slit lamp (CSL).

Study Design: Cross Sectional Study Validating the use of a medical device.

Methods: 43 patients recruited from clinics at Hotel Dieu Hospital (Kingston, ON). 42 patients met the inclusion criteria and were assessed by two examiners with a level of training ranging from PGY2 residents to attending staff. Patients were assessed using the DSL and then a CSL. Examiners used both the DSL and CSL to assess the anterior chamber (AC) depth using Van Herick technique and a simplified grading scheme (open, closed or needing gonioscopy). The presence or absence of cells and/or flare, using a modified SUN criteria grading scheme was also assessed. Qualitative data was collected on the ability to assess corneal integrity, foreign bodies, epithelial defects, stromal infiltrates and conjunctival injection using the DSL.

Results: 48 eyes of 42 participants were examined using both the DSL and CSL. When comparing the data for each examiner, no statistically significant differences were identified between the novice and experienced examiners. There was substantial agreement between the DSL and CSL when assessing AC cell and flare (kappa 72.6 and 60.4 respectively) and moderate agreement when assessing AC depth (kappa 42.5). The DSL compared to CSL had a sensitivity and specificity of 98.3% (95% CI= 94-100) and 100% (95% CI= (98.7-100) respectively, for detecting AC cell. The DSL had sensitivity and specificity of 100% (95% CI= 97.5-100) and 88.2% (95% CI= 80.2-96.1) respectively for detecting AC flare.

Conclusions: There was substantial agreement between the drone and conventional slit lamp when assessing subtle anterior segment findings including AC depth, cell and flare. The sensitivity and specificity of the drone slit lamp for assessing these findings ranged from 88.2% to 100%. This drone slit lamp provides excellent capability for examination of anterior segment pathology in live patients when compared to a conventional slit lamp.

Title: Development of an Ophthalmology Referral Software using Decision-Tree Based Artificial Intelligence

Authors: Damien Pike, Stuti Tanya, Christopher S. Jackman

Abstract Body:

Purpose: With Canada's aging population the demands on ophthalmologists to provide timely and high-quality vision care are steadily increasing. To address this, the clinical and research community has harnessed artificial intelligence (AI) and machine learning (ML) to improve technological advancements and increase the efficiency with which we deliver care to patients in ophthalmology clinics. In addition to making clinical care more efficient, we believe that using sophisticated AI-based software to improve how primary care practitioners refer patients to ophthalmology services holds significant value and can play an important role to help meet the needs of our aging population. Here, our objective is to develop semi-automated software for ophthalmology referrals and assess its feasibility and efficacy in community-based ophthalmology practices.

Study Design: The design of this study was subdivided into two segments 1) to develop a novel decision-tree based software platform for ophthalmology referrals and 2) to use quantitative measurements of the software's performance to test its efficacy in a comprehensive ophthalmology practice.

Methods: The software algorithm was initially written and developed in MATLAB R2016b using objective C++ coding language. The referral algorithm was built to prompt the referring practitioner with questions about the ocular complaint which, based on the response, would help the practitioner with next steps in the referral process.

Results: A beta version of the referral software is currently being tested internally at the Jackman Eye Institute in St. John's, Newfoundland. Preliminary data shows that the standardized referral platform helps to guide primary care practitioners with referral decisions insofar that it provides a tentative diagnosis and timeline for the patient.

Conclusions: We are developing a software platform to improve the pipeline for ophthalmology referrals from primary care practitioners. Future work will focus on implementing convolutional neural network based ML to train the referral software to help triage the consults from referring practitioners.

Title: Toronto Tele-Retinal Screening Program for Diabetic Retinopathy: Sociodemographic Impact

Authors: Jessica Cao, Rebecca Merritt, Lisa Kha, Tina Felfeli, Olivera Sutakovic, Michael H. Brent

Abstract Body:

Purpose: Diabetic retinopathy (DR) is the leading cause of blindness in working age Canadians. However, screening rates remain low with approximately 40% of diabetic individuals in Ontario not receiving regular eye exams. Surprisingly, large cities were found to have the lowest screening rates. The Toronto Tele-Retinal Screening Program (TTRSP) was initiated in 2013 to target regions with low screening rates. This project presents sociodemographic data of TTRSP participants and screening trends over the past 5 years in order to assess the efficacy of TTRSP in identifying preventable disease in an inner-city population.

Study Design: Retrospective case series of screening data.

Methods: Electronic medical records of all adults with diabetes mellitus screened through the TTRSP from September 2013 to March 2019 across 15 urban screening sites were obtained. Sociodemographic data of screened patients, including income, education, and ethnic background were collected from April 2017 to March 2019. OCT and colour fundus photographs were graded for presence or absence of DR and diabetic macular edema (DME). Statistics were conducted using SPSS with significance $p=0.05$.

Results: 1374 patient screens were completed for 973 unique patients with average age of 55.9 ± 12.4 years and diabetes duration of 7.1 ± 7.4 years. 265 patients had repeat screenings through the program, up to five visits over the study period. Of all screens, 26% showed some degree of DR and 4% were also found to have vision-threatening DME. 15% of patients had never had an eye exam.

Self-reported sociodemographic data was available from 587 patients, representing 60.3% of program participants. 82% were born outside of Canada, and 17% did not have provincial health coverage. 77% had concurrent chronic illness, disability, drug/alcohol dependence, or mental illness. Only one-third of patients had some level of post-secondary education, compared to over half of the Canadian population. Despite a high non-response rate (48%) for income data, over half of completed responses reported an annual household income under \$15,000.

Patients with annual household income under \$25,000, were significantly more likely than the remainder of patients to have some degree of DR ($p=0.04$) and DME ($p=0.01$). These patients were also more likely to have never had a previous eye exam ($p=0.05$).

Conclusions: Tele-retinal screening programs can effectively identify treatable DR and DME. The TTRSP program is successful in targeting vulnerable inner-city populations in Toronto with low DR screening rates and bringing care to many who would have otherwise not received screening.

Title: Traumatic Badminton-Related Ocular Injuries in Vancouver, British Columbia

Authors: Shanna Carlie Yeung, Grace Qiao, Karyn Caplette, Simon Warner

Abstract Body:

Purpose: Badminton is a major cause of sports-related ocular injuries in Vancouver, British Columbia. The racquets and shuttlecocks pose risks due to their speed, density and size, often bypassing the protective walls of the bony orbit. This study describes the frequency, types and severity of acute badminton-related ocular injuries seen in a tertiary eye care centre in Vancouver between 2013 and 2019.

Study Design: Retrospective chart review.

Methods: Medical charts from visits to a tertiary eye care centre in Vancouver between March 2017 and October 2019 were reviewed. In addition, non-identifying surveillance data from Vancouver Coastal Health Authority Emergency Department visits between January 1, 2013 and October 21, 2019 were analyzed for badminton-related injuries by using keyword searches.

Results: From the tertiary centre, 36 patients received ophthalmic care for badminton-related ocular injuries. Of these, 27 were new consultations, with trauma occurring between March 2017 to October 2019, and 9 were follow-up visits for injuries sustained prior to March 2017. The median patient age was 48.5 years. Shuttlecock impact caused 30 injuries, racquet impact caused 5, and 1 had an unspecified mechanism. Injuries were more frequent in the right eye (24) compared to the left (12). The most common ocular injuries identified were hyphema (25 cases), angle recession (15), mydriasis (13, of which 4 were persistent), commotio retinae (8), elevated intraocular pressure (6), iritis (3), and posterior vitreous detachment (3). All angle recession cases required annual monitoring for glaucoma. One patient developed secondary glaucoma as a complication. Eight patients required interventional management (2 anterior chamber washouts, 1 pars plana vitrectomy, 2 laser retinopexies for operculated holes, 1 cataract surgery, 1 repositioning of subluxed posterior chamber intraocular lens).

From the emergency department records, 100 badminton-related eye injuries were extracted. The distribution of eye injuries was similar to non-eye related badminton injuries when stratified by age, gender, place of residence, seasonality and acuity. Between 2011 and 2019, an eye was injured in 17% of all badminton injuries, and badminton accounted for 0.4% of eye injuries resulting from any cause.

Conclusions: Badminton-related ocular trauma can result in vision-impairing injuries and activity-limiting rehabilitation. In more severe cases, surgical intervention or long-term monitoring for secondary vision-threatening complications was required. Our future goals are to increase public awareness about the risk of badminton-related ocular trauma, and to promote injury mitigation through an intervention to mandate or encourage the use of protective eye wear.

Title: Ophthalmologist Wellness Survey

Authors: Ihor V. Hayda, Lisa Gould, Colin Mann

Abstract Body:

Purpose: The purpose of our study was to survey the COS membership to obtain data regarding the mental health and wellness of its members and to compare the data to the results from the Canadian Medical Association (CMA) National Physician Health (NPH) survey conducted in 2018.

Study Design: The study was executed in the form of a survey. The survey was borrowed from the CMA 2018 NPH Survey with some modifications to fit ophthalmology. Permission to use and modify the survey was obtained from CMA.

Methods: Ethics approval was obtained from the University of Manitoba Research Ethics Board. The survey was translated into French by a certified translator and delivered through the online platform "Survey Gizmo" in English and French versions. The survey links were emailed out to all COS members with a reminder sent out after 2 weeks. The survey was available for 4 weeks in total.

Results: Overall mental health (N=181) was broken up into flourishing (58.6%), languishing (0.5%) and moderate (40.9%). 76% of respondents were found to have high resilience and 24% had low resilience (N=180). High burnout (N=184) was split into high emotional exhaustion (40%) and high depersonalization (19%) with an overall burnout rate of 42%. Depression screening (N=191) found that 24% are at risk of depression. Lifetime suicidal ideation (N=190) was found to be 17% with 7% reporting suicidal ideation within the last 12 months.

Female ophthalmologists had less satisfaction with workload and job demands compared to males. Females reported working more hours per week than their male counterparts. Residents were found to be at higher risk of suicidal ideation and burnout.

Conclusions: The overall mental health results from our survey were strikingly similar to the results of the CMA NPH survey results, suggesting that many of the problems affecting physician mental health are similar across the various fields of medicine. Some differences were found with burnout rates being slightly higher and depression rates slightly lower. Residents continue to show higher rates of burnout and suicidal ideation compared with doctors in practice. This data may be useful in helping coordinate efforts to improve the mental health of ophthalmologists and residents.

RETINA | RÉTINE

2020 COS Virtual Annual Meeting

Title: Retrospective Review of Outcomes Following Vitrectomy using Subretinal Fluid Drainage by Perfluoro-n-octane, Posterior Retinotomy or Pre-existing Peripheral Breaks in Patients with Primary Rhegmatogenous Retinal Detachment

Authors: Bryon R. McKay, Michael Kryshalskyj, Verena Juncal, Alan Berger, Rajeev H. Muni

Abstract Body:

Purpose: To evaluate the visual and anatomical outcomes of 23-gauge pars plana vitrectomy using either original retinal breaks (RB), posterior retinotomy (PR), or perfluoro-n-octane (PFO) for subretinal fluid (SRF) drainage during the repair of primary rhegmatogenous retinal detachment (RRD)

Study Design: Single center, multi-surgeon retrospective analysis of primary RRD at a major tertiary metropolitan hospital in Toronto, Canada.

Methods: 60 eyes (60 patients) underwent 23-gauge pars plana vitrectomy using either 1) drainage of SRF through the primary RB (n=20), 2) Drainage of SRF through PR (n=20), or 3) Drainage via PFO (n=20) for repair of primary RRD between October 2009 and December 2017. Exclusion criteria included eyes with giant retinal tears, grade C2 or worse proliferative vitreoretinopathy (PVR), history of ocular trauma or previous retinopexy, and the presence of other vitreoretinal diseases. Patients with Diabetes were included if the fellow eye had mild non-proliferative diabetic retinopathy or less with no evidence of proliferative disease in either eye.

Results: At presentation there were no significant differences in age (RB 59±6; PR 61±8; PFO 58±5y) sex (RB 72% male, 28% female; PR 75% male, 25% female; PFO 71% male, 29% female), baseline vision (RB 0.7±1.1; PR 1.0±1.2; PFO 1.0±1.1 LogMAR) or time to presentation (RB 3.1±1.1; PR 3.5±0.8; PFO 4.2±1.2 days) between the 3 groups. There was a significant difference in baseline lens status between groups with the PFO group having fewer phakic patients at baseline (RB 80%; PR 100%; PFO 62% phakic, p<0.05). Single-operation success rate was not significantly different between groups (RB 95.5%; PR 94.6%; PFO 95.8%), and final anatomical success rate was 100% in all three groups. Final visual acuity was not significantly different between groups (RB 0.5±0.8; PR 0.6±0.7; PFO 0.5±0.7 LogMAR). Baseline subfoveal fluid height (SFH) >825µm was associated with worse 12-month acuity. Residual subfoveal fluid analysis and restoration of retinal anatomy using optical coherence tomography varied in the first 3-6 months post-operatively in all three groups. Complete resolution of SRF at 6 and 12 months was similar in all groups. There are no significant differences in complications with the most common being epiretinal membrane formation (RB 5.5%; PR 6.2%; PFO 5.2%) and transient increased in IOP requiring IOP-lowering medication (RB 11.5%; PR 10.6%; PFO 12.1%). There were no reported cases of endophthalmitis.

Conclusions: There is no significant difference in visual acuity or anatomical success of surgery at 12 months between the three different methods of SRF drainage. Baseline SFH >825µm was associated with worse visual acuity at 12 months in all three groups.

Title: Structural integrity of intraocular lenses with eyelets in a model of transscleral fixation with Gore-Tex suture

Authors: Andre S. Pollmann, Darrell R. Lewis, R Rishi Gupta

Abstract Body:

Purpose: Sutured scleral fixation is a common technique for positioning a posterior chamber intraocular lens (IOL) in patients without adequate capsular bag support. Recent reports have described IOL eyelet fracture from Gore-Tex suture strain in enVista IOLs. We sought to compare fracture characteristics of IOLs used in sutured scleral fixation.

Study Design: Experimental benchtop study.

Methods: A model was designed to compare IOL eyelet fracture characteristics of enVista MX60 (model available prior to June 2018), enVistaMX60E (current model), Akreos AO60, and CZ70BD IOLs. Tension was applied via Gore-Tex suture and measured with a digital force gauge. Two suture configurations (radial and non-radial) were tested using the MX60E IOL.

Results: Twenty-five trials were conducted. Mean eyelet fracture force was 1.666 N for MX60 (range 1.000-2.000), 1.000 N for MX60E (range 1.000-1.000), 2.330 N for AO60 (range 2.000-3.000), and 0.998 N for CZ70BD (range 0.990-1.000). Compared to the MX60E, greater eyelet strength was observed with the MX60 ($p=0.024$) and AO60 ($p=0.004$) IOLs. Radial and non-radial suture configuration did not affect MX60E eyelet fracture force.

Conclusions: The enVista MX60E eyelet may be less resistant to Gore-Tex suture tear out compared to the MX60 and AO60 IOLs. Altering suture configuration does not affect enVista eyelet resistance to fracture. During off-label use in transscleral fixation, extra caution should be used when handling IOLs and applying tension on sutures.

Title: Management and Visual Outcomes of Twenty-four Cases of Culture-proven Acute Bacterial Endophthalmitis Following Intravitreal Injection of Contaminated Bevacizumab In A Single Day

Authors: Kunyong Xu, Raed Mousa, Eric K. Chin, David R. P. Almeida

Abstract Body:

Purpose: Bevacizumab requires compounding for off-label intravitreal injection and thus there is a risk of possible contamination during preparation. This study evaluates the microbiology results, management, and visual outcomes of endophthalmitis following intravitreal injection secondary to contaminated bevacizumab in order to mitigate the knowledge gap present in these inherently rare circumstances.

Study Design: Retrospective consecutive case series of patients who developed culture-proven acute endophthalmitis after receiving intravitreal injection with contaminated bevacizumab in a single site in Gaza.

Methods: All patients suspected of endophthalmitis had vitreous biopsy and microbial cultures prior to initiation of treatment. All patients were managed with immediate tap and injection of antibiotics (TAI) followed by early pars plana vitrectomy (PPV). Snellen best-corrected visual acuity (BCVA) at the time of receiving bevacizumab injections, at presentation of infection, and three-months post-management of the endophthalmitis were collected. Microbiology culture results and complications were also recorded.

Results: Twenty-four patients developed acute bacterial endophthalmitis following intravitreal injection of 24 contaminated bevacizumab single-dose syringes in a single day. All cases had culture-positive microbiology; 23 (95.8 %) grew Streptococcus species and one (4.2%) grew Enterococcus species. Six cases (25.0%) had optic nerve atrophy, 3 (12.5%) developed retinal detachment (RD), one (4.2%) had vitreous hemorrhage and one (4.2%) had band keratopathy. At three-month follow-up, compared to BCVA at the time of initial presentation, 11 (45.8%) patients had improved vision; 8 patients (33.3%) had unchanged BCVA and 5 patients (20.8%) had worse BCVA. However, at three-month follow-up, when compared to BCVA prior to endophthalmitis (baseline), 22 cases (91.7%) had significantly worse BCVA.

Conclusions: Contamination of off-label bevacizumab poses devastating risk of endophthalmitis following intravitreal injection. The most common virulent pathogen was Streptococcus which portends poor visual prognosis and requires immediate aggressive management. Vigilance needs to continue to ensure that all possible safeguards are in place to prevent contamination during preparation of off-label bevacizumab for intravitreal injection.

Title: Foveal avascular zone analysis on OCT-A imaging in eyes following macula-off rhegmatogenous retinal detachment repair: a comparison between eyes with retinal displacement vs no displacement

Authors: SAMARA B. MARAFON, Carolina Francisconi, Verena R. Juncal, Natalia Figueiredo, Louis Giavedoni, Alan Berger, Filiberto Altomare, David T. Wong, David R. Chow, Rajeev H. Muni

Abstract Body:

Purpose: To compare morphological parameters of the foveal avascular zone (FAZ) in optical coherence tomography angiographic (OCTA) images in patients with vs without retinal displacement following rhegmatogenous retinal detachment (RRD) repair.

Study Design: Prospective cohort study.

Methods: Eyes following uncomplicated and successful macula-off RRD repair were studied and the fellow eye, if healthy, was used as a control. Fundus autofluorescence imaging (FAF) was used to determine if there was retinal displacement following RRD repair by the presence of retinal vessel printings. The superficial FAZ in 3x3mm OCTA images were analyzed on ImageJ software by two graders, and the FAZ area, circularity and axial ratio were compared between control and post RRD repair and its subgroups.

Results: FAZ area of 126 eyes were evaluated, in a mean follow-up period of 91.05 ± 28 days after intervention. The mean logMAR visual acuity in study eyes was 0.41 ± 0.34 . FAZ area was similar between RRD eyes and controls (RRD $0.287 \pm 0.11 \text{ mm}^2$; control $0.312 \pm 0.11 \text{ mm}^2$; $p=.221$). The circularity of the FAZ was significantly worse in eyes following RRD repair compared with controls (RRD 0.626 ± 0.10 ; controls 0.667 ± 0.11 ; $p=.035$) and the axial ratio was higher (less symmetric) in RRD eyes vs controls (RRD 1.26 ± 0.17 ; controls 1.19 ± 0.15 ; $p=.034$). There were no significant differences in FAZ parameters between patients undergoing pars plana vitrectomy, pneumatic retinopexy and scleral buckle in this cohort. There was a lower circularity score when comparing eyes with retinal displacement found on FAF (eyes with displacement 0.59 ± 0.10 ; eyes without displacement 0.64 ± 0.10 ; $p=.049$). The FAZ parameters were not significantly correlated with visual acuity or objective measurements of metamorphopsia (MCHARTS).

Conclusions: OCT-A is a non-invasive technology that may be useful to assess anatomical outcomes following RRD repair. This study demonstrates that RRD has an impact on FAZ circularity post-operatively. Additionally, our results show that retinal displacement may influence FAZ shape on OCT-A, and this could be a useful biomarker to evaluate the extent of retinal displacement/stretch in eyes following RRD repair.

Title: Macular microvascular quantification in eyes with choroidal melanoma versus contralateral eyes with Optical Coherence Tomography Angiography

Authors: Travers Weaver, Zaid Mammo, Marinko Sarunic, Katherine Paton

Abstract Body:

Purpose: To quantitatively evaluate and compare the macular microvasculature and foveal avascular zone (FAZ) morphology in eyes with choroidal melanoma prior to radiation brachytherapy with the unaffected contralateral eyes using optical coherence tomography angiography (OCTA)

Study Design: Prospective consecutive case series

Methods: The study was approved by the ethics committee of the University of British Columbia. Consecutive patients with a new diagnosis of unilateral non-macula involving choroidal melanoma and a normal contralateral eye were imaged. OCTA images, 3x3 mm, of the macula were acquired using Zeiss Plex Elite 9000. A fully-automated and validated machine learning segmentation tool was used to evaluate four morphometric parameters of the FAZ including: Area, minimum diameter, largest diameter and eccentricity. The same algorithm was used to quantify vessel density of the superficial and deep perifoveal vasculature.

Results: Optical coherence tomography angiography demonstrated no difference in foveal avascular zone parameters in affected eyes as compared with fellow eyes. Maximum diameter of FAZ (μm) *tumour* 0.83 +/- 0.25 vs *control* 0.96 +/- 0.02 (p > 0.1). Minimum diameter FAZ (μm), *tumour* 0.48 +/- 0.06 vs *control* 0.50 +/- 0.01 (p > 0.10). FAZ Area (mm^2) *tumour* 0.31 +/- 0.1 vs *control* 0.320994 +/- 0.02 (p > 0.1). Eccentricity of FAZ (value of 1 is a circle, while $e < 1$ is an ellipse) *tumour* 0.66 +/- 0.18 vs *control* 0.795383 +/- 0.04 (p > 0.1). It also showed no significant decrease in superficial and deep capillary vascular density (CVD). Superficial CVD *tumour* 0.044 +/- 0.008 vs *control* 0.47 +/- 0.009 (p > 0.1). Deep CVD *tumour* 0.023 +/- 0.007 vs *control* 0.022 +/- 0.004 (p > 0.1).

Conclusions: Previous retrospective studies have shown that eyes with treatment-naive non-macula involving choroidal melanoma exhibited decreased macular vessel density when compared to contralateral eyes. However, our prospective study evaluating the FAZ morphology and perifoveal vessel density using a validated machine learning algorithm does not demonstrate a difference in vasculature in eyes with melanoma in comparison to the fellow eye. Future studies documenting the precise timing of macular vascular changes could aid in determine the natural history of microvascular change in choroidal melanoma and the development of radiation retinopathy following treatment.

Title: Efficacy of Intravitreal Aflibercept Administered Using a Treat-and-Extend Regimen Over 2 Years in Patients with Neovascular Age-Related Macular Degeneration: The ARIES Study Results

Authors: Varun Chaudhary, Paul Mitchell, Eric Souied, Edoardo Midena, Frank G. Holz, Philip Hykin, Sebastian Wolf, Helmut Allmeier

Abstract Body:

Purpose: To assess whether intravitreal aflibercept (IVT-AFL) injection administered in an early treat-and-extend (T&E) regimen was non-inferior to a late-start T&E regimen in neovascular age-related macular degeneration (nAMD).

Study Design: ARIES (NCT02581891) was a multicenter, randomized, open-label, active-controlled, parallel-group, Phase 3b/4 study comparing the efficacy of IVT-AFL administered in two different T&E regimens over 2 years in treatment-naïve patients with nAMD. The study was conducted at 39 sites in Canada, Europe, and Australia.

Methods: All patients received three initial monthly doses of 2mg IVT-AFL (Weeks 0, 4, and 8), followed by an injection at an 8-week treatment interval (Week 16). At Week 16, patients were randomized 1:1 to an early-start T&E arm (IVT-AFL T&E regimen extended in 2-week increments or an initial 4-week interval [maximum 16 weeks]) or a late-start T&E arm (IVT-AFL every 8 weeks until Week 52, followed by a T&E regimen). The primary endpoint was change in best-corrected visual acuity (BCVA, Early Treatment Diabetic Retinopathy Study [ETDRS] letters) from randomization (Week 16) to Week 104.

Results: Of 287 treatment-naïve patients with nAMD enrolled, 271 patients were randomized at Week 16. Baseline characteristics were largely similar between treatment arms. At Week 104, mean change in BCVA from Week 16 was -2.1 vs -0.4 ETDRS letters, and from baseline was +4.3 vs +7.9 ETDRS letters in the early- vs late-start treatment arms, respectively.

Around half of the letter-score difference between the groups was evident at randomization (Week 16); at Week 16, mean change from baseline in BCVA was +6.4 vs +8.3 ETDRS letters. Mean number of injections was 12.0 vs 13.0 (early- vs late-start arms). The proportion of patients maintaining visual acuity (<15 ETDRS letter loss) from baseline to Week 104 was 93.4% and 96.2% in early- and late-start arms, respectively, which is similar or better than that observed in pivotal trials. By Week 104, mean central retinal thickness had decreased by 162µm and 159µm from baseline in early- and late-start arms, respectively. By Week 104, 47.2% and 51.9% of patients had a last injection interval of ≥12 weeks in the early- and late-start arms, respectively. The proportion of patients with ocular serious treatment-emergent adverse events (study eye) was 0.0% (early-start T&E) and 2.9% (late-start T&E). The safety profile was consistent with previous studies.

Conclusions: These results demonstrate a relative consistency of functional and anatomic outcomes with both early- and late-start IVT-AFL T&E regimens for the treatment of nAMD in patients from Canada, Europe, and Australia. The observed mean reduction in the number of injections with early-start T&E following initial dosing was clinically relevant.

Title: Canadian Treat-and-Extend Trial with Ranibizumab in nAMD Patients: CANTREAT 36-month Extension Results

Authors: Peter J. Kertes, Tom Sheidow, Geoff Williams, Mark Greve, Ivan Galic, Jason Baker

Abstract Body:

Purpose: Few large prospective studies have assessed the efficacy of a treat-and-extend (T&E) regimen compared with once-monthly (OM) ranibizumab dosing for treatment of neovascular age-related macular degeneration (nAMD). The primary efficacy outcome of the main study was to assess non-inferiority of a T&E ranibizumab dosing regimen compared to OM at 12 Months, and the 12-month extension portion assessed the long-term effectiveness in those initially randomized to T&E regimen and remaining on T&E vs. those randomized to OM but switched to T&E at Month 24.

Study Design: A 24-month randomized (1:1 T&E:OM), open-label, Canadian, post-authorization non-inferiority study with 12-month extension of T&E regimen for all ongoing patients.

Methods: A subset of patients completing the 24-month main study follow-up (T&E or OM) were offered a 12-month ranibizumab extension with a T&E regimen for a total of 36-months. Subject disposition, Best Corrected Visual Acuity (BCVA; in ETDRS letters), and injection frequency were assessed at 36-months. Data are presented for extension patients only by treatment group randomization in the main study + extension (T&E vs. OM-T&E).

Results: The study was approved by ethics boards and an Institutional Review Board. A total of 139 patients (73 T&E: 66 OM-T&E) entered the 12-month extension and 121 patients (68 T&E: 53 OM-T&E) completed the 12-month extension. A total of 18 extension patients (12.9%) discontinued early.

Demographics and baseline BCVA were comparable between groups. Mean (SD) changes from Baseline in BCVA at 12, 24, and 36-months were 9.5 (8.80), 7.8 (11.93), and 6.3 (11.61) letters for T&E and 8.2 (9.44), 5.8 (12.86), and 3.9 (13.91) letters for OM-T&E arms, respectively. After 36 months in the study, 35.6%, 21.9%, and 13.7% of T&E patients gained ≥ 5 , ≥ 10 , and ≥ 15 letters from baseline compared to 24.2%, 13.6%, and 6.1% of OM-T&E patients, respectively; 2.7% T&E and 7.6% OM-T&E patients lost ≥ 15 letters. The differences in BCVA gains and losses at 36 months were not significantly different between the groups. From Baseline to Month 24, T&E patients received a mean (SD) of 16.4 (4.42) injections and OM-T&E patients received a mean (SD) of 23.6 (0.88) injections. During the 12-month extension period, a mean (SD) of 7.3 (2.73) and 7.1 (2.80) injections were administered to patients in the T&E and OM-T&E arms, respectively.

Conclusions: After 36 months of treatment, the mean BCVA improvements at 24-months were maintained for both the patients exclusively treated with the T&E regimen and those patients that switched to T&E after 24 months of the OM regimen.

Title: Geographic Atrophy in the Canadian Treat and Extend Trial with Ranibizumab in patients with nAMD (CANTREAT)

Authors: Parnian Arjmand, Kenneth Eng, Radha Kohly, Carol Schwartz, Pradeepa Yoganathan, Tom Sheidow, Peter J. Kertes

Abstract Body:

Purpose: To evaluate the presence, development, size and type of geographic atrophy (GA) in the 12-, 24- and 36-month CANTREAT study (NCT02103738) for neovascular age-related macular degeneration (nAMD).

Study Design: Post hoc analysis of a subset of patients from a multicenter, prospective, randomized, open-label, post-authorization, double-masked active treatment-controlled clinical trial.

Methods: Fundus autofluorescence (FAF) photos of a subset of patients in the CANTREAT study from the Sunnybrook Health Sciences Centre (Toronto, Ontario) at baseline, months 12, 24 and 36 were retrospectively graded by two masked graders for GA: well-defined areas of atrophy within 250 μm of the macula, excluding atrophy associated with retinal pigment epithelium tears. The area of atrophy was measured using ImageJ (NIH, Maryland, USA).

Results: The study was research ethics board approved. A total of 60 patients with nAMD, 30 in each arm of the study, once-monthly (OM) vs. treat and extend (T&E) with intravitreal ranibizumab 0.5 mg, were identified who had completed 24 months of the study. 8 patients completed 36 months. Images from 5 patients were deemed ungradeable. At baseline, GA was identified in 66% of patients with nAMD; of these, 65.7% were multifocal and the remainder were characterized as unifocal atrophy. At 12 months, new GA was identified in 16.6% of patients in the OM vs. 20% in the T&E arm ($P>0.05$). Eyes that were graded to have no GA by 12 months did not develop new GA by 24 or 36 months. Mean change in square-root area of GA from base-line in the OM and T&E arms was 243.70 μm and 340.56 μm at 12 months ($p=0.59$), 342.62 μm and 415.04 μm at 24 months ($p=0.69$), and 1003.27 μm and 1374.61 μm at 36 months ($p=0.88$), respectively, using a two-tailed unequal variance t-test.

Conclusions: New or progressive GA was detected with a similar frequency, characteristic, and surface area in both once monthly and treat and extend arms of the CANTREAT study in this subset of patients at 12, 24 and 36 months.

Title: Discovery of novel disease-causing mutations in inherited retinal dystrophies - an application to retinitis pigmentosa

Authors: Caberry W. Yu, Erika Tavares, Chenyu Tang, Ajoy Vincent, Elise Héon

Abstract Body:

Purpose: Inherited retinal dystrophies (IRDs) implicate >250 genes, however, ~50% of patients do not have a genetic diagnosis. These patients are offered Whole Genome Sequencing (WGS) to identify the genetic cause. This project aims to identify novel disease-causing variants in patients with autosomal dominant retinitis pigmentosa (RP) who failed standard-of-care panel-based genetic testing. It also aims to refine a streamlined variant analysis pipeline of WGS data that is applicable for other IRDs to identify novel disease-causing mutations.

Study Design: Case series.

Methods: WGS was performed on DNA of two family members with RP whereby standard of care genetic testing failed to identify a disease-causing mutation. Copy number variations (CNVs), transposable elements (TEs), and single nucleotide polymorphisms (SNPs) were examined. These variants underwent quality filter to ensure low frequency in controls. The remaining variants were validated manually through software visualization, and examination of gene expression in retina, and in silico prediction of gene splicing and pathogenicity.

Results: The filter strategy identified 3 CNVs, 8 TEs, and 59 SNPs of interest. Variants were then prioritized using conservation in vertebrates, relation to retina, and mouse phenotype data. Segregation analyses were performed on variants of interest. A CNV that is a 86 000 base pair tandem duplication of a region on chromosome 8 was identified to be potentially disease-causing. The variant underwent the analysis pipeline and was found to be shared between the affected individuals and not found in controls. It contains the gene KLF10 which is highly expressed in the retina and is not previously linked to IRDs.

Conclusions: The genetic characterization of IRDs is particularly important and timely as there is an emergence of novel and personalized gene-specific treatment opportunities. The variant identified on chromosome 8 contributes to genetic diagnosis certainty for autosomal dominant RP patients and for optimal gene-specific management of patients. The variant analysis pipeline based on WGS data created for this case is a streamlined way to discover novel variants for patients without a genetic diagnosis.

Title: Levels of systemic VEGF and ranibizumab in the infant of a nursing mother undergoing intravitreal ranibizumab therapy

Authors: Verena Juncal, Radha Kohly, Samara B. Marafon, Keyvan Koushan, Yenge Diambomba, Rajeev Muni

Abstract Body:

Purpose: Ranibizumab has been detected in the breast milk (BM) of lactating women following intravitreal injection. To date, there is no study looking at the impact on the child of a nursing mother receiving ranibizumab therapy. The purposes of this study are to: evaluate serum ranibizumab and plasma VEGF levels in the infant of a nursing mother receiving ranibizumab therapy; compare systemic VEGF levels in the child of a nursing mother receiving ranibizumab to those in 4 controls; describe a case of a pregnant patient with bilateral central retinal vein occlusion (CRVO) who received ranibizumab injections post-partum while breastfeeding and to measure the levels of ranibizumab and VEGF in her BM.

Study Design: Prospective, interventional clinical study.

Methods: This is a study including both a 34-year-old nursing patient who required bilateral ranibizumab injections post-partum and her newborn child. Baby was regularly breastfed, except on the 3 days following each injection, when a “pump and dump” strategy was adopted, where mother regularly pumped and discarded BM while baby was fed exclusively with formula. BM samples were obtained at baseline and then daily following injections (days 1-14 after first eye was injected). Baby’s blood samples were obtained at baseline and then daily starting on the day that baby resumed breastfeeding (day 4 after the first injection) for 11 days (corresponding to 1 week after mother’s second eye was injected). Plasma and serum samples were obtained for VEGF and ranibizumab analysis, respectively. In addition, blood samples of 4 controls of similar gestational age as the index infant were obtained and analyzed for plasma VEGF levels.

Results: This mother presented when she was 28-weeks pregnant with bilateral CRVO with optic disc neovascularization. She experienced rapid deterioration of visual acuity in both eyes despite pan-retinal photocoagulation. Pregnancy was interrupted at 33 weeks and 6 days. Mother received a ranibizumab injection in the right eye 4 days post-partum and then in the other eye 1 week later. Although baby was being breastfed, a “pump and dump” strategy was adopted on the first 3 days post-injections in an attempt to minimize baby’s exposure to the drug present in the BM. Blood and BM samples are currently under analysis and VEGF and ranibizumab levels will be added to the results.

Conclusions: This is the first study looking at ranibizumab and VEGF levels in the systemic circulation of the infant of a nursing mother receiving ranibizumab injections.

Title: Ganglion Cell Complex Changes in Wet AMD patients Treated With Anti-VEGF Intravitreal Injections According to Treat-and-Extend Protocol in Comparison to Non-Treated Dry AMD

Authors: Jessica Cao, Mohamed Mongy, Lisia Barros-Ferreira, Olivera Sutakovic, Michael H. Brent

Abstract Body:

Purpose: Intravitreal injections (IVIs) of anti-vascular endothelial growth factor A (anti-VEGF-A) is the cornerstone of treatment for wet age-related macular degeneration (AMD). There is concern that repeated transient IOP spikes caused by anti-VEGF IVIs can damage retinal nerve structures and cause potential glaucomatous changes in patients receiving long-term treatment.

Ganglion cell loss has been associated with visual field defects in glaucoma, but there is conflicting evidence on whether IVIs are linked to ganglion cell complex (GCC) thinning. Our study analyzes longitudinal changes to GCC thickness in wet AMD patients receiving anti-VEGF IVIs, and is the first study to our knowledge that uses a treat-and-extend protocol.

Study Design: Retrospective cohort study. 46 patients with wet or dry AMD were followed for 3 years.

Methods: The wet AMD group received IVIs for at least 3 years following a treat-and-extend protocol. 22 patients received ranibizumab, and 1 patient received aflibercept. The control group consisted of dry AMD patients who were observed and did not receive any IVIs. Data was collected at 0, 1, 2, and 3 year visits (± 2 months). GCC and RNFL thickness in all 4 quadrants was acquired by spectral domain high definition optical coherence tomography(OCT) (Zeiss Cirrus HD-OCT). Statistical analysis was conducted using SPSS 24.0. $p < 0.05$ was considered statistically significant. Means are reported as \pm standard deviation.

Results: Between the wet AMD and control groups, mean GCC thickness was not significantly different at baseline ($p=0.11$) as well as at 3 years ($p=0.11$).

In the control group, there was no change in GCC thickness between baseline and year three ($p=0.55$). In wet AMD group, there was a nonsignificant trend towards reduction in GCC thickness ($-4.09 \pm 8.47 \mu\text{m}$, $p= 0.09$). However, when the groups were compared, the change in GCC thickness over 3 years was not significantly different ($p = 0.86$). Surprisingly, correlation analysis in the wet AMD group showed that receiving a greater quantity of IVIs trended towards preservation of the GCC layer at 3 years ($p=0.07$).

Conclusions: Our study provides longitudinal evidence that there is no significant GCC thinning in wet AMD patients following a treat-and-extend regimen over 3 years, and that IVIs may even be protective. This refutes earlier suggestions that IVIs may be related to GCC damage. Larger, longer term prospective studies that consider quantity of IVIs are needed to better evaluate the association between intravitreal administration of anti-VEGF agents, GCC changes, and glaucoma.

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🏆 PREMIER PRIX, PRIX D'EXCELLENCE DE LA SCO 🏆

Title: Retinal Displacement following Pneumatic Retinopexy vs Pars Plana Vitrectomy for Rhegmatogenous Retinal Detachment (ALIGN STUDY)

Authors: Carolina L. M. Francisconi, Samara B. Marafon, Natalia Figueiredo, Verena Juncal, David Ta Kim, Koby Brosh, Francesco Sabatino, Roxane J. Hillier, Mustafa Kadhim, Sandro Di Simplicio, Varun Chaudhary, Alan Berger, Filiberto Altomare, David R. Chow, David T. Wong, Louis R. Giavedoni, Shaina Rubino, Edwin H. Ryan, Rajeev H. Muni

Abstract Body:

Purpose: Previous studies have demonstrated that approximately 40% of patients that undergo pars plana vitrectomy (PPV) for rhegmatogenous retinal detachment (RRD) repair have post-operative retinal displacement on Fundus Autofluorescence (FAF) imaging. Recently, the PIVOT trial showed that Pneumatic Retinopexy (PnR) may offer advantages over PPV in terms of visual acuity and vertical distortion. No prior studies have compared retinal displacement following PnR and PPV prospectively. Our aim was to compare the rates of retinal displacement following PnR vs PPV.

Study Design: Prospective cohort study.

Methods: We included all consecutive patients presenting at our institution between June 2018 and July 2019 with primary macula-off RRD where PnR or PPV were the treatment of choice. The primary outcome was the incidence of retinal displacement, evaluated by FAF imaging between 2 and 4-months post RRD repair. Images were evaluated by 2 independent masked graders for the presence of retinal vessel printing (RVP), displacement location and extent of displacement. Secondary outcomes included the correlations of retinal displacement with best-corrected visual acuity (BCVA), metamorphopsia (MCHARTS), and aniseikonia (New Aniseikonia Test).

Results: We included 121 eyes of 120 patients (PnR=75; PPV=46). 104 eyes had good quality FAF imaging that could be adequately graded. The median age was 60±12 years, 86 (71%) patients were male, and 49 (40.5%) patients were phakic. Sixteen patients (21%) failed PnR repair and required subsequent PPV. Five patients (11%) in the PPV group required a second PPV to achieve retinal re-attachment. The median follow-up period was 90 ±30 days. There was no significant difference in extent of retinal detachment (number of clock hours) between groups (PnR=5.9±2.31; PPV=6.67±2.8, p=0.3). There was a significantly higher incidence of retinal displacement in patients who underwent PPV as the final procedure to achieve retinal re-attachment (PnR=12.5%; PPV=48%; p<0.001). Among those patients with retinal displacement, PPV was associated with greater severity of retinal displacement in the posterior pole (PnR=0.17um, n=7 PPV=0.36um, n=23; p=0.006). Severity of retinal displacement in the posterior pole was correlated with worse BCVA (r=0.53; p=0.005), and the presence of retinal displacement was associated with more severe aniseikonia scores (With RVP=4.7±5.7; Without RVP=1.9±3.7, p=0.006). No correlation was observed between MCHARTS scores and retinal displacement.

Conclusions: This is the first prospective study comparing retinal displacement rates between PnR and PPV following RRD repair. PPV is associated with significantly higher rates of retinal displacement and more severe posterior pole displacement compared with PnR. Furthermore, BCVA was correlated with the severity of posterior pole displacement, and aniseikonia scores were associated with the presence of retinal displacement. These results suggest that retinal displacement has a clinically significant impact on visual function following RRD repair. Our results may help explain the inferior BCVA results associated with PPV

reported in the PIVOT trial and provide further insights on the pathophysiology of residual visual impairment in patients following RRD repair.

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Title: COX2 Acetylating Immuno-Resolvents: effects on ocular fibroblast cytokine secretion and in vitro scarring activity

Authors: James J. Armstrong, Erica A. Li, Anastasiya Vinokurtseva, Cindy M. L. Hutnik

Abstract Body:

Purpose: The medical community has long benefitted from competitively inhibiting cyclooxygenase 2 (COX2) and protecting patients from the deleterious effects of excessive prostaglandin (PG) production with effects ranging from minor pains to cytokine mediated end organ fibrosis. However, more recently it has become apparent that these early inflammatory lipid mediators are essential for engaging the downstream signaling cascade responsible for bringing about the endogenous resolution of inflammation. Acetylsalicylic acid is capable of directly acetylating COX2 such that it stops producing PGs and, most importantly, the acetylated enzyme's biosynthetic activity is altered to become lipoxygenase-like, now producing several key pro-resolving mediators from upstream polyunsaturated fatty acid substrates. The aim of this study was to assess several novel agents, with increased predicted COX2 acetylating potency, for the ability to force COX2 to produce excessive lipoxygenase products and oppose inflammation and scarring in vitro.

Study Design: Novel drug exposure experiments in vitro using glaucoma patient derived Tenon's capsule fibroblasts.

Methods: Human Tenon's capsule fibroblasts were derived from glaucoma patients undergoing trabeculectomy, cultured in vitro and co-treated with inflammatory cytokines (IL-1 β /IFN γ /TNF) with (and without) the experimental COX2 acetylating agents. Liquid chromatography tandem mass spectrometry (LC-MS/MS) with deuterium-labeled eicosanoid internal standards was used to measure changes in prostaglandin and pro-resolving lipid mediator production over 48hrs. Cell-mediated collagen contraction assays under identical treatment conditions were used to assess in vitro scarring activity.

Results: LC-MS/MS revealed significantly reduced prostaglandin E2 (PGE₂) and 6-keto-prostaglandin F1 alpha (6kPGF_{1 α}) production within inflammatory cytokine-induced subconjunctival fibroblasts after experimental treatment. A simultaneous and significant increase in lipoxygenase products 15-hydroxyeicosatetraenoic acid (HETE), 18-hydroxyeicosapentaenoic acid (HEPE) and 17-hydroxy-docosahexaenoic acid (OHDHA) was also observed - suggesting that acetylated COX2 was acting on arachidonic (AA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), respectively, in a manner akin to a lipoxygenase enzyme. Human Tenon's capsule fibroblast-mediated collagen contraction was significantly inhibited by exposure to COX2 acetylating agents, and the inhibitory effects remained significant even with the addition of TGF β 1 to enhance fibroblast contractility.

Conclusions: The lipid mediators inhibited by COX2 acetylating enzymes have long been recognized as pro-inflammatory and disease associated. The lipid mediators whose production is stimulated by acetyl-COX2 are more recently recognized pro-resolving precursor lipid mediators. These data from subconjunctival fibroblasts suggest that novel COX2 acetylating agents have therapeutic promise as small molecule immuno/fibro-resolvent agents.

Title: Efficacy of Intravitreal Dexamethasone Implant Monotherapy as the Treatment of Macular Edema in Non-infectious Uveitis

Authors: Julius Vladimir Ilin, Chloe Gottlieb

Abstract Body:

Purpose: This study investigates the efficacy of dexamethasone intravitreal implants (DEX), a novel treatment, as monotherapy for the treatment of macular edema in non-infectious intermediate, posterior or panuveitis.

Study Design: Retrospective chart review from the University of Ottawa Eye Institute, Ottawa, Ontario, Canada

Methods: Thirty patients seen at an academic tertiary care centre for the treatment of intermediate, posterior and panuveitis with DEX were included in the study. Exclusion criteria included concomitant oral prednisone, systemic immunomodulatory treatment, or periocular steroid 6 weeks prior to the first implant. The primary outcome measure was central retinal thickness (CRT) as measured by spectral-domain optical coherence tomography (sdOCT). Secondary measures were best corrected visual acuity (BCVA) and time to failure, defined as number of months with DEX implant until an adjunct therapy is indicated, up to 12 months after the first injection. Baseline measurements of CRT and BCVA were measured within 1 month prior to intravitreal DEX implant, and follow up measurements were collected at 1-month and subsequent 3-month intervals up to 12 months after each injection.

Results: A total of 49 implants on 39 eyes of 30 patients were included in the analysis of this study. Of these, 64.1% (25 of 39) had an improvement in BCVA and 65.4% (17 of the 26 collected eyes) had a reduction in CRT. BCVA improved from 0.285um (SE: 0.05um) at baseline to 0.172um (SE: 0.03um) at 3 months and 0.182um (SE: 0.05um) at 12 months. Preliminary CRT data showed a decrease from 392um (SE: 31um) at baseline to 305um (SE: 22um) at 1 month and 326um (SE: 12um) at 12 months. Of the 39 eyes, only 4 eyes (10.2%) failed the treatment and required systemic corticosteroid therapy. The average time to failure in these patients was 7 months.

Conclusions: The DEX implant as monotherapy for macular edema in non-infectious uveitis was associated with a reduction in CRT and improvement in BCVA, with only 10.2% of patients requiring additional treatment in a 12-month period. The DEX intravitreal implant, used as a monotherapy in treatment-naïve eyes with intermediate, posterior and panuveitis, is a local corticosteroid therapy that has the potential to treat uveitis without the addition of oral corticosteroid or other immunomodulatory therapy.

Title: Effectiveness of topical cycloplegics in treating pain in the setting of anterior segment injury or inflammation: a systematic review and meta-analysis

Authors: Carter W. Lim, Kevin Wong, Monali S. Malvankar-Mehta, Cindy M. L. Hutnik

Abstract Body:

Purpose: Topical cycloplegics are frequently prescribed for pain relief secondary to ciliary spasm. Despite their widespread use, it remains unclear whether there is sufficient evidence to support the use of cycloplegics in relieving pain in an injured and inflamed eye. The purpose of this study was to investigate if sufficient evidence in the literature exists to justify the use of these agents in this context.

Study Design: Systematic review and meta-analysis

Methods: Appropriate keywords relating to cycloplegics and inflammatory and infectious eye conditions were collected to design a search strategy. Using these keywords, a search was conducted on MEDLINE, EMBASE, CINAHL, Cochrane, Web of Science, and BIOSIS databases for relevant articles. Titles and abstracts were collected and independently screened for relevancy by two independent screeners. Full-text screening was then conducted on relevant articles. Meta-analyses were performed on data extracted from relevant articles (STATA 15.0). Fixed and random-effects models were developed based on heterogeneity.

Results: A total of 5388 articles were identified and screened. 15 articles were relevant and underwent full-text screening. 8 of these articles were useful for data analyses. Of these 8, three articles supported the notion that cycloplegics are effective at treating pain, while the other 5 did not. Five articles were included in the meta-analyses. Results indicated a non-significant reduction in intensity of pain in less than a day with homatrapine (SMD = -0.10; 95%CI: [-0.57, 0.37]). However, results showed a significant reduction in intensity of pain in 2-days follow-up with cyclopentolate (SMD = -0.47; 95%CI: [-0.92, -0.02]) and homatrapine (SMD = -0.89; 95%CI: [-1.64, -0.14]). A non-significant reduction in cells at 1-day follow-up with cyclopentolate (SMD = -0.11; 95%CI: [-0.42, 0.20]) and atropine (SMD = 0.22; 95%CI: [-0.40, 0.84]) and up to 3-months follow-up with cyclopentolate (SMD = -0.23; 95%CI: [-0.55, 0.08]) and atropine (SMD = -0.00; 95%CI: [-0.62, 0.62]) was seen. Additionally, results suggested a non-significant reduction in flare at 1-day follow-up with cyclopentolate (SMD = -0.21; 95%CI: [-0.52, 0.10]) and atropine (SMD = 0.25; 95%CI: [-0.37, 0.87]).

Conclusions: Results indicated that some topical cycloplegics do help significantly to reduce intensity of pain in the post-operative setting. Results also suggested a non-significant reduction in cells and flare reaction with certain topical cycloplegics. Importantly, there were no studies investigating other uveitic eye conditions other than the post-operative context. The high heterogeneity between studies suggest that more robust prospective trials are required to further elucidate cycloplegics' efficacy in relieving pain in uveitis.

Title: Uveitis in Vogt-Koyanagi-Harada Syndrome in a Canadian Indigenous Population

Authors: Michael T. Kryshtalskyj, Mili Roy

Abstract Body:

Purpose: To characterize presentations, characteristics and outcomes of uveitis in Vogt-Koyanagi-Harada (VKH) syndrome in a North American Indigenous population in the largest such study to date.

Study Design: Retrospective case series.

Methods: Charts of 27 First Nations patients diagnosed with uveitis and VKH were reviewed. Data collected included patient demographics (age, gender, rural vs. urban residence), ocular and systemic disease characteristics, treatment (medical, laser and surgical), complications and visual outcomes. Visual outcomes were analyzed as distribution of initial and final best-corrected Snellen visual acuities (VA) defined as mild ($\geq 20/40$), moderate (20/150 to 20/50), or severe visual loss ($\leq 20/200$), as well as change in VA of each study eye over study duration. Descriptive and comparative statistical analyses were performed.

Results: Average age at uveitis onset was 30.9 ± 13.8 years, and 26 patients (96.3%) were female. Nineteen patients (70%) lived in rural areas. Nine patients (33.3%) had complete VKH; 8 patients (29.6%) had incomplete VKH, and 10 patients (37%) had probable VKH. Systemic associations included integumentary (19 patients, 70%), neurologic (17 patients, 63%), and auditory (13 patients, 48%) findings. Initial rates of mild, moderate and severe vision loss were 19 eyes (35.2%), 12 eyes (22.2%), and 23 eyes (42.6%), respectively, compared with 19 eyes (35.2%), 14 eyes (25.6%) and 21 eyes (38.9%), respectively at the end of the study. Across all eyes, the average change in VA was 0.1 ± 6.3 Snellen lines from initial to final measurement. This population had a low rate of immunomodulatory therapy (IMT) use (10 patients, 37%). Laser procedures were needed in a total of 20 eyes (37.0%). Surgical procedures were required in (46.3%) eyes. Each eye had an average of 3.1 ± 1.8 complications, with the highest frequency being cataract (n=33; 61.1%), posterior synechiae (n=27; 50%), and retinal detachment (n=18; 33%).

Conclusions: While VKH is a relatively rare overall cause of uveitis in North America, its importance in the Canadian Indigenous population has been shown. This study attempts to characterize this entity in the study population. Approximately 65% of patients in this study demonstrated moderate or severe vision loss both at initial and final measurements. The relatively low rate of IMT usage achieved in this population (37%) falls short of targets. Factors such as geographic, linguistic and cultural barriers to accessing care, and comorbidities including tuberculosis and diabetes may be contributory. It is important to better understand this entity to optimize care and outcomes.