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Canadian Ophthalmological Society | Société canadienne d'ophtalmologie
EYE PHYSICIANS AND SURGEONS OF CANADA | MÉDECINS ET CHIRURGIENS OPHTALMOLOGISTES DU CANADA

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2019 COS Annual Meeting | Congrès annuel de la SCO 2019
Abstract Booklet | Livre des résumés
Paper (Oral) Presentations | Présentations orales

By subspecialty | Par surspécialité

CATARACT SURGERY | CHIRURGIE DE LA CATARACTE

Session Title: My New Favourite Toy
Location: Room 2000 C
Session Time: Sunday, June 16, 2019, 10:45 AM – 12:15 PM

Title: Practice patterns of the Canadian Ophthalmological Society members in cataract surgery – Survey 2019

Authors: Lindsay Ong-Tone

Abstract Body:

Purpose: This will be the eleventh 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 2019 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 week intervals.
Results: There was a decrease in the number of respondents who were using femtosecond laser assisted cataract surgery (FLACS) in 2017 (11.8%). This increased back to 16.9% in 2018. The cataract wound size has been getting smaller over the years. In 2017, the most popular one was 2.2 mm (40.5%) followed by 2.4 mm (22.6%) and 2.75 mm (20.2%). Nearly 70 percent of the respondents were correcting astigmatism at the time of cataract surgery. The majority (82 percent) were using a toric intraocular lens to do so. Of the respondents who correct astigmatism at the time of cataract surgery, 74% corrected 1 Diopter or more of with the rule astigmatism while 76.7% corrected 1 Diopter or less of against the rule astigmatism. The number of respondents using intracameral antibiotics has increased from 23.1 percent in 2009 to 46.6 percent in 2017. In this latest survey, the most popular intracameral antibiotic was moxifloxacin (75.6 percent) followed by cefuroxime (12 percent) and vancomycin (12 percent).
Conclusions: Certain trends in the practice patterns of the COS members in cataract surgery have been observed and maintained over the years. Namely, the main wound size has decreased, the use of toric intraocular lenses and intracameral antibiotics have increased markedly over the years.

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: Evolution of intraocular lens (IOL) power prediction formulas and development of new technologies have led to improved refractive outcomes in modern cataract surgery. Given recent advances, there is a parallel increase in patient expectations regarding refractive outcomes and achieving spectacle independence is a major factor of patient satisfaction. Intraoperative aberrometry is a new development which measures the refractive power of an aphakic eye intraoperatively and predicts the residual refractive error expected for specific IOL powers. This study aims to compare the accuracy of intraoperative aberrometry with seven formulas based on pre-operative biometry for predicting 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: Fifty-seven eyes underwent cataract extraction, by one of three surgeons, with monofocal and trifocal IOL implantation without previous PRK or LASIK. For each eye, an IOL power was selected based on pre-operative biometry measurements from the IOLMaster 500. The spherical equivalent (SE) was predicted pre-operatively with the Barrett Universal II, SRKT, Holladay I, Holladay II, Haigis, HofferQ, and Hill-RBF formulas and intraoperatively with wavefront aberrometry. For each formula, the absolute difference between the one month post-operative SE and the predicted SE was calculated to determine the prediction error. The proportion of eyes with a post-operative SE within 0.5D of the refractive target was also calculated.
Results: The analysis included 37 eyes. Formulas with the lowest mean prediction error were intraoperative aberrometry (0.27D), Hill-RBF (0.30D), Haigis (0.31D), Barrett Universal II (0.31D), Holladay II (0.36D), Holladay I (0.38D), SRKT (0.38D), and HofferQ (0.42D). Formulas with the highest proportion of eyes within 0.5D of the refractive target were intraoperative aberrometry (85%), Barrett Universal II (85%), Hill-RBF (82%), Haigis (79%), Holladay II (79%), SRKT (74%), Holladay I (71%), and HofferQ (68%). In 56% of eyes, intraoperative aberrometry recommended a different IOL power than the surgeon previously chose. In 29% of eyes, the IOL power implanted differed from the pre-operative choice.
Conclusions: Based on preliminary results, intraoperative aberrometry has a lower mean prediction error than pre-operative biometry formulas. Intraoperative aberrometry and the Barrett Universal II formula were equally effective at achieving a post-operative spherical equivalent within 0.5D of the refractive target. Data collection is ongoing and we hope to establish statistical significance with further results and larger sample sizes.

Title: A Comparative Analysis of Intraocular Lens Power Formula Accuracy

Authors: Austin Pereira, Marko Popovic, John C. Lloyd, Sherif El-Defrawy, John Gorfinkel, Matthew B. Schlenker

Abstract Body:

Purpose: The aim of this study was to evaluate the accuracy of 10 intraocular lens (IOL) power formulas (Barrett Universal II, Haigis, Hill-RBF, Hoffer Q, Holladay 1, Holladay 2, Olsen, SRK/T, Super Formula and T2) in a single, large-sample analysis.
Study Design: Retrospective consecutive case series.
Methods: Cataract extraction and IOL implantation procedures between January 2015 - August 2017 from two surgical centres in Toronto, Canada were considered for inclusion. Preoperative biometric estimates were obtained from an IOLMaster 500. The postoperative predicted spherical equivalent was compared to the observed 1-month spherical equivalent for ten IOL power formulas. For five formulas (Haigis, Hoffer Q, Holladay 1, Holladay 2 and SRK/T), and only in eyes > 25.5mm, the Wang-Koch axial length (AL) adjustment was investigated. The primary outcome was the percentage of cases with a prediction error within ±0.50D of target. Secondary analyses investigated the effect of AL and anterior chamber depth on mean prediction error, as well as the percentage of cases with a prediction error within ±0.25D and ±1.00D.
Results: In decreasing order, the formulas with the highest percentage of cases within ±0.50D of target were: Barrett Universal II (77.4%), T2 (76.4%), Super (75.9%), Holladay 1 (75.4%), Hill-RBF (74.7%), SRK/T (72.6%), Hoffer Q (72.5%), Haigis (71.7%), Olsen (67.4%) and Holladay 2 (67.3%). For short eyes (AL < 22.5mm, n = 69), the Holladay 1 formula proved to be the most accurate (78.3%), whereas the Olsen formula was the least (56.5%). For long eyes (AL > 25.5mm, n = 116), the Barrett Universal II was the most accurate (76.7%), whereas the Olsen formula was the least (62.1%). The Wang-Koch AL adjustment resulted in a shift from hyperopic error to a myopic refractive outcome for all five optimized calculations in cases with long ALs.
Conclusions: The Barrett Universal II IOL power formula was associated with the most accurate refractive outcome at intermediate and long ALs, whereas the Holladay 1 formula performed best for eyes with short ALs. The Wang-Koch adjustment should be implemented in older generation formulae for eyes with long ALs to improve refractive outcomes.

Session Title: Nightmare in my OR
Location: Room 2000 C
Session Time: Sunday, June 16, 2019, 1:30 – 3:00 PM

Title: An Extended Validation Study of the Iris Glare, Appearance and Photophobia (Iris GAP) Questionnaire for Patients with Iris Defects

Authors: Michael T. Kryshtalskyj, Amrit S. Rai, Georges Durr, Dominik W. Podbielski, Iqbal I. K. Ahmed

Abstract Body:

Purpose: To report a two-and-a-half-year extended validation study of the Iris GAP questionnaire. Previously, we reported the development and preliminary validation of the first patient-reported outcome measure to assess symptoms and iris appearance in patients with iris defects (Iris GAP).
Study Design: Prospective observational study.
Methods: A total of 256 patients were prospectively enrolled and divided into 4 iris defect subgroups: no defect (control, n=73), minor defect (n=80), major defect (n=74), and surgically repaired (n=22). Minor defects included iridotomies and transillumination defects, while major defects included iridodialysis, corectopia, polycoria and aniridia. Age, sex, ethnicity, and lens status were collected. Patients completed the Iris GAP questionnaire, and the glare and driving subscales of the Refractive Status and Vision Profile (RSVP) questionnaire for comparison. Test-retest reliability was studied by having the patient complete the questions two weeks later. Iris Gap is a 12-item questionnaire with subscales for symptoms and iris appearance. It uses a 4-point Likert scale from 0-3, with higher scores representing greater symptomatology. Cronbach α and intraclass correlation coefficients (ICC) were calculated to assess internal consistency. One-way ANOVA was conducted to compare scores between groups.
Results: Iris GAP scores ranged from 0-32 with a 97% completion rate. Iris GAP had high test-retest reliability (Cronbach =0.866, ICC=0.953, $p<0.0005$), demonstrated across symptom subscales (Cronbach =0.852, ICC=0.948, $p<0.0005$) and appearance subscales (Cronbach =0.833, ICC=0.908, $p<0.005$). Median time between test and retest was 14 days (95% CI 7.2-20.8 days). Iris GAP demonstrated high discriminant validity between subgroups (one-way ANOVA $p<0.0005$) indicating that it accurately differentiates between subgroups. In pairwise comparisons, the major defect group had statistically significantly higher scores than any of the other groups ($p<0.005$ for each). The control and repaired groups had the lowest scores, while the minor defect group had intermediate scores. Nine patients underwent iris repair between tests and had a mean difference of 8.2 ± 6.2 points between their pre-operative and post-operative scores ($p=0.004$). Iris GAP scores positively correlated with RSVP scores (R =0.73).
Conclusions: In patients with iris defects, Iris GAP can reliably evaluate symptomatology and patient-reported iris appearance. It has strong internal consistency, test-retest reliability, and discriminant and concurrent validity with the RSVP questionnaire.

Session Title: Hot Seat (complaints and lawsuits) and Hot Stuff (new research)
Location: Room 2000 C
Session Time: Sunday, June 16, 2019, 3:45 – 5:15 PM

Title: Medicolegal risk in cataract surgery: A review of litigation against Canadian ophthalmologists (2013 - 2017)

Authors: Alex Ragan, Devesh Varma, Jit Gohill, Stephanie Dotchin

Abstract Body:

Purpose: To investigate trends in litigation against Canadian ophthalmologists related to the performance of cataract surgery and ancillary services.
Study Design: Retrospective file review of records of the Canadian Medical Protective Association.
Methods: This study was a retrospective file review of all Canadian Medical Protective Association ("CMPA") records for the period from 2013 to 2017. All legal actions and threats of legal action against Canadian ophthalmologists relating to the performance of cataract surgery, and that had been settled or terminated as of December 2017, were included. Legal actions filed outside of Canada, not reported to the CMPA, or that did not relate to the performance of cataract surgery or ancillary services were excluded. Data collected included the number of legal actions and threats, the specific causes alleged for such actions and threats, and the outcomes of such actions.
Results: One hundred and seventy-five closed legal actions or settled threats of legal action against Canadian ophthalmologists for the period from 2013 - 2017 were considered and, of these, 58 (33%) cases involved the performance of cataract surgery or ancillary services and therefore met the inclusion criteria. Among the 58 included cases, 19 (33%) related to dissatisfaction with visual outcome, 19 (33%) to lack of informed consent, 11 (19%) to wrong intraocular lens implantation, 10 (17%) to inadequate post-operative follow-up and 6 (10%) to surgical complications including posterior capsular rupture, choroidal hemorrhage, retinal tears, or detachments. Some cases involved more than one complaint. Overall, a favorable legal outcome was achieved by ophthalmologists in 59% of cases.
Conclusions: Based on a review of CMPA records, cataract surgery represents one-third of legal actions and threats against Canadian ophthalmologists. Major causes included dissatisfaction with visual outcome, lack of informed consent, incorrect intraocular lens implantation, and inadequate postoperative follow-up, all of which may have been preventable.

Title: Risk Factors, Experience and Results in Cataract surgery

Authors: Harold W. Climenhaga

Abstract Body:

Purpose: to establish a reference complication rate for cataract surgery when performed by an experienced surgeon and adjusting for known pre-operative risk factors
Study Design: Prospective Cohort Study
Methods: Between 31 July 2009 and 27 May 2016 all cataract surgeries carried out by one surgeon (n=16,984) were pre-operatively classified by risk factor(s) and all adverse surgical outcomes were recorded. (Health Research Ethics approval was obtained - #Pro00061598.)
Results: Posterior Capsular Tear with or without vitrectomy occurred at the following rates: No risk factors - 0/13,241 (0.0%); Resident (no other risks) - 3/66 (4.5%); Tamsulosin use - 0/1144 (0.0%); “Small” pupil - 1/1144 (same case as the next two lines) (0.09%); Mechanical pupil expanders (subset of small pupils) - 1/542 (0.18%); Pseudoexfoliation/PXF other eye -1/691+131=822 (0.12%); “Dense” nuclear sclerosis - 0/614 (0.0%); Prior Vitrectomy/trauma - 6/230+81=311 (1.9%); Mature white cataract - 4/222 (1.8%); Posterior Polar Cataract - 2/27 (7.4%).
Anterior Capsular Tears occurred in nine cases, three of which had no risk factors. In 8/9 cases the IOL was placed in the capsular bag and in 1/9 in the sulcus.
Zonular loss without capsular damage occurred in five pseudoexfoliation cases, four trauma cases and one idiopathic lens subluxation visible pre-operatively.
Conclusions: The normal complication rate for cataract surgery in the absence of identifiable risk factors approaches zero. All complications should be considered avoidable.
New technologies in cataract surgery need to be evaluated based on the quality of the visual outcome - there can be no safety advantage.
Reporting complication rates in the absence of sorting by risk factor is of limited utility.
I suggest classifying risk factors by the associated surgical skills: small pupil, weak zonules, dense nuclear sclerosis, mature white, other.

Title: Feasibility and acceptability of tools for assessing competency in cataract surgery

Authors: Nawaaz Nathoo, Andrea Gingerich, Ravi Sidhu

Abstract Body:

Purpose: To understand how stakeholders use and perceive various tools for the assessment of resident performance in cataract surgery, and how both teachers and students envision the assessment tools supporting the transition to competency-based education.
Study Design: Cross-sectional, qualitative study
Methods: Surgical teachers at two academic teaching hospitals in Vancouver, British Columbia used 3 different assessment tools (OSCAR, GRASIS, and an entrustability scale) when they taught cataract surgery to residents. Semi-structured interviews with teachers and a focus group with the residents were used to probe feasibility of the tools including educational impact, acceptability, and cost. Interpretive description, a qualitative methodology, was used to guide data analysis.
Results: Three main themes emerged: (1) the primary goal of surgical assessment for both students and teachers is to provide feedback that can improve surgical competence; (2) different surgical teachers prefer different assessment tools, and their choice may also vary depending on the circumstances (e.g. training level of the learner); (3) that pre-training on the use of tools, combined with established pathways for remediation, may help with standardizing how preceptors use assessment tools and improve their ability to give critical feedback.
Conclusions: Assessment tools that emphasize formative feedback and align with teaching practices will improve acceptability to end-users, both teachers and residents. Teachers have different teaching practices, however, that will impose challenges on determining their alignment with the tools. We recommend that the feasibility of assessment tools, including aspects such as educational impact, acceptability, and cost, be carefully considered alongside the traditional metrics of reliability and validity as these tools are implemented into an assessment program.

Title: Cost Effective Analysis of Multifocal and or Extended-Depth-of-Focus IOL Implantation during Cataract Surgery in Canada

Authors: Rami A. Abo-Shasha, Monali Malvankar, Bo Li

Abstract Body:

Purpose: The purpose of this study is to determine whether wide adoption of multifocal (MF) and/or EDOF IOL implantation is cost-effective in reducing health care cost by reducing the number of falls secondary to bifocal spectacles use.
Study Design: Cost Effectiveness Analysis
Methods: The health care cost associated with bifocal spectacles-related falls status post cataract extraction was calculated in the Canadian population, taking into consideration the average cost of emergency visits, average, cost of hospital admissions, and associated hip fracture repairs. The cost associated with multifocal and/or EDOF IOL implantation was generated and compared with the health care costs associated with increased fall risks related to bifocal spectacles use. A theoretical cost-based model was generated and the potential cost savings associated with increased adoption of multifocal and/or EDOF IOL was calculated.
Results: Approximately 350,000 patients undergo cataract surgery each year in Canada. The use of bifocal spectacles is associated with an 11% increase risk of falls annually. The average patient lives 14 years post-cataract extraction. The total cost of falls over a 14-year period due to bifocal specactles use is $1.0 billion. The estimated cost of population-wise adoption of MF and/or EDOF IOL is $777 million. Therefore, population-wide adoption of MF and/or EDOF IOL has theoretical savings of $223 million on an annual basis.
Conclusions: Falls are the leading cause of health costs to the Canadian health care system. Increased adoption of multifocal/EDOF IOL implantation in eligible patients undergoing cataract surgery will result in significant health care savings.

Title: Stereopsis for Microsurgery: Does it Really Matter?

Authors: Hanouf Alkharashi, Robert G. La Roche

Abstract Body:

Purpose: There remains a lack of objective evidence on whether stereopsis is necessary for an ophthalmic surgical career. It is also unclear whether high grade stereoacuity correlates with better surgical performance. The present study attempts to address this question by evaluating the surgical performance of subjects with different levels of stereoacuity using a virtual reality (VR) intraocular surgical simulator (EYESi, VRmagic Holding AG, Mannheim, Germany).
Study Design: Quasi-experimental trial with three groups.
Methods: Subjects were tested based on their stereoacuity level and stratified in 3 age-matched groups: normal stereo (60 seconds of arcs or better), subnormal stereo (worse than 60 seconds of arc), and patients with no measurable steroacuity in the clinical setting. 33 subjects with no previous surgical experience were recruited from IWK Health Centre, Halifax, NS from March to August 2018. Ethical approval from IWK Research Ethics Board (REB) was obtained before conducting the study. Subjects performed 3 attempts on a standardized microsurgical module on the EYESi VR simulator. Our hypothesis is that individuals with normal stereopsis perform better and faster than those with either deficient or absent stereoacuity. Mixed repeated measure ANOVA was used for statistical analysis.
Results: There was no significant main effect of the stereo-group that the participants belonged to on their scores *[F (2, 28) = 0.21, p=0.81],* or on the time needed to complete the task *[F(2, 28) = 0.04, p=0.96],* or on the odometer value*[F(2, 28) = 0.45, p=0.64]*or on the amount of injury to the cornea *[F(2, 28) = 0.56, p=0.57]*or to the lens*[F(2, 28) = 0.50, p=0.61].*
Conclusions: This study compared the microsurgical performance of subjects with deficient and absents stereoacuity to those with normal stereoacuity and failed to find any statistical significant difference among the three stereo-groups. Caution is recommended when advocating high level stereopsis as a requirement for admission to residency training programs in ophthalmology as there is still no definite evidence that stereopsis is necessary to achieve satisfactory skills in ophthalmic microsurgery.

Title: Dropless Cataract Surgery: Canadian Experience with First 1000 Eyes As an Alternative Advanced Drug-Delivery Method for Cataract Surgery Patients

Authors: Barry Y. Emara, Rasha Stino

Abstract Body:

Purpose: To assess efficacy of transzonular injection of 0.2 ml triamcinolone acetonide (TA) and moxifloxacin hydrochloride in prevention of infection and inflammation post cataract surgery in first 1166 eyes.
Study Design: Retrospective chart review
Methods: Charts of 666 patients (1166 eyes) receiving transzonular injection of triamcinolone acetonide (TA) and moxifloxacin hydrochloride at conclusion of cataract surgery by single surgeon (B.Y.E.) from February 2016 to September 2018 were reviewed . Outcome measures included additional postoperative steroid drops required post dropless cataract surgery and endophthalmitis.
Results: Of 884 eyes of 501 patients undergoing dropless conventional cataract surgery (383 bilateral (766 eyes) 118 unilateral (118 eyes)), 72 eyes (8.1%) required additional steroid drops. Of 282 eyes of 165 patients undergoing dropless femtosecond laser-assisted cataract surgery (FLACS) (117 bilateral (234 eyes) 48 unilateral (48 eyes)), 34 eyes (11.9%) required additional steroid drops. Of 1166 total eyes of 666 patients undergoing dropless cataract surgery, 106 eyes (9.1%) required additional steroid drops. There were no cases of endophthalmitis noted.
Conclusions: Transzonular injection of 0.2 ml triamcinolone acetonide (TA) and moxifloxacin hydrochloride was efficacious in the prevention of infection and inflammation post cataract surgery in the first 1166 eyes, with less than 10% of eyes requiring additional steroid drops and no cases of endophthalmitis observed.

Title: Comparison oftoricintraocular lens prediction usingPentacam, OPD, and IOL Mastermeasurements

Authors: Qayim Kaba, **Hannah Chiu**, Eric Tam, Raj Maini, Sohel Somani

Abstract Body:

Purpose: To determine and compare the prediction error using IOL Master, Pentacam and OPD corneal topography measurements for astigmatism correction using a Toric intraocular lens.
Study Design: Prospective cohort study
Methods: Consecutive patients with requiring correction of corneal astigmatism and undergoing cataract extraction and toric intraocular lens implantation were recruited. Corneal astigmatism was measured preoperatively using IOL Master, OPD, and Pentacam. Residual astigmatism was determined using vector analysis, with comparison of centroid astigmatism error for each of the three topographic methods. Intraclass correlation coefficient was used to determine the similarity between predicted and actual corneal astigmatism. Predicted axis was compared to post-operative axis to determine the measurement method most accurate for axis.
Results: A total of 41 eyes of 30 consecutive subjects with corneal astigmatism undergoing cataract extraction with toric intraocular lens implantation and no other ocular comorbidities were included in the study. Centroid errors of prediction error in IOL Master, Pentacam, and OPD were 0.39@96, 0.36@92, and 0.33@76, respectively, in with-the-rule (WTR) eyes at post-operative month 1 (POM1). They were 0.40@68, 0.33@62, and 0.38@55 for against-the-rule (ATR) eyes. For ATR eyes, Pentacam had the lowest centroid prediction error and the highest ICC ($P<0.01$) between the predicted and estimated astigmatism. A statistical test of the residual astigmatism (cylindrical power) between pentacam and OPD for WTR eyes showed no significance ($P>0.05$). There was no statistical significance ($P>0.05$) for actual and predicted axis comparison between IOL Master, Pentacam, and OPD.
Conclusions: Pentacam topography resulted in the least corneal astigmatism prediction error, especially in patients with ATR astigmatism. IOL Master showed the highest centroid astigmatism error in both WTR and ATR eyes.

Title: Comparison of intraocular lens (IOL) calculation accuracy using Haigis and Barrett Formulas in manual versus laser-assisted cataract surgery.

Authors: Soumya Sharma, Harrish Nithianandan, Eric S. Tam, Hannah Chiu, Raj Maini, Sohel Somani

Abstract Body:

Purpose: The purpose of this study was to compare the performance and accuracy of two intraocular lens (IOL) power calculation formulae, Haigis and Barrett Universal II, on a Tecnis IOL platform in patients who have undergone either Manual Cataract Surgery (MCS) or Refractive Laser-assisted Cataract surgery (ReLACS).
Study Design: Retrospective EMR chart review.
Methods: Included patients who had pre-operative biometric testing done with IOL Master 700 using both Haigis and Barrett formulas and implantation of a Tecnis IOL. Predicted spherical equivalence (SE) from each formula was compared to the post-operative SE taken at one month. The Mean Absolute Error (MAE) and Median Absolute Error (MedAE) were compared for both formulae.
Results: Of the total 158 eyes studied, 64 eyes underwent MCS and 94 eyes underwent ReLACS. The overall MAE was statistically significantly less using the Barrett (0.29±0.25D) versus Haigis (0.36±0.30D) ($p<0.002$). The MAE in the MCS group showed a trend towards less error with the Barrett (0.27±0.21D) versus the Haigis (0.35±0.26D) ($P=0.06$). The MAE in the ReLACS group was statistically significantly less using the Barrett (0.29±0.27D) versus Haigis (0.37±0.33D) ($P<0.016$). The MedAE in the overall, MCS and ReLACS groups using the Barrett formula was 0.24D, 0.25D, and 0.22D respectively; and for the Haigis formula was 0.27D, 0.26D and 0.28D respectively. The expected differences (ED) between Barrett and the fourth generation Haigis formula were significantly correlated with axial length ($r=0.169$, $p= 0.017$), corneal curvature ($r = 0.227$, $p = 0.002$), and lens thickness ($r = 0.354$, $p = 0.000$).
Conclusions: The Barrett formula was found to be statistically more accurate than the Haigis formula in all eyes, and specifically in eyes undergoing ReLACS. This trend was also observed in patients undergoing MCS, albeit not statistically significant.

Title: Comparison of the refractive effect between femtosecond laser versus manual clear corneal incisions

Authors: Austin Pereira, Sohel Somani, Eric S. Tam, Hannah Chiu, Raj Maini

Abstract Body:

Purpose: The aim of this study was to assess corneal morphologic changes and the magnitude of surgically induced astigmatism (SIA) following clear corneal incisions (CCIs) created manually or with the femtosecond laser using the Catalys platform during cataract surgery.
Study Design: Retrospective cohort analysis.
Methods: Patients undergoing femtosecond laser-assisted cataract surgery (FLACS) or manual cataract surgery performed by 4 experienced surgeons between June 2018 - September 2018 in Toronto, Ontario, were considered for inclusion. Postoperative corneal astigmatism values were compared to preoperative astigmatism indices to determine the SIA at the postoperative 3-month (POM3) time-point using the Alpins vector method. Secondary outcomes included postoperative 1-week (POW1) and 1-month (POM1) analysis, intraoperative phacoemulsification parameters, postoperative central corneal thickness (CCT), corrected visual acuity (CDVA) and intraocular pressure (IOP). Generalized estimating equations accounting for within-patient correlation were utilized for statistical analysis. This study adhered to the tenets of the Declaration of Helsinki and was approved by the William Olser Health System Ethics Review Board.
Results: Refractive outcomes from 104 eyes of 61 patients, 50 eyes in the FLACS cohort and 54 eyes in the manual group, were recruited for analysis. Baseline parameters between groups were not significantly different. Femtosecond laser CCIs led to a lower SIA compared to manual CCIs at POM3, however this difference was not statistically significant (FLACS: 0.42D (0.28 - 0.85), manual: 0.47D (0.30 - 1.00), p=0.41). The mean postoperative CCI was significantly thinner following FLACS procedures compared to manual cataract surgeries (FLACS: 703.56±56.75µm, manual: 744.26±86.03µm, p=0.006). While there were trends toward reduced phacoemulsification time (p=0.59), thinner postoperative CCT (p=0.20), better postoperative CDVA (p=0.52) and lower IOP (p=0.06) in FLACS procedures compared to manual cases, these differences were not statistically significant. The above trends were consistent at POW1 and POM1 time-points.
Conclusions: There is no significant difference in SIA following FLACS CCIs using the Catalys platform in comparison to manual cataract surgery. FLACS cases lead to significantly thinner CCIs compared to manual procedures. FLACS incisions trend to reduce phacoemulsification time and lead to a thinner CCT, improved postoperative CDVA and reduced IOP postoperatively.

Title: Physician and Patient Reporting of Appropriateness and Prioritization for Cataract Surgery

Authors: Evan Michaelov, Matthew Schlenker, Morgan Lim, Chelsea D'Silva, Simona Minotti, Dean Smith, Devesh Varma, Robert Reid, Iqbal Ike K. Ahmed

Abstract Body:

Purpose: To determine the influence of patient-evaluation metrics, and physician appropriateness and prioritization on scheduled cataract surgery.
Study Design: Prospective interventional cohort study.
Methods: 158 patients (Cohort A) and 312 patients (Cohort B) enrolled from September 2016 to May 2017 in Mississauga, ON received cataract clinical assessment (4 surgeons for Cohort A; 7 for Cohort B). Physicians evaluated patients for cataract surgery appropriateness and prioritization (both scale 1-10); and patients completed eCAPS (Cohorts A and B), CatQuest, and EQ5D questionnaires (Cohort B). The association between appropriateness and prioritization, and patient-reported function were explored using Kruskal-Wallis testing, logistic regression, and Spearman's correlation coefficients, as appropriate.
Results: 89.3% of patients referred for cataract surgery were deemed appropriate as defined by a score of ≥6 (median 8; IQR 7-9 in both cohorts). Median appropriateness ratings were dissimilar amongst physicians (Kruskal-Wallis, $p<0.001$). The greatest associations with being deemed appropriate for cataract surgery were ipsilateral visual acuity (VA) of 20/50 or worse (OR=3.10, $p<0.01$) and impairment in night driving (OR=2.87, $p<0.01$). Additionally, 8 (33%) of the patient reported quality of life questions were associated with patients being deemed appropriate for cataract surgery. In contrast, prioritization ratings followed a normal distribution with a median of 5 (IQR 4-7) in Cohort A and 6 (IQR 5-7) in Cohort B (Kruskal-Wallis $p<0.001$). Significant associations with an increase in prioritization scores included ipsilateral VA worse than 20/50, contralateral VA worse than 20/50, and increasing scores in 13 (54%) of the patient reported quality of life questions. The physician conducting the visit and the patient's income also had a statistically significant impact on the priority rating. Ordinal regression identified only ipsilateral VA 20/50 or worse ($p<0.01$), eCAPS Q5 ($p<0.01$) and income of 30 000-49 999 ($p<0.01$) and 50 000 - 69 999 ($p<0.01$) as significant predictors of increased prioritization ratings. Spearman's correlation revealed preop eCAPS aggregate (rho=0.141, $p=0.002$) and CatQuest aggregate (rho=0.120, $p=0.034$) as having a significant correlation with prioritization scores. EQ5D aggregate scores did not demonstrate any significant correlation with physician prioritization.
Conclusions: There is significant discordance between physician reported outcomes and patient reported functional status. The most significant association with appropriateness and prioritization was ipsilateral VA of 20/50 or worse. This analysis highlights that patients and physicians may have different views of appropriateness and prioritization. Future studies will explore the factors involved in improving patient-reported functional status following cataract surgery.

Title: Catquest-9SF: Validation and Application in Various Populations

Authors: Anna Kabanovski, Matthew B. Schlenker, Wendy Hatch, Varun Chaudhry, Sherif El-Defrawy, Rob Reid, Ike Ahmed

Abstract Body:

Purpose: Cataract is a common and potentially blinding eye disease for which surgery is the only effective treatment. Visual acuity alone is not enough to assess surgical outcomes. The Catquest-9SF questionnaire is one tool that has been developed to evaluate patients' self-assessed visual function as related to daily tasks. Since its development in Sweden, Catquest-9SF has been translated, culturally adapted, and validated in several populations. The aim of this review was to compile the results of the validation studies for this questionnaire published to date.
Study Design: Systematic review.
Methods: Catquest-9SF validation studies in Australia, China, Denmark, England, Germany, Austria, Italy, Malaysia, the Netherlands, Sweden, and Spain were compiled in this review. Rasch-based metrics were used to assess validity and reliability of the questionnaire in all these populations.
Results: Thirteen studies with a sample size range of 102 to 10486 (total n=14889) undertaken from 2009 to 2018 were included. Catquest-9SF had ordered response thresholds in all studies. 9 out of 13 studies had significant mistargeting (difference between the item and person mean values ranged from -1.21 to -2.04), suggesting that the specified tasks were relatively easy to perform. With an infit/outfit range of maximum 0.5-1.5, only two studies had misfitting items: in China (2016, item 7) and Denmark (2018, items 4 and 6). All studies showed unidimensionality with principal components analysis, with the level of variance explained by the raw data >60% and the first contrast eigenvalue <2.0. Precision was acceptable in all populations, with person separation index >2 and person reliability >=0.80. There was also notable differential item functioning for several items in some populations.
Conclusions: The results of all studies published to date support the validity and reliability of the Catquest-9SF questionnaire in measuring visual disability in patients with cataract in various populations. Additional items should be considered to facilitate better targeting of items for visual abilities in future studies. Next steps will include additional validation studies in new populations and incorporation of the questionnaire in routine clinical practice.

Title: Catquest-9SF Questionnaire and eCAPS: Validation in a Canadian Population

Authors: Anna Kabanovski, Simona C. Minotti, Matthew B. Schlenker, Morgan Lim, Chelsea D'Silva, Amalraj Antony, Rob Reid, Ike Ahmed

Abstract Body:

Purpose: Cataract surgery is the most frequently performed surgical procedure worldwide. Visual acuity alone has limitations in assessing a patient's appropriateness and prioritization for cataract surgery. Several tools, including the Catquest-9SF questionnaire and electronic cataract appropriateness and priority system (eCAPS) have been developed to evaluate patients' self-assessed visual function as related to day-to-day tasks. The aim of this study was to investigate the performance of pre-operative Catquest-9SF and eCAPS questionnaires in Peel Region cataract patients.
Study Design: Rasch analysis validation study for two instruments.
Methods: The English translation of the Swedish nine-item Catquest-9SF and eCAPS were administered in pre-operative patients in Peel region, Ontario, Canada. Psychometric properties including ordered thresholds, misfitting items, the ability to distinguish patients based on ability, uni-dimensionality, targeting, and differential item functioning were tested using Rasch analysis with Winsteps software (v.4.2.0).
Results: A total of 313 cataract patients completed the eCAPS and Catquest-9SF. The median age of participants was 70.0 (mean=69.07, SD=8.29), and 56.5% were female. The Catquest-9SF fulfilled criteria for valid measurement. All items fit into the Rasch model, with infit range 0.75-1.35, outfit range 0.83-1.36. There was adequate precision with person separation index 2.09 and person reliability 0.81. Catquest-9SF had ordered response thresholds and showed unidimensionality with principal components analysis. There was mistargeting, with a difference of -1.43 between the mean for persons and the mean for items, suggesting that the specified tasks were relatively easy to perform. There was no significant differential item functioning. eCAPS had 3 items that misfit the Rasch model and were excluded from the remainder of the analysis (infit range 0.82-1.30, outfit range 0.75-1.36). The instrument did not demonstrate adequate precision (person separation index 0.19, person reliability 0.04). This indicates that eCAPS had limitations as a measurement tool. 78.8% of subjects scored 9 or below. The question that demonstrated the best spread in responses was "extent of impairment in visual function."
Conclusions: The Catquest-9SF demonstrated good psychometric properties and is suitable for assessing the visual function of Peel Region patients in Canada with cataract. There was some mistargeting that suggests that the specified tasks were relatively easy to perform, which is in line with previous research. The eCAPS questionnaire is not as sensitive in differentiating patients who had impaired vision.

Title: Assessing **M**inimally **I**mportant **D**ifference for Cataract Surgery **U**sing the CATQUEST 9-**S**F (The MIDUS Study)

Authors: Prima Moinul, Joshua Barbosa, Bryon McKay, Anne Beattie, Nina Ahuja, Mark Fava, Mei Lin Chen, Enitan Sogbesan, Forough Farrokhyar, Varun Chaudhary

Abstract Body:

Purpose: Minimally important difference (MID) is the threshold change in functional vision that patients perceive to be beneficial, such that they are willing to undertake the risks associated with treatment. Our objective is to determine the MID for functional vision after cataract surgery using Catquest 9SF in a Canadian population.
Study Design: Single-centered, prospective cohort study
Methods: Adult patients undergoing elective cataract surgery completed the Catquest 9SF and VF-14 visual disability questionnaires two weeks prior to and three months following their cataract surgeries. Patient demographics, pre- and post-operative best-corrected visual acuities (BCVA), contrast sensitivity using the Pelli-Robson chart, and wait-times to surgery were assessed. MID scores on the Catquest 9SF questionnaire were calculated using regression analysis, anchor-based longitudinal approach and distribution-based methods with a 95% confidence intervals on SPSS software V23.
Results: In total, 83 patients (71.6±10.8 years old, 59.0% female) were enrolled in the study. BCVA, contrast sensitivity and VF-14 scores improved pre-to-post operatively in all patients (77.1±11.4 to 83.0±9.5 ($p<0.001$); 1.07±0.42 to 1.55±0.19 ($p<0.001$); and 77.1±15.9 to 94.0±10.9 ($p<0.001$), respectively). Seventy patients (87.4%) self-reported a great deal of improvement in vision post-operatively. All patients experienced a significant decrease in mean Catquest Rasch score from -0.60±1.59 pre-operatively to -3.20±1.9 post-operatively ($p<0.001$) corresponding to improved functional vision. The Catquest anchor-based MID scores were -2.49, -2.52, -2.56 and approximately -2.5 using BCVA, contrast sensitivity, VF14 and wait-time as anchors, respectively. The mean wait time to surgery was 25.8±20.2 weeks.
Conclusions: This is the first Canadian study to provide an evidence-based approach to wait-time target for cataract surgery referrals while maximizing a patient's ability to achieve MID and improvements in quality of life including improvements in BCVA, contrast sensitivity, and functional vision.

Title: Functional Vision Changes Following Cataract Surgery in Five Southern Ontario Healthcare Centers

Authors: Jenny Qian, Tiandra Ceyhan, Joshua Barbosa, Varun Chaudhary

Abstract Body:

Purpose: For cataract surgery, common outcome metrics, foremost of which is visual acuity (VA), are not always aligned with patient benefit. VA testing is performed in tightly controlled environments optimized for sight, which may not capture factors such as glare, contrast sensitivity, and higher order aberrations. Attempts at assigning cataract surgery priority should focus on comprehensive metrics that evaluate potential for change in functional or 'everyday' vision. The purpose of this study is to determine the change in functional vision following cataract surgery.
Study Design: A multi-centered, prospective cohort study.
Methods: Local research ethics board approval was obtained prior to study commencement. Consenting patients 18 years or older scheduled for cataract surgery at one of five Southern Ontario Hospitals completed a pre-operative and post-operative Catquest-9SF questionnaire, a validated visual disability survey. Change in functional vision was determined by pre-to-post operative change in Catquest scores. Demographic information, VA, and time-to-treatment were also collected at baseline.
Results: Six-hundred-and-seven recruited patients completed both the baseline and follow-up questionnaires. Mean age was 73.1 ±9.2 years and 47.0% (285 participants) were male. Most patients had a high school or post-secondary education (college, trade school, or university degree) (32.3% and 36.2% respectively). This was the first eye cataract surgery for the majority of patients (67.1%) and on average, patients waited 20.6 ± 18.8 weeks for their surgery. 27.2% of patients had other ocular comorbidities, of which glaucoma (42.4%) was the most common. There was a statistically significant improvement in Catquest scores following cataract surgery, which decreased from 2.04 ± 0.98 pre-operatively to 1.31 ± 0.75 post-operatively ($p<0.01$).
Conclusions: In most patients, functional vision improved after cataract surgery as demonstrated by lower post-operative Catquest scores. The use of pre- and post-operative visual disability questionnaires may be more useful in determining visual benefits after cataract surgery than standard visual acuity measurements alone. Future research can be conducted to determine which patient factors may predict a change in functional vision.

Title: Models of Intracameral (IC) Antibiotic Concentration Decay in the Anterior Chamber (AC) Increase our Understanding ofIC Antibiotic Efficacy

Authors: Steve A. Arshinoff, Tina Felfeli, Milad Modabber

Abstract Body:

Purpose: Mathematical models of intracameral antibiotic concentration decay in the anterior chamber compared to resistance levels were created to better understand the duration of antibacterial efficacy of intracameral administration of prophylactic antibiotics.
Study Design: The resultant graphs were developed from available literature data on injected antibiotic doses, the mechanisms of action of different drugs, logarithmic decay mathematics and reported levels of resistance of bacteria causing endophthalmitis.
Methods: Models of aqueous turnover were applied to intracameral antibiotics and administration techniques, and the results studied to enhance our understanding of IC antibiotic decay in the AC. The three commonly used IC antibiotics were compared.
Results: Graphs of antibiotic concentration decay were drawn illustrating what happens under various assumptions. The results will be compared to experimental data from the literature.
Conclusions: The study of models of intracameral antibiotic concentration decay can enhance our understanding of the effects of our current protocols and suggest better practices.

Title: An Eye on the Air: Settle Plate Testing to Measure Air Quality in a Tertiary Care Ophthalmology Department during Fast Track Vs. Regular Cataract Procedures

Authors: Aishwarya Sundaram, Joline Head, Ian Davis, Mark Seamone, Daniel M. O'Brien, Audra Russell-Tattrie, Christopher D. Seamone

Abstract Body:

Purpose: With the advent of new technology, the time required to perform cataract surgeries has significantly decreased. In our center, cataract surgeries are scheduled in two ways: traditional manner vs. fast track days. The differences between the two days is threefold, during fast track days: 1) there is no anesthesia coverage in the operating room (OR), 2) patients are brought into the OR in their street clothes, and 3) patients are pre-selected to be healthier with uncomplicated cataracts. Traditionally cataract surgery is performed with an anesthesia technician. As well, patients change into hospital gowns, presumably for infection prevention. The purpose of our study was to measure the impact of this type of fast track procedures on the air quality in the OR.
Study Design: Cohort design
Methods: The air quality in the OR was measured using settle plate testing during three time periods each week: inactive period (when OR was not in use) vs. fast track vs. regular cataract days for 8.5 hours each day. Settle plate testing is a passive form of measuring the air quality. Passive methods of sampling the air quality is presumed to be more representative of the microbes that settle on patients during surgery. Six chocolate and sabouraud plates were placed in the operating room: 4 in each corner of the room and 2 in the surgical field (top of the microscope and the phacoemulsification machine). The plates were then analyzed for the number of colonies of bacteria and fungi that grew on the plates and the type of organism was also identified.
Results: The average number of bacteria that grew on the plates near the door were higher during fast track cataract days compared with the plates placed near the door on regular cataract days. However, there was no significant difference in the number of colonies and type of bacteria and fungi that grew in the surgical fields of the fast track and regular cataract days ($p=0.41$). There was a significant difference when comparing the inactive period with the regular and fast-track days ($p<0.001$ for both), suggesting that human factors likely play a role in the air quality of the operating room.
Conclusions: Our study suggests that fast track procedures, such as having the patient in their street cloths and quick turn-over protocol with nursing staff, does not affect the air quality in the surgical field. These findings potentially support safe methods for quicker cataract turnover in the OR, which could potentially help reduce long cataract surgery wait lists with the increased efficiency of OR turnaround procedures.

Title: OVDs to avoid incomplete caps and prevent capsulorhexis extension in FLACS

Authors: Steve A. Arshinoff

Abstract Body:

Purpose: To develop a technique to prevent incomplete caps during FLACS, which may tear out.
Study Design: The technique was developed based upon the principles of rheology, and its success was observed in subsequent cases.
Methods: After the femto rhexis creation, a highly viscous and cohesive OVD is injected through a small-bore cannula over the center of the casulorhexis, until the rhexis becomes concave. The OVD cannula is then used to progressively depress the perimeter of the rhexis x 360 degrees along its circumference, pulling gently towards the centre, to assure that it is free.
Results: Since adopting this technique, no further incomplete caps have been seen.
Conclusions: The OVD Central Press Technique works because depression of the centre of the rhexis causes it to extend centrally, if at all, and not peripherally

Title: Corneal Changes Associated with Intrastromal Limbal Relaxing Incisions using the Femtosecond Laser

Authors: Carter W. Lim, Sohel Somani, Hannah Chiu, Raj Maini, Eric S. Tam

Abstract Body:

Purpose: To assess the corneal changes following intrastromal limbal relaxing incisions (LRIs) of varying arc lengths made during femtosecond laser assisted cataract surgery (FLACS) using the Catalys platform.
Study Design: Retrospective cohort study
Methods: FLACS with intrastromal LRI were performed by 4 surgeons between June-September 2018 using standardized settings on the Catalys platform. The intrastromal LRI was created 8.5 mm from the cornea centre, 60% stromal depth at steep axis. Single LRI arc lengths of 30°, 40°, 50°, or 60° were applied based on incremental preoperative corneal astigmatism of 0.1D or greater. Keratometric astigmatism and axes were calculated preoperatively (preop), postoperatively at 1-week (POW1) and 1-month (POM1). Vector analyses were performed using the Alpins vector method with ASSORT software.
Results: For 30° (n=125 eyes), 40° (n=69 eyes), 50° (n=8 eyes), and 60° (n=13 eyes) LRIs, mean preop astigmatism±SD were 0.70±0.37D, 0.91±0.37D, 1.25±0.60D, and 1.65±0.73D, respectively. 30° arcs had significantly increased mean astigmatism±SD at POW1 (0.94±0.61D) and POM1 (0.76±0.46D) relative to preop mean ($P<0.0001$). While there were trends toward reduced corneal astigmatism with 40°, 50° and 60° LRIs at POW1 and POM1, the difference from preop means were not significantly different. POM1 vector analyses of 30°, 40°, 50°, 60° groups showed correction indices of 4.77, 0.5, 0.31, 0.99; mean flattening effects of 0.13D, 0.06D, 0.16D, 2.13D; mean angle of errors of 41°, -43°, 36°, 0°, respectively.
Conclusions: 30° LRIs did not predictably impact preop astigmatism. While there were trends toward reduced corneal astigmatism at 40° and 50° LRIs, larger intrastromal LRIs (60°) led to more predictable astigmatic change with greater flattening effect and lower angle of error.

Title: Histopathological software analysis of the trabecular meshwork and corneal endothelium between anterior and posterior chamber intraocular lenses in donor eyes

Authors: Christina Mastromonaco, Matthew Balazsi, Dyvia Rao, Rafael Nojiri, Thiago Figueiredo, Nabil Saheb, Miguel Burnier

Abstract Body:

Purpose: The best intraocular lens (IOL) model and implantation site has been debated in the literature. Posterior IOLs are known to lower intraocular pressure (IOP) in patients post-surgery. It has been demonstrated, using histopathology, that there are trabecular meshwork (TM) changes in posterior IOL implants when compared to crystalline lenses, which may describe why there is a lowering of IOP. In cases of a posterior capsular rupture or inadequate capsular support during cataract surgery, an anterior chamber IOL may be implanted. TM changes may also occur upon anterior IOL placement, however, this has never been analyzed. Therefore, the aim of this study is to examine the histopathological changes in both the TM and corneal endothelium among donor eyes with anterior and posterior chamber IOLs.
Study Design: Experimental study.
Methods: Forty fixed post-mortem donor eyes with IOL implants from the Minnesota Lions Eye Bank were obtained, along with relevant clinical history. The anterior segments were bisected through the center of the pupil, processed routinely and embedded in paraffin. Slides were stained with Masson's Trichrome and CD31 vascular endothelial staining antibody, and further digitalized. Customized Medical Parachute TMAN software quantified the cellular components, the trabecular extracellular matrix (ECM), ECM fibrosis and trabecular lamellae area on each slide. Schlemm's Canal endothelium and corneal endothelium were quantified.
Results: Cellular area component of the TM was significantly lower in the posterior IOLs and also in the anterior IOLs, compared to the natural crystalline lens ($p=0.0004$). ECM area component, TM fibrosis score, and TM lamellae area showed no differences ($p=0.38$, 0.72, 0.10). CD31 stained Schlemm's Canal endothelium very well, no differences between groups were seen with its expression level ($p=0.57$). Significantly lower corneal endothelial cells were seen in anterior chamber IOLs compared with both posterior IOLs and the crystalline lenses ($p<0001$).
Conclusions: Anterior and posterior IOLs in our sample group demonstrated a loss of cellular components in the TM compared to the natural crystalline lenses. The anterior chamber lenses led to a greater loss of corneal endothelial cells post-cataract surgery. There is absence of scaring in the TM, indicating no wound healing in the TM tissue post-surgery. The endothelial cells in Schlemm's canal do not seem to be affected by the IOL placements.

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

Session Title: Taming the Rogue Cornea
Location: Room 205 BC
Session Time: Friday, June 14, 2019, 10:45 AM – 12:15 PM

Title: The stage of keratoconus at initial presentation for ophthalmological assessment

Authors: Sangsu Han, Nirojini Sivachandran, Mark Fava

Abstract Body:

Purpose: Although it is well-known that keratoconus (KCN) often presents with normal clinical findings in its early stages, it is unclear how early/late into the disease process these patients are diagnosed with KCN. Our goal is to determine the stage of KCN at first presentation with an ophthalmologist. The Amsler Krumeich (AK) classification, and the "Keratoconic cone (K_{Max})-Decentration of the thinnest pachymetry from the apex-Thinnest pachymetry" (KDT) classification were used.
Study Design: A single-centered retrospective chart review.
Methods: We reviewed the charts of all patients referred for KCN at the Hamilton Regional Eye Institute from 2013 to 2017. Demographics (age, gender), best corrected visual acuity (BCVA), slit lamp examination (SLE) findings, refraction, and corneal topography (keratometry, pachymetry, astigmatism) with the Oculus Pentacam were obtained. For the eyes that we newly diagnosed with KCN, we used the AK and KDT classifications to stage the disease.
Results: Out of 154 patients referred for KCN, 133 (86%) had positive diagnoses. 119/133 (89%) were newly diagnosed with KCN. The mean age at diagnosis was 30.4 ± 10.2 years while the mean BCVA was 0.42 ± 0.57 on LogMAR scale. The SLE findings associated with KCN were present in only 66/238 (28%) eyes. The 238 eyes with new diagnoses of KCN were divided into: 138 (58.0%) Stage 1, 51 (21.4%) Stage 2, 22 (9.2%) Stage 3, and 27 (11.3%) Stage 4 based on the AK classification. Calculation of the mean values yielded the average AK classification to be Stage 1. With regards to the KDT classification, the mean K_{Max} was 55.2 ± 10.1 diopters, the mean decentration of the thinnest pachymetry from the apex was 0.91 ± 0.31 mm, and the mean thinnest pachymetry was 471.6 ± 55.7 um; this translated into mean KCN stage of K2D2T1. "K" and "T" parameters of the KDT classification showed significant positive correlations to the AK classification (Pearson Chi-Square, $p<0.000$ and $p<0.000$). In the meantime, "D" parameter showed significant negative correlation to the AK classification (Pearson Chi-Square, $p<0.013$).
Conclusions: We reinforce the results of previous studies by demonstrating that majority of the eyes with early KCN have unremarkable SLE findings. We add to the literature by showing that KCN patients usually present themselves for ophthalmological assessment at Stage 1 based on AK classification, or at Stage K2D2T1 based on KDT classification. While the KDT classification is generally in good agreement with the AK classification, its slightly higher staging may be attributable to it utilizing the corneal topography data better. The AK classification, which is from the pre-corneal topography era, fails to incorporate the data available through corneal topography. To summarize, we highlight the important role of corneal topography as an essential diagnostic modality for early detection of KCN.

Title: Sjogren's Disease Associated Dry Eye: Patient Experience and Adherence to Therapy.

Authors: Rookaya Mather, **Evan Michaelov**, Manav Nayeni, Arpit Dang

Abstract Body:

Purpose: To determine the factors that influence adherence to dry eye therapy and identify burdens experienced by patients with Sjogren's disease with respect to ocular symptoms, financial impact of treatment, and disease-related anxieties.
Study Design: Prospective Cohort Study.
Methods: A 27-questions survey was created with both online and paper versions, and was distributed to members of the Canadian Sjogren's Society and patients of a cornea specialist in London, Ontario (RM). All responses were anonymous, and were analyzed using SPSS software (IBM, Armonk, NY).
Results: 244 patients with Sjogren's disease were enrolled from March to August 2018. The majority of patients (171, 70.1%) were diagnosed by a rheumatologist. Median age of respondents was 61 (IQR 53-68). 31.8% of respondents had a household income of <$40 000 CAD. Private insurance was held by 35.7% of respondents, however only 2.9% had coverage of non-prescription agents for their dry eye disease.
Dry eye symptoms experience by patients included ocular irritation (76.6%), burning sensation (56.1%) and foreign body sensation (54.4%). Patient's feared reduced quality of life (76.6%) and blindness (52.9%) due to their dry eye disease. The most common reported reason for missed dry eye treatments were cost of therapy (36.1%) and forgetfulness (32.4%). A majority of patients (83.1%) reported using some form of drop rationing technique to reduce cost of therapy, including using single use vials of medication more than once (41.8%), using fewer drops than prescribed (30.3%) and using drops past expiry (22.5%). However, 24.7% of patients claimed they would not reveal to their physicians that they were not using their medications as advised.
Conclusions: Dry eye disease poses a substantial burden, both financially and in terms of quality of life for patients suffering from Sjogren's disease. High drop burden promotes sub-therapeutic and potentially unsafe medication rationing techniques. Eye care professionals need to be aware of the factors that influence patient adherence to dry eye therapy, as well as understand the impact of dry eye symptoms, socioeconomic status, and mental outlook on the overall patient experience of patients with Sjogren's disease.

Title: Subclinical endothelial dysfunction revealed with scleral contact lens wear in patients with past herpes simplex or herpes zoster keratitis.

Authors: Jaime C. Sklar, Vishakha Thakrar, Clara Chan

Abstract Body:

Purpose: Herpes simplex (HSV) and Varicella Zoster (VZV) viruses are part of the *Herpesviridae* family affecting approximately 4 billion individuals globally. These are estimated to affect the V1 nerve distribution with ocular involvement in 1.5 million patients with HSV (herpetic keratitis) and in 25% of cases of VZV (herpes zoster ophthalmicus). Both can affect all layers the cornea including the epithelium, stroma and endothelium. Scleral contact lenses (SCL) are unique in their design as they sit beyond the corneal limbus and contain a fluid interface. They are indicated for use as therapy for ocular surface disease such as severe dry eye and for corneas with significant irregular astigmatism such as those with keratoconus, corneal scarring, or after corneal transplantation. While patients with obvious corneal endothelial dysfunction may develop corneal edema with SCL wear, it has not been previously demonstrated in eyes without any evidence of endothelial compromise after HSV/VSV infection
Study Design: Retrospective chart review.
Methods: Five charts were reviewed for a total of five affected eyes in patients who developed corneal edema with SCL wear. Of those, 4 had a history of ocular HSV and one had ocular VZV. The course of their HSV/VZV, ocular co-morbidities, surgical interventions for definitive treatment, visual acuity, medications and type and duration of contact lens use were recorded.
Results: There was a range of ocular co-morbidities amongst the 5 eyes including: eye injury, keratoconus, glaucoma, and cataracts. All patients were treated with prophylactic systemic antiviral therapy. Patients used topical steroids for control of immune stromal keratitis/uveitis, or to prevent corneal transplant rejection. Mean time to development of edema after starting SCL was 8.4 ± 5 months. Prior to lens fittings, patients demonstrated no clinical evidence of stromal edema or symptoms of morning blur. Visual acuity after the development of corneal edema ranged from 20/60 - 20/400 in the affected eyes. Two patients required corneal transplantation for definitive treatment: one underwent penetrating keratoplasty (PKP) and one underwent Descemet's stripping automated endothelial keratoplasty under pre-existing PKP. All five were fitted with gas permeable scleral contact lenses.
Conclusions: This is the first study to demonstrate subclinical endothelial dysfunction that is revealed after scleral contact lens use in patients with a history of herpetic keratitis. Eye care providers should be aware of this clinical scenario, corneal transplantation may be required, and alternative types of contact lens may be more suitable for these eyes.

Title: Candidakeratitis: epidemiology, management, and clinical outcomes

Authors: Grace L. Qiao, Jennifer Ling, Titus Wong, Sonia N. Yeung, Alfonso Iovieno

Abstract Body:

Purpose: To determine the epidemiological characteristics, risk factors, and clinical outcomes of Candida keratitis in a tertiary eye care center in Vancouver, Canada.
Study Design: This is a retrospective observational case series.
Methods: We reviewed the medical records of confirmed Candida keratitis cases based on a systematic search of culture positive corneal scraping specimens archived in our microbiology laboratory from 2003 to 2017. We subsequently analyzed the collected data for demographic information, clinical risk factors, comorbidities, presenting characteristics, therapeutic approaches, and final outcomes.
Results: The study identified a total of 40 cases of culture-positive fungal keratitis, of which 25 cases were attributed to Candida (62.5%) from 24 patients. Of these, 21 cases from 20 patients were clinically confirmed to be Candida keratitis. Eight patients were male (40%), and 12 were female (60%). The mean age was 57 years (range 21-87). *Candida albicans*was the most common species isolated (48%), followed by *Candida parapsilosis*(29%), *Candida tropicalis*(10%), *Candida guillermondii* and *Candida krusei*(4% respectively), and 1 case categorized as "non-*albicans*." The proportion of all fungal keratitis cases caused by Candida appears to have increased only in 2016 (75% of 4 cases) and 2017 (100% of 4 cases), though conclusions about trend must be considered with caution due small overall numbers of cases. Pre-existing ocular surface disease was the most common risk factor (71%), followed by contact lens use (52%), recent ocular surgery (38%), and history of ocular trauma (38%). Sixteen patients ultimately required some type of surgical management (76%). Of these, 13 patients received a penetrating keratoplasty (1 optical, 12 therapeutic), and 3 required evisceration or enucleation. Worse presenting visual acuity was highly associated with failing medical management. Good initial visual acuity was predictive for better visual outcomes. Despite theories of higher virulence of albicans species of Candida, we found similar requirements for surgical management between patients with albicans versus non-albicans species, and worse visual outcomes amongst patients with non-albicans Candida keratitis. These poorer outcomes may be attributable to the higher incidence of risk factors - such as pre-existing ocular surface disease and recent ocular surgery - amongst patients who developed non-albicans keratitis.
Conclusions: Candida keratitis presents as a vision-threatening opportunistic infection, which disproportionately affects an already compromised cornea. Early microbiological confirmation is essential to enable prompt initiation of appropriate treatment, as clinical diagnosis is often delayed. Despite medical antifungal therapy, the ocular complications are often devastating and require surgical management.

Title: Antimicrobial and Clinical Efficacy of Cliradex as compared with I-Lid 'n Lash® Hygiene in Treating Blepharitis: A Randomized, Outcomes-Assessor Masked, Clinical Trial

Authors: Yufeng Chen, Reginald Tan, Mohammed Taha, Pablo Morales, Kashif Baig, George Mintsioulis, Setareh Ziai

Abstract Body:

Purpose: To assess the efficacy of tea tree oil eyelid wipe in the treatment of blepharitis
Study Design: Prospective, randomized control study
Methods: Twelve blepharitis patients with more than 3 months of symptoms presenting to the Ottawa Hospital, who were not on any steroids, antibiotics, or other preserved eye drops were enrolled in the study. An institutional review ethics board approval was obtained. At the initial visit, a culture of the patient's lid margin was done on blood and chocolate agar to assess how much eyelid bacteria was present at baseline. Objective measurements such as visual acuity, grading of lid margin inflammation and conjunctival inflammation were taken. Patients were also asked to fill out a survey grading the symptoms they experienced secondary to the blepharitis. Patients were then randomized, with concealment, to receive either eye wipes with or without tea tree oil for 2 weeks. After using the wipes for 2 weeks, all of them were asked to discontinue the wipes and come back for a 2 week, 4 week and 6 week follow-up. At each follow up, culture of the lid margin, vision, lid margin inflammation grading, conjunctival inflammation grading, and grading of symptoms were taken.
Results: Patients randomized to the tea tree oil wipes had a baseline CFU count of 43.3 (blood agar[B])/11.8 (chocolate agar[C]) at baseline, 7.4 (B)/2.8 (C) at 2 weeks, 48.3 (B)/5.3 (C) at 4 weeks, and 83.8 (B)/4.5 (C) at 6 weeks. Patients randomized to the non-tea tree oil wipes had a CFU count of 25.7 (B)/14(C) at baseline, 44 (B)/3.3(C) at 2 weeks, 40 (B)/6(C) at 4 weeks, and 22 (B)/3(C) at 6 weeks. There was no significant change in CFU compared to baseline on blood agar at 2 weeks between the tea tree oil and non-tea tree oil group (-25 versus +18.3, p=0.21), 4 weeks (+43.7 versus +39, p=0.91), or 6 weeks (+55.3 versus +11.2, p=0.18). Change in vision was not significantly different between the two groups at 2 weeks (p=0.3), 4 weeks (p=1), or 6 weeks (p=0.8). The amount of lid margin inflammation was not significantly different between the two groups at 2 weeks (p=0.6), 4 weeks (p=1), or 6 weeks (p=0.07). The amount of conjunctival inflammation was not significantly different between the two groups at 2 weeks (p=0.9), 4 weeks (p=1), or 6 weeks (p=0.37). Patients' subjective grading of symptoms was also not significantly different at 2 weeks (p=0.9), 4 weeks (p=0.3), or 6 weeks (p=0.66). Two patients were lost to follow up, and one patient randomized to the tea tree oil wipe group could not complete the study due to side effects.
Conclusions: Although the trend is that tea tree oil is more effective at lowering bacterial count immediately after use, this effect does not last. Though there is initially a more significant decrease in bacterial load in the tea tree oil group, at all follow ups there was no difference in the amount of lid/conjunctival inflammation or patients' subjective reporting of symptoms. One patient also complained of severe reaction to tea tree oil wipes.

Title: Trends in Presentation and Management of Corneal Ulcers at an Emergency Eye Care Center: A 10-yr review

Authors: Nirojini Sivachandran, Danyal Saeed, Ryan Cho, Cheryl Main, Forough Farrokhyar, Mark Fava

Abstract Body:

Purpose: To determine theepidemiological features and laboratory findings of all those who presented with microbial keratitis between 2007 and June 2017 at Hamilton Regional Eye Institute (HREI).
Study Design: Retrospective Chart Review.
Methods: Patients who were evaluated at the HREI for microbial keratitis and culturing of corneal sample from 2007 to June 2017 were identified by the microbiology department at Hamilton Health Sciences after REB approval. A retrospective chart review was completed. Data was extracted, coded and analysed using SPSS Software Version 22 (IBM Inc).
Results: A total of charts 2909 charts were identified for having cultured eye samples from 2007-2017. Of this we have reviewed 814 charts and 138 charts met the study criteria. Charts were omitted as they were not corneal scrapping, not MK (i.e. DSEK or PKP), repeated entry, electronic charts could not be found, or age under 18. There were 68(49.3%) females and 70(50.7%) males and 58% were older than fifty years of age ($p<0.001$). Predisposing factors included an ocular exposure i.e. abrasion, trauma etc. (41.3%), contact lens wear (CLW) (23.9%), and ocular surface disease (15.9%). Both the right and left eye were equally affected (47.8%), and in the rare case bilateral involvement (3.6%) was noted. Majority of the infiltrates were 1-4mm (41.3%, $p<0.001$), peripheral (40.6%, $p<0.001$), and associated with an epithelial defect (58.7%, $p<0.001$). Inflammatory burden was documented by the presence of anterior chamber reaction (52.2%) and hypopyon (20.3%). Corneal scrapping was positive in 49.3% with gram positive (73.0%) and gram negative (27.0%) bacteria, viral (4.5%), fungal (9.0%) and acanthamoeba (3.0%). Pre-scrapping antibiotics was used in 39.9%, which had increased to 97.8% with a change in treatment regimen (87%) post-scrapping.Majority of the patients had resolution of their MK (87.5%), though 77.0% had associated scarring and 37.1% had complications i.e. corneal thinning, PKP etc. Evaluation of initial and final visual acuity did not reveal a statistical difference.
Conclusions: Preliminary analysis suggests that despite having resolution of the MK with antimicrobial treatment, there was no significant difference in final visual acuity outcome. This may be in part due to majority of the patients being older, with predisposing risk factors and poor vision at presentation. As well, there may be a selection bias as patients presenting to a tertiary care center likely have more advanced or non-resolving MK.

Session Title: Tricky Transplant Time!
Location: Room 205 BC
Session Time: Friday, June 14, 2019, 1:30 – 3:00 PM

HOT TOPIC | SUJET PIQUANT

Title: Long-Term Outcomes Following Primary Boston Keratoprosthesis Type 1 Implantation

Authors: Taylor Nayman, Cristina Bostan, Andrei-Alexandru Szigiato, Mona Harissi-Dagher

Abstract Body:

Purpose: To compare long-term outcomes of primary vs. secondary (post-graft failure) Boston Keratoprosthesis type 1 (KPro).
Study Design: Retrospective comparative cohort study.
Methods: A retrospective comparative cohort study was performed on 82 eyes with reversible corneal blindness. All eyes had no prior retinal disease or glaucoma that could compromise post-operative visual potential. All received a KPro type 1 (40 primary vs. 42 secondary KPro) by a single surgeon with a minimum of five years of follow-up. Outcomes included visual acuity (VA), complications, and device retention. A statistical analysis compared the primary vs. secondary KPro groups to evaluate differences between outcomes.
Results: Mean follow-up was 59.6 ±2.3 months. VA increased from baseline in both groups at all time points. In both groups this was significant for the first 3 years post-operatively ($p<0.05$), and years 4 and 5 in the primary group ($p<0.05$) but not in the secondary group. VA was similar between groups at each time point up to 5 years (logMAR VA 1.3±0.8 in primary vs. 1.5 ±0.8 in secondary at 5 years, $p>0.05$). Sterile vitritis, choroidal detachment, and glaucoma occurred more frequently after primary KPro (17.5% vs. 2.4%, 27.5% vs. 7.14%, and 35% vs. 14% respectively, $p<0.05$). Primary KPro had lower retention rates (70.0% vs. 90.5%, $p<0.05$).
Conclusions: Primary KPro yielded similar visual outcomes to secondary KPro long-term but showed higher complication and lower retention rates, which differs from published short-term results. However, for patients for whom a traditional graft is likely to fail, a KPro represents a feasible and promising option.

Title: Endophthalmitis in patients with Boston keratoprosthesis type I at a Canadian eye care center

Authors: Cristina Bostan, Taylor Nayman, Andrei Alexandru-Szigiato, Mona Harissi-Dagher

Abstract Body:

Purpose: To determine the epidemiology, visual outcomes, and microbiological profile of Boston keratoprosthesis type I (KPro)-associated endophthalmitis.
Study Design: Retrospective cohort study
Methods: Retrospective medical chart review of 140 consecutive KPro eyes with a follow-up of 61±32 months. Clinically-diagnosed endophthalmitis cases were identified. Outcome parameters included: endophthalmitis incidence rate, surgery-to-infection time, recurrence incidence rate, vision loss compared to baseline, loss of eye (evisceration required to control infection), risk factors and culture results (positivity, isolated organism, antibiotic susceptibility).
Results: Endophthalmitis occurred in 12 eyes (9%) at 20±17 months postoperatively (incidence 0.0015 cases/eye-year). Four cases of recurrence were observed in 2 eyes (incidence 0.0086 cases/eye-year). Loss of vision >2 Snellen lines, progression to “no light perception” and eye loss occurred in 75, 33, and 17%, respectively. All patients were on prophylactic topical fluoroquinolones and steroids before endophthalmitis episode; 75% used extended-wear contact lenses. Ocular surface disease and prior glaucoma tube shunt or trabeculectomy did not affect endophthalmitis risk. Positive cultures (58%) isolated gram-positive bacteria sensitive to fluoroquinolones in all but 1 eye.
Conclusions: KPro-associated endophthalmitis occurred with an incidence of 0.0015 cases/eye-year in our cohort, which is lower than the incidence reported in other North-American centers. Unlike these, where gram-negative and fungal infections are increasing, we report only gram-positive cases with use of fluoroquinolone-alone prophylactic topical therapy.

Title: Long-term outcomes with bilateral Boston keratoprosthesis type I

Authors: Cristina Bostan, Andrei Alexandru Szigiato, Taylor Nayman, Mona Harissi-Dagher

Abstract Body:

Purpose: To evaluate long-term outcomes of bilateral Boston keratoprosthesis type I (KPro).
Study Design: Retrospective interventional case series.
Methods: Were included all 11 patients who underwent bilateral sequential KPro at a mean of 14±6 months interval with a total of 62±3 months of follow-up. First (1st) and second (2nd) operated eyes were compared with respect to visual acuity (VA), complications and retention rates.
Results: The most common indication for KPro was aniridia (67%). Preoperative and 5-year VA did not differ between 1st and 2nd operated eyes. Best VA achieved was also similar but was reached faster in the 2nd eye ($p<0.05$). Although initially after 2nd surgery the 2nd eye had equal or better VA compared to the 1st eye in 55% of patients, it did so in only 37% at 5 years. Complications and device retention were similar in both eyes. The total number of complications per patient increased significantly with 2nd surgery, however ($p<0.05$).
Conclusions: The long-term benefit of a 2nd contralateral KPro for bilateral corneal blindness appears limited.

Title: Use of intraoperative anterior segment optical coherence tomography for Bowman layer transplantation

Authors: C Maya Tong, Rénuka S. Birbal, Philip W. Dockery, Jack S. Parker, Gerrit R. J. Melles

Abstract Body:

Purpose: To describe the use of intraoperative anterior segment optical coherence tomography (iAS-OCT) as a useful tool to help surgeons better visualize midstromal dissection for Bowman layer (BL) transplantation, and ultimately alter surgical decision making for patients with Keratoconus.
Study Design: Retrospective cohort study
Methods: Twenty one consecutive eyes of twenty patients with Keratoconus underwent Bowman layer transplantation. Midstromal dissection was facilitated using an operating microscope (Lumera 700; Carl Zeiss Meditec, Inc) fitted with iAS-OCT (Callisto; Carl Zeiss Meditec, Inc). Intra- and postoperative complications (up to 6 month follow-up) were recorded.
Results: In nineteen eyes, BL transplantation aided with iAS-OCT enabled visualization of the dissection plane, even in cases for which blood, edema, or scarring otherwise would have obscured the surgeon's view of the air-endothelial reflex. This allowed dissections proceeding too anteriorly or posteriorly to be course-corrected before inadvertent perforation occurred and proper placement and total unfolding of the donor graft could be confirmed. In two eyes, intraoperative perforation during stromal dissection resulted in the operation being aborted. 89% of patients (16/18) demonstrated a reduction in Kmax 1 day postoperatively, which was maintained in 86% of patients (12/14) at 6 months postoperatively. No immediate postoperative complications occurred.
Conclusions: Particularly during the surgical learning curve, or for surgeons not experienced with manual dissection DALK, iAS-OCT may enable corneal surgeons to be more confident and comfortable with their stromal dissections and to achieve better results with BL transplantation.

Session Title: Cutting Edge Strategies for Common Vision Problems
Location: Room 205 BC
Session Time: Friday, June 14, 2019, 3:45 – 5:15 PM

HOT TOPIC | SUJET PIQUANT

Title: Change in transplant rates for keratoconus treatment since the introduction of corneal collagen crosslinking in Ontario and British Columbia.

Authors: Colten Wendel, Jaime C. Sklar, Angela Zhang, Nir Sorkin, Clara Chan, Sonia Yeung, Alfonso Iovieno

Abstract Body:

Purpose: To assess the change in corneal transplant rates for keratoconus (KCN) since the start of crosslinking (CXL) in Ontario and British Columbia in 2008.
Study Design: Retrospective chart review of all corneal transplants performed between 1998 and 2016 at the Eye Bank of Canada - Ontario & British Columbia divisions.
Methods: A retrospective chart review was conducted, and data were stratified by diagnosis, where each was labelled as KCN or other. Type of transplant, age, gender, and pre-operative visual acuity were recorded. Data were stratified by diagnosis, where each was labelled as KCN or other. Data was analyzed using a chi-square test of independence.
Results: 29,348 charts were reviewed. Chi-square analysis demonstrated a significant change in the proportion of transplants performed for KCN ($p<2.2x10^{-16}$), where a decrease was observed after (range:16.8%-6.54%; mean:10.94%) compared to before CXL (range:16.55%-12.39%; mean: 14.14%). However, there has been no change in the raw number of grafts required for KCN across our study interval ($p=0.5$) while a marked increase in endothelial keratoplasties was observed between the two time points ($p<0.001$). There were no statistically significant differences in the mean age, gender, or pre-operative visual acuity between the patients in the two periods. Additionally, there has been an increasing trend towards using deep anterior lamellar keratoplasty over penetrating keratoplasty over time in the two centres.
Conclusions: Since the introduction of CXL in Ontario and British Columbia, there has been no change in the number of transplants over time. The observed decrease proportion of transplants for KCN appeared to be secondary to an increase in endothelial keratoplasty, rather than a true decrease in the requirement for keratoplasty in KCN.

Title: Outcomes of Cyanoacrylate Adhesive Application for Corneal Perforations: A Retrospective Case Series

Authors: Sonia Anchouche, Mona Harissi-Dagher, Laura Segal, Louis Racine, Marie-Claude Robert

Abstract Body:

Purpose: Cyanoacrylate adhesive is routinely used in the treatment of corneal melting and perforations. Despite its widespread use, the literature on its effectiveness remains largely insufficient. The purpose of this study is to examine the outcomes of cyanoacrylate adhesive application in patients with corneal perforation and assess for predictors of treatment response.
Study Design: Retrospective case series.
Methods: A single-center retrospective analysis was conducted for the clinical outcomes of patients over the age of 18 who underwent cyanoacrylate adhesive gluing for corneal perforations between 2013 and 2018. The research protocol was approved by the Centre hospitalier de l'Université de Montréal institutional review board. The primary outcome was the proportion of successful glue applications, defined as tectonic stability of the globe without subsequent keratoplasty (KP). Secondary outcomes included visual acuity, success of subsequent interventions as well as complications after glue application.
Results: 40 patients (40 eyes) were included in this study. The mean age of presentation was 68 ± 13 (58% women) with a median length of follow-up of 317 days ((interquartile range (IQR): 91- 578). The two most common etiologies for corneal perforations were infections (45%; 18/40), and degenerative corneal diseases (18%; 7/40). Thirty percent (12/40) of subjects required more than one application of cyanoacrylate adhesive. Eighteen percent (7/40) of patients experienced a resolution of their corneal perforation with cyanoacrylate gluing alone and 53% (21/40) required subsequent KP. Median duration of cyanoacrylate treatment for patients who did not undergo KP, defined as time between first application of adhesive and first appointment following its dislodgement, was 48 days (IQR: 23 - 85). For the patients requiring KP, the median delay to graft, defined as time between first application of adhesive and date of surgery, was 22 days (IQR: 4 - 49). Of these cases, 67% (14/21) were successful and 33% (7/21) failed. KP success was defined as the presence of a clear graft at last visit. For successful treatment, the median time delay between glue application and KP was 22 days (IQR: 2 - 38). The median time delay for unsuccessful KPs was 27 days (IQR: 13 - 65). There is no significant difference in median time delay between the two categories (p=0.54). Documented complications arising from treatment of corneal perforation with glue included most notably 4 repeat corneal melts and 4 cases of ocular evisceration.
Conclusions: Cyanoacrylate gluing may be considered as a stand alone treatment modality for corneal perforations for some patients. In cases requiring KP, our preliminary data do not reveal any difference in delay to treatment for patients with successful KP and failed KP.

Title: Amniotic membrane transplantation for Stevens-Johnson syndrome /toxic epidermal necrolysis: review of adult and paediatric cases in Toronto

Authors: Yelin Yang, Hall Chew, Kamiar Mireskandari, Simon Fung, Asim Ali

Abstract Body:

Purpose: In patients with Stevens-Johnson syndrome (SJS) /toxic epidermal necrolysis (TEN), the ocular surface is markedly inflamed in the acute setting which can lead to significant long-term sequelae. Early use of amniotic membrane transplantation (AMT) suppresses inflammation and promotes healing in these patients. This study aims to review the Toronto experience of AMT among patients with acute ocular SJS/TEN.
Study Design: Multicentre consecutive case series
Methods: Patients who underwent AMT for ocular SJS/TEN at the Hospital for Sick Children and Sunnybrook Health Sciences Centre between 2010 and 2018 were included in the study. Outcomes and clinical data including best-corrected visual acuity (BCVA), ocular surface and lid abnormalities including trichiasis, distichiasis, lid keratinization, tarsal scarring, entropion, symblepharon, superficial punctal keratitis/epithelial defect and limbal stem cell deficiency (LSCD) were analyzed.
Results: Thirty-two eyes of 16 patients (9 adult, 7 paediatric) were included in the study with median follow up of 33 months (range 4 months to 9 years). Of these patients, 62% (10/16) were male and the mean age was 24.4 years. The median number of days between diagnosis and AMT was 3 (range 1 to 30), where 14 patients received AMT within 7 days of diagnosis. Preoperatively, BCVA was worse than 20/200 in 8/16 eyes with available data. The majority of patients had severe ocular involvement, including conjunctival injection (32/32 eyes), corneal epithelial defect (26/32) symblepharon formation (24/32) and pseudomembranous conjunctivitis (20/32). Complications, and the median time to the complication, were as follows: lid margin keratinization (26/32, 3 months), symblepharon (18/32, 1.5 month), tarsal conjunctival scarring (16/32, 2 months), trichiasis (12/32, 2 months), distichiasis (9/32, 10 months), lid entropion (7/32, 3 months) and LSCD (7/32, 5 months). All adult patients had evidence of lid keratinization, while pediatric patients had proportionally higher rate of entropion (7 eyes) and LSCD (5 eyes). At last follow up, 21/32 of eyes had BCVA ≥20/40, while vision in the remaining 11 eyes was limited mostly due to corneal scarring,LSCD or poor compliance with treatment. Two patients that had delayed AMT at 13 and 30 days respectively had poorer visual outcome and developed significant LSCD. Three patients in the pediatric group required entropion repair within the first year.
Conclusions: AMT is an effective treatment for stabilizing the ocular surface during the acute phase of SJS/TEN. However, chronic ocular sequelae can still occur in long term and require close monitoring.

Session Title: What's Trending in Refractive Surgery?
Location: Room 205 BC
Session Time: Saturday, June 15, 2019, 10:45 AM – 12:15 PM

Title: Topography-Guided Photorefractive Keratectomy for Irregular astigmatism after Radial Keratotomy using a high speed laser

Authors: Simon P. Holland, David T.C. Lin, Albert Covello, Samuel Arba Mosquera

Abstract Body:

Purpose: To evaluate Topography-guided Photorefractive Keratectomy (TG-PRK) for Irregular astigmatism after Radial Keratotomy (RK) with Schwind Amaris 1050 (SA)
Study Design: Retrospective case series
Methods: Retrospective case series of 33 RK eyes treated with SA laser and CXL. Data collected at 12 months for analysis: pre- and post-operative UDVA, CDVA, MR and topographic cylinder.
Results: 19 of 33 (58%) showed UCVA ≥20/40 post-operatively. 17 (52%) had improved CDVA and 9(27%) gained ≥2 lines while 1 (3%) lost 2 or more line. Mean astigmatism was reduced from 2.07±1.79D to 0.98±1.17D. Mean spherical equivalent was improved from 2.46±1.95D to -0.42±1.79D.
Conclusions: Early results of TG-PRK CXL with Schwind Amaris 1050 show efficacy and safety in treating post-RK irregular astigmatism. More than a half (58%) had UDVA ≥20/40 at one year and 25% had CDVA improved ≥2 lines. The technique maybe an alternative treatment for post-RK with contact lens intolerance.

Title: Two year outcome of Topography-Guided Photorefractive Keratectomy with Collagen Cross-linking for Keratoconus

Authors: David T.C. Lin, Simon P. Holland, Albert Covello, Samuel Arba Mosquera

Abstract Body:

Purpose: To evaluate **24 months** results of topography-guided Photorefractive Keratectomy (TG-PRK) with simultaneous collagen cross-linking (CXL) for keratoconus
Study Design: Retrospective case series
Methods: A retrospective consecutive series of keratoconic eyes were studied to evaluate the outcomes of Topographic Guided Photorefractive Keratectomy (TG-PRK) with the Schwind Amaris 1050 Excimer laser with simultaneous corneal collagen cross-linking (CXL). Image capture with Sirius and CXL with the Athens protocol. Pre-operative and post-operative uncorrected distance visual acuity (UDVA), corrected distance visual acuity (CDVA), manifest refraction (MR) and topographic data were analyzed. Cases with sufficient data at 24 months follow-up were included.
Results: 54 eyes had sufficient data at 24 months for analysis. 27 of 54 (50%) showed UDVA ≥20/40 post-operatively. 22 eyes (42%) had improved CDVA and 14 (26%) gained two or more lines while 15 eyes (28%) had loss CDVA with 7 (13%) lost 2 lines or more. Mean astigmatism was reduced from 3.14±1.59D to 2.18±1.79D ($p<0.0001$). Mean spherical equivalent was improved from -2.54±3.54D to -0.71±2.91D ($p<0.0001$). 4 eyes showed progression and 5 with haze judged sufficient to reduce CDVA.
Conclusions: Two year results of topography-guided PRK (Schwind Amaris) treatment with CXL for keratoconus show efficacy and safety, with half achieving 20/40 UDVA or better. 42% had improved CDVA and more than a quarter had CDVA improved two or more lines. It provides an alternative to contact lens intolerant keratoconus patients.

Session Title: DMEK and Tech: Improving outcomes with techniques and technology
Location: Room 205 BC
Session Time: Saturday, June 15, 2019, 1:30 – 3:00 PM

Title: Assessment of Endothelial Cell Densities in Eye Banks: Comparison of Alizarin Red versus Specular Microscopy

Authors: Etienne Vachon-Joannette, Patricia Ann Laughrea, Marie Eve Légaré, Patrick Carrier, Jeanne d'Arc Uwamaliya, Mathieu Thériault, Stéphanie Proulx

Abstract Body:

Purpose: The evaluation of corneal tissue quality before transplantation is assessed, in part, using endothelial cell density (ECD) obtained at the specular microscope. The central corneal endothelium is analyzed (a fraction of the endothelial population) and ECD is extrapolated. Ambiguity in this count is related to the indistinct cell margins, making the count somewhat imprecise. Our study aims to compare the different parameters provided by endothelial specular microscopy with those provided by alizarin red staining to determine if there is a significant difference between these two methods.
Study Design: Prospective observational study.
Methods: A sample of 78 corneas ineligible for transplantation was analyzed using both specular microscopy and alizarin red staining. Four central endothelial areas were analyzed for each method and merged in a respective average. Endothelial cell density, coefficient of variation and the % of hexagonal cells were analyzed using the KSS-EB10 software for each of the methods studied. Different variables (age, gender, laterality, time interval between death and analysis) were reviewed in order to make a descriptive analysis. After ensuring that the data followed a normal distribution, the count values were compared with each other using a paired Student t test. A regression model based on generalized estimating equations was used to study the impact of each variable on the associated count. Finally, the use of a positive control helped validate the reliability of the measures made in specular microscopy and conventional microscopy.
Results: A statistically significant lower density of 155 cells / mm^2 ($p < 0.0001$) was obtained for alizarin red measurements compared to those obtained using specular microscopy. Staining with alizarin red also demonstrated a higher coefficient of variation (+0.85, $p = 0.0227$) whereas the specular microscopy demonstrated a higher rate of hexagonality (+1.13%, $p = 0.0400$). ECD was correlated with age, but no significant correlation was found according to donor gender, laterality or the time interval between the death and the analysis.
Conclusions: This study demonstrates a statistical and clinical relevant difference between the specular microscope and alizarin red staining. Thus, according to the respective criteria of eye banks, endothelial count of eligible corneas for transplant might be overestimated, compromising graft survival in corneas with borderline ECDs.

Title: Outcomes of Descemet membrane endothelial keratoplasty (DMEK) at a Canadian university hospital center

Authors: Michael Marchand, Mona Harissi-Dagher, Marie-Claude Robert

Abstract Body:

Purpose: Posterior lamellar keratoplasty has become the standard of care for endothelial pathologies, such as Fuchs endothelial corneal dystrophy (FECD) and pseudophakic bullous keratopathy (PBK), leading to faster recovery, fewer complications, and better vision outcomes compared with traditional penetrating keratoplasty. Descemet membrane endothelial keratoplasty (DMEK), in which only the Descemet membrane and endothelium are transplanted, has the potential to further improve visual acuity outcomes and decrease rejection rates. However, DMEK is technically challenging, and difficulty with donor preparation, graft attachment, and primary graft failure has been described. The purpose of this study is to report and analyse the clinical outcomes and complications of the first eyes that underwent DMEK surgery in our university-based center.
Study Design: Retrospective observational case series.
Methods: Eighty-five eyes of 73 consecutive patients who underwent DMEK between March 2016 and July 2018 were included in this study. DMEKs (n=91) were performed by five surgeons and included all their first cases. Outcome measures examined included pre- and postoperative best corrected visual acuity (BCVA), endothelial cell count (ECC), central corneal thickness (CCT), intraocular pressure (IOP), and intraoperative and postoperative complications (rejection, graft detachment, rebubbling rate, graft failure, need for reoperation). This study was conducted in compliance with the Declaration of Helsinki and approved by the CHUM Research Ethics Committee.
Results: The median BCVA increased from 0.40 [mean 0.59±0.50] logMAR (Snellen equivalent, 20/50) before surgery to 0.14 [mean 0.30±0.47] logMAR (Snellen equivalent, $20/25^{-2}$) 6 months after DMEK (p=0.002). The change in CCT was -123±45µm ($p < 0.001$), and -124±43µm ($p < 0.001$) at 6 and 12 months after surgery. Using pre-stripped and stamped grafts with post-processing endothelial cell counts of 2764±256 cells/mm^2, the mean postoperative ECC was 1597±587 cells/mm^2 at 6 months and 1446±388 cells/mm^2 at 12 months. The median endothelial cell loss at 6 months after DMEK was 39.8%. Fourteen eyes (15.4%) had graft detachment involving more than one third of the graft and required rebubbling. The mean rebubbling time was 10±5 days after DMEK surgery. No episode of graft rejection was observed in our cohort. However, nineteen eyes (20.9%) had DMEK graft failure for which 6 eyes (6.5%) had repeat DMEK, 11 eyes (12.1%) had Descemet stripping automated endothelial keratoplasty (DSAEK), and 3 eyes (3.3%) had penetrating keratoplasty (PKP). The mean regraft time was 17±13 weeks.
Conclusions: Our data suggest that DMEK is a safe and effective procedure for endothelial pathologies, with excellent visual outcomes. The low rejection rate makes DMEK an attractive alternative to DSAEK and PKP.

HOT TOPIC | SUJET PIQUANT

Title: Long-term outcome comparison between femtosecond laser-assisted and manual Descemet membrane endothelial keratoplasty

Authors: Nir Sorkin, Zale Mednick, Adi Einan-Lifshitz, Tanya Trinh, Gisella Santaella, Alexandre Telli, Clara C. Chan, David S. Rootman

Abstract Body:

Purpose: To evaluate long-term outcomes of femtosecond-enabled Descemet membrane endothelial keratoplasty (F-DMEK) compared with manual Descemet membrane endothelial keratoplasty (M-DMEK) in patients with Fuchs endothelial dystrophy (FED)
Study Design: A retrospective, interventional case series
Methods: Included were eyes with FED and cataract that underwent either F-DMEK or M-DMEK combined with cataract extraction at the Toronto Western Hospital, and had at least 18 months' follow-up. Exclusion criteria: complicated anterior segments, previous vitrectomy, previous keratoplasty, corneal opacity or any other visually significant ocular comorbidity.
Results: Included were 16 eyes of 15 patients in the F-DMEK group (average follow-up 33.0±9.0 months) and 45 eyes of 40 patients in the M-DMEK group (average follow-up 32.0±7.0 months). There were no issues with the creation of femtosecond descemetorhexis (in the F-DMEK group) - all descemetorhexis cuts were complete. BSCVA improvement did not differ significantly between the groups at 1, 2 and 3 years (p=0.849, p=0.465 and p=0.936, respectively). Rates of significant detachment in F-DMEK and M-DMEK were 1 of 16 eyes (6.25%) and 16 of 45 eyes (35.6%), respectively (p=0.027). Rebubbling rates were 1 of 16 eyes (6.25%) and 15 of 45 eyes (33.3%), respectively (p=0.047). Cell-loss rates following F-DMEK and M-DMEK were 26.8% and 36.5% at 1 year (p=0.042), 30.5% and 42.3% at 2 years (p=0.008), 37% and 47.5% at 3 years (p=0.057), respectively. Graft failure rate was 0% in F-DMEK and 8.9% in M-DMEK (all were primary failures, p=0.565).
Conclusions: F-DMEK showed good long-term efficacy with reduced detachment, rebubble and cell-loss rates, compared with M-DMEK

Title: Two-Year Outcomes of Hemi-Descemet Membrane Endothelial Keratoplasty (Hemi-DMEK)

Authors: Yelin Yang, **Fargol Mostofian**, Javiera Compan, Kashif Baig

Abstract Body:

Purpose: Hemi-Descemet Membrane Endothelial Keratoplasty (hemi-DMEK) has been described as a technique to increase the availability of donor cornea by splitting donor corneal transplant into two separate grafts. The purpose of this study is to evaluate the long-term outcome after Hemi-DMEK at a single tertiary center.
Study Design: Retrospective, observational case series
Methods: This is a case series of six eyes undergoing hemi-circle shaped DMEK grafts at the University of Ottawa Eye Institute. Hemi-circle grafts were created by equally dividing an 11.0 mm manually trephined graft. The patient's best-corrected visual acuity (BCVA) and endothelial cell density (ECD) were evaluated up to 27 months postoperatively. Intraoperative and postoperative complications were also assessed.
Results: The median age of patient was 78 years, with follow up ranging from 18 to 27 months. Hemi-DMEK was successful in 5 out of 6 eyes; one eye had persistent graft detachment and corneal edema despite re-bubbling. The patient underwent repeat DMEK at 2 months postoperatively. All 5 successful grafts cleared within 6 months, and had BVCA greater than 20/40 at the latest follow up (range 18 to 27 months). Compared to preoperative measurements, average central ECD decreased by 58% (range: 0.5% to 85% decrease) at final follow up.
Conclusions: This case series highlights that hemi-DMEK is a feasible method to increase availability of donor cornea with stable visual outcomes up to two years.

RON JANS CLINICAL CORNEA RESEARCH AWARD
PRIX RON JANS POUR LA RECHERCHE CLINIQUE SUR LA CORNÉE

Title: The effect of cornea preservation time on DMEK outcomes

Authors: Maria Elena Montpetit Gonzalez, Johanna Choremis, Michèle Mabon, Tanguy Boutin, Leila Mejdoub, Isabelle Brunette, Julia Talajic

Abstract Body:

Purpose: The average preservation time (PT) of donor corneas at Hôpital Maisonneuve-Rosemont (HMR) is 8 to 9 days according to Héma-Québec, but corneas are frequently used up to 14 days. In the United States the vast majority of corneas are stored for fewer than 8 days, as many surgeons reject donor tissue that has been stored for longer. The effect of PT on DMEK has not yet been studied. Therefore, our overall goal is to determine if a longer PT has an impact on the outcome of DMEK cornea transplants.
Study Design: This is an ambispective cohort observational study involving 2 study groups. Group 1: Donor cornea preserved ≤7 days, Group 2: >7 to 14 days.
Methods: Thirty-six eyes of 32 patients that underwent DMEK at HMR between April 2015 and February 2018 were studied. Eyes were assigned to either group according to their donor cornea PT. **Group 1**: *n*=17, and **Group 2**: *n*=19. The primary outcome was central endothelial cell density (ECD) at 12 months post-DMEK, and secondary outcome parameters were graft failure and rebubbling rate.
Results: The mean age at surgery was 68 years (range: 48-88 years; 50.2% men). Mean follow-up time was 18.3 months. Mean (±SD) preoperative donor ECD was 2697±337 cells/mm^2 in Group 1 and 2840±319 cells/mm^2 in Group 2. At 1 year, mean ECD decreased to 1261±559 cells/mm^2 and 1190±451 cells/mm^2, respectively (mean difference, 71 cells/mm^2; 95% CI -271.65 to 413.65; p= 0.68). This represented an endothelial cell loss of 53±18% in Group 1 and 58±17% in Group 2. 65% of central ECD in Group 1 were over 1000 cells/mm^2 compared to 53% in Group 2. Rebubbling and failure rate were 29% and 0% in Group 1 and 26% and 11% in Group 2. Mean delay from death to preservation was 11.56±5.55 hours in Group 1 and 12.49±6.18 hours in Group 2. Mean delay from stripping to surgery was 2±1.13 days (range: 0-4 days) for Group 1, and 2±1.57 days (range: 0-6 days) for Group 2.
Conclusions: In this small study, PT did not significantly affect DMEK outcomes. A larger sample size is needed. If long PTs negatively impact DMEK this will affect eye bank storage worldwide. Conversely, safe use of longer PTs will allow for an increased DMEK donor pool, reducing waiting lists and facilitating tissue access.

GLAUCOMA | GLAUCOME

Session Title: Glaucoma Frontiers
Location: Room 2000 C
Session Time: Friday, June 14, 2019, 10:45 AM – 12:15 PM

HOT TOPIC | SUJET PIQUANT

Title: Intra- and inter-hemispheric processing during binocular rivalry in early glaucoma

Authors: Saba Samet, Esther G. Gonzalez, Graham E. Trope, Luminita Tarita-Nistor

Abstract Body:

Purpose: Glaucoma is associated with degeneration not only in the primary visual pathways, but also in the corpus callosum. Binocular rivalry can provide insights into the dynamics of the visual system, including the intra- and inter-hemispheric processing of visual information. In this study we used binocular rivalry to determine whether changes in the visual pathways and corpus callosum can be detected behaviourally in early glaucoma.
Study Design: Prospective, observational study.
Methods: Thirty-one patients with early stage open angle glaucoma (mean age 66 ± 12 years) and 30 age-matched (mean age 63 ± 10 years) controls participated. In both groups, the functional (stereo-acuity, visual field mean deviation, visual acuity) and structural (retinal nerve fiber layer, average cup-to-disc ratio, vertical cup-to-disc ratio) measures were equivalent for the left and right eye of each participant. The two groups were equivalent in functional but not structural measures. Rivalry stimuli were 5 deg diameter discs of 3cpd vertical and horizontal sine wave gratings. They were presented dichoptically centrally, 5 deg peripherally to the left and to the right, in random order. The outcome measure was the rivalry rate (RR), defined as the number of perceptual changes per minute.
Results: RR was analyzed with a 3 (Location: central, right, left) x 2 (Group: glaucoma, control) mixed factorial ANOVA. There was a significant Location main effect $F(1.5, 89.8) = 22.5$, $p < 0.001$, partial $\eta 2 = 0.28$ and an interaction Location x Group effect $F(1.5, 89.8) = 3.8$, $p = 0.04$, partial $\eta 2 = 0.06$. Pairwise comparisons showed that RR with the central stimuli was significantly higher than those with peripheral (right or left) stimuli, $p < 0.001$. Also, RR of the control group was significantly higher than that of the glaucoma group for the central stimuli ($p = 0.03$), but not for the peripheral stimuli. The average RR of the control group was 26% higher than that of the glaucoma group for the central stimuli.
Conclusions: Using binocular rivalry, this study detected changes in inter-hemispheric, but not in intra-hemispheric processing of information in patients with early stage glaucoma. These results indicate dysfunction in the inter-hemispheric transfer in early glaucoma that was detected behaviourally before any changes in standard functional measures.

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

Title: Comparison of the diagnostic sensitivity of macular ganglion cell layer thickness, peripapillary retinal nerve fibre layer thickness, and Bruch membrane opening-minimum rim width in detecting glaucoma

Authors: Jennifer L. Gao, Jack Quach, Marcelo T. Nicolela, Lesya M. Shuba, Balwantray C. Chauhan, Jayme R. Vianna

Abstract Body:

Purpose: Technological advances in spectral-domain optical coherence tomography (OCT) have provided clinicians with multiple diagnostic parameters for detecting glaucoma, including the macular ganglion cell layer thickness (GCLT), peripapillary retinal nerve fibre layer thickness (RNFLT), and Bruch membrane opening-minimum rim width (MRW). It remains equivocal, however, whether a particular test is diagnostically more sensitive and whether some glaucomatous eyes are uniquely identified by any one test. We conducted a retrospective study to determine and compare the diagnostic sensitivity of the GCLT, RNFLT, and MRW in detecting glaucomatous damage. This study also aims to determine the proportion of glaucomatous eyes that are uniquely identified by each type of OCT parameter.
Study Design: Retrospective observational study
Methods: This study included 639 eyes of 639 patients with glaucoma. The reference standard for glaucomatous damage was a 24-2 standard automated perimetry test on the Humphrey Field Analyzer that was reliable (less than 15% false positives) and abnormal, defined as having a glaucoma hemifield test outside normal limits and either an abnormal mean deviation (MD) or pattern standard deviation at $P < 5\%$. The visual field must have been performed within 24 months prior to or 6 months after the OCT exam. For patients with bilateral glaucoma, one eye was randomly selected for the study. Patients with macular disease, non-glaucomatous optic neuropathies, and cerebrovascular accidents were excluded. All patients underwent OCT imaging of the GCLT, RNFLT, and MRW by the Spectralis OCT (Heidelberg Engineering, Germany) at our centre from April 2017 to September 2018. Each parameter was computed globally and in 6 sectors. The GCLT, RNFLT, and MRW tests were considered abnormal if the global or sectoral values were abnormal ($P < 0.01$) compared to normative database values, adjusted for age and BMO area. The primary outcome measure was the sensitivity of each OCT parameter in diagnosing glaucoma and comparisons between the tests were done using the McNemar test. A Venn diagram was created to show the ability of each OCT parameter to uniquely identify eyes with glaucoma.
Results: The median (interquartile range) age of study patients was 70.6 (62.9-78.2) years and visual field mean deviation was -4.81 (-8.79 to -2.15) DB. The OCT parameter with the highest diagnostic sensitivity for glaucoma was RNFLT at 77% (95% confidence interval, 74-80%) sensitivity, followed by MRW at 63% (59-66%) and GCLT at 61% (57-65%). The RNFLT was statistically significant in having a greater sensitivity compared to the other parameters ($P<0.001$), while the sensitivity of the MRW and GCLT were similar ($P = 0.41$). Of all study eyes, 297 (46%) were identified to have glaucoma by all three OCT parameters. A number of glaucoma cases were uniquely detected by each test (and undetected by the other tests): 26 (4%) by GCLT, 56 (8%) by RNFLT, and 15 (2%) by MRW.
Conclusions: From the OCT parameters, RNFLT had higher diagnostic sensitivity than MRW and GCLT in identifying glaucomatous eyes. However, some glaucoma patients were uniquely identified by the MRW or GCLT, suggesting that all parameters have some level of diagnostic value.

Title: Adherence of Glaucoma Surgical Trials to the World Glaucoma Association Guidelines in the Era of MIGS

Authors: David J. Mathew, Bryon R. McKay, Alfred Basilious, Avner Belkin, Graham E. Trope, Yvonne M. Buys

Abstract Body:

Purpose: In March 2009, the World Glaucoma Association (WGA) published guidelines for the design, conduction and reporting of glaucoma surgical trials in order to facilitate meaningful studies and comparisons between studies through standardization of reported outcomes. The goal of this study was to determine how well surgical trials using microinvasive glaucoma surgeries (MIGS) conform to the WGA guidelines.
Study Design: Systematic review
Methods: Using a predefined search strategy, the following databases were searched for comparative trials involving MIGS in the English peer-reviewed literature from 2000 to June 21, 2018: Medline, EMBASE, BIOSIS, Cochrane and Web of Science. From the WGA guidelines, 53 outcomes were selected for evaluation: methodology (31), definition of success (7), ethics (10), postoperative complications (1), economic evaluation (1) and statistical reporting (3). Each article was assessed by two reviewers and differences were resolved by consensus.
Results: Twenty-eight eligible publications were identified; three were longer-term follow-ups from a previous publication, leaving 25 distinct studies. There were 10 randomized controlled trials (RCT) and 15 non-randomized comparative trials (non-RCT). The mean total score out of 53 was 24.2±6.2 (45.7% compliance): 28.1±6.2 (53%) and 21.6±4.7 (40.8%) for RCT and non-RCT, respectively. The mean follow-up was 19.9±11.6 months (range, 6-48). Mean % compliance for each subsection were: methodology 48.9%; definition of success 21.1%; ethics 55.6%; postoperative complications 88%; economic evaluation 0%; and statistical reporting 37.3%. In 16 studies (64%), at least one author reported an association with the industry. 32% of studies reported an author being a shareholder. 24% of studies had industry as an author. The primary IOP endpoint was defined as both an upper limit and percentage reduction in only 4 (16%) studies (1 RCT, 3 non-RCT). An IOP-based survival curve was provided in 7 (28%) studies (none of the RCTs). Two studies (8%) had an IOP scatter plot. Twelve studies (48%) reported 95% confidence intervals. The use of Goldmann applanation tonometry for intraocular pressure (IOP) measurement was mentioned in 18 (72%) studies. Only 4 (16%) studies used the mean of three diurnal IOP readings as the baseline IOP.
Conclusions: Published comparative MIGS trials show low adherence (45.7%) to the WGA guidelines. Developing standardized methodology and reporting of results of glaucoma surgical trials could greatly enhance interpretation and transparency of study outcomes and facilitate comparisons between trials. Authors and journals should be encouraged to follow the WGA guidelines.

Title: Canadian Trends in Glaucoma Filtration Procedures from 2003 to 2016: Potential Impact of Minimally Invasive Glaucoma Surgery

Authors: Vinay Kansal, James J. Armstrong, Cindy Hutnik

Abstract Body:

Purpose: To evaluate trends in Canadian glaucoma surgery billing code usage in the era of minimally invasive glaucoma surgery (MIGS).
Study Design: Population-based, retrospective cohort study
Methods: All patients who underwent a publicly funded glaucoma filtration procedure from January 2003 to December 2016 in 6 provinces representing most of the Canadian population. Frequency of glaucoma-related procedures performed in each province were adjusted against Statistics Canada and primary open angle glaucoma (POAG) prevalence data, then expressed as number of procedures per 1000 POAG patients. Frequency of all glaucoma filtration procedures, with and without implantation of a drainage device in each province per year are reported.
Results: For the total Canadian sample, glaucoma filtration procedures per 1000 POAG patients per year remained constant, with increased drainage device implantation over time ($P<0.0001$). Ontario and Nova Scotia mirrored the overall population. British Columbia and Saskatchewan showed increased rates of glaucoma filtration surgery, with increased drainage device implantations. In Quebec, overall filtration surgery decreased, while the rate of device implantation increased ($p<0.0001$). Alberta showed a decline in filtration surgery and device implantations from 2003-2008, and increase thereafter.
Conclusions: Over the study period, there was a distinct trend towards a greater proportion of surgeries involving indwelling glaucoma devices in most provinces. Challenges encountered during this investigation highlight the need for identifiers in provincial health databases to better delineate between *ab interno* and *ab externo*. Implementation of procedures in the absence of specific billing codes prevents accurate analyses of contemporary patient management and its cost implications.

Title: Surgeon Experience as a Risk Factor for Failure for Ab-Interno Gelatin Microstent: A Canadian Multicentre Study

Authors: Jeb A. Ong, Matthew B. Schlenker, Fady Sedarous, Andrei-Alexandru Szigiato, Husayn Gulamhusein, Paul Harasymowycz, Michael Dorey, Maryam Abtahi, Barend Zack, Delan Jinapriya, Iqbal Ike K. Ahmed

Abstract Body:

Purpose: To compare the surgical success and safety of early compared to later surgical cases in patients receiving an ab-interno gelatin microstent with mitomycin C.
Study Design: Retrospective interventional cohort study.
Methods: A multicentre propensity score matched cohort study, including 6 glaucoma surgeons across 4 Canadian sites was conducted. Early cases conducted by fellows were also included as additional separate surgeons. Exclusion criteria included atypical forms of glaucoma, previous glaucoma, retinal or corneal surgery, and <1 month of follow-up. The primary outcome was hazard ratio of failure, defined as IOP <6 with >2 lines of vision loss, or >17 on no medications on 2 consecutive visits despite in-clinic maneuvers (including needling) >1 month post-operatively1. Surgeons' first 20 cases (EC) were matched to cases with the closest propensity score from the later (21+) cases (LC) respectively. The propensity score regression coefficients included: age, gender, race, OD or OS, glaucoma type, BCVA, presence of diabetes, pseudophakia, disease severity, decision IOP, number of medications, and previous trabeculoplasty. Secondary outcomes were HRs for failure defined as IOP of 6-14 and 6-21mmHg, as well as medications, interventions, complications, and reoperations.
Results: 157 eyes in the EC group were propensity score matched to eyes from the LC group in a 1:1 ratio. Median decision IOP was 20.0 (16.0-24.0) and 21.0 (18.0-26.0) mmHg and median pre-operative mean deviation was -11.4 (-17.0 to -4.7) dB and -10.1 (-19.6 to -4.6) dB. HR of failure for 6-17 was 1.45 (1.00-2.09) in the EC group compared to the LC group, 1.51 (1.05-2.18) for 6-14, and 1.51 (1.04-2.19) for 6-21 without medication and 1.08 (0.65-1.79), 1.27 (0.78-2.03), 0.97 (0.54-1.74) allowing for medications. Complete success rates at 1 year were 0.48 (SE 0.05) and 0.53 (SE 0.05) respectively for the EC and LC groups and qualified was 0.82 (SE 0.04) and 0.81 (SE 0.04). Needling rates were 40.8% (EC20) and 34.4% (LC), with a HR for needling of 1.10 (0.69-1.76). Complications after 1 month occurred in 18.1% (EC), and 10.3% (LC) of eyes (p=0.073). Reoperation was undertaken in 13.4% (EC) and 15.3% (LC) of eyes (p=0.748).
Conclusions: In a Canadian multicentre retrospective study of consecutive cases, success rate was higher and complication rate lower in surgeons with 20 case experience with the ab-interno gelatin microstent.

Session Title: Improving Care in Glaucoma
Location: Room 2000 C
Session Time: Friday, June 14, 2019, 3:45 – 5:15 PM

Title: Competency-based Education Evaluation Tools for Resident Performance in Selective Laser Trabeculoplasty and Nd:YAG Laser Peripheral Iridotomy

Authors: Danielle D. Wentzell, Christopher Hanson, Helen Chung, Patrick Gooi

Abstract Body:

Purpose: To develop resident assessment modalities for performance in selective laser trabeculoplasty (SLT) and Nd:YAG laser peripheral iridotomy (LPI) that are suitable for the shift to competency-based medical education (CBME) in ophthalmology.
Study Design: Survey
Methods: A modified Delphi process was used to develop task-specific checklists and a global rating scale (GRS) for SLT and LPI to assess resident performance. Well-established and previously studied global rating scales in surgical performance were adjusted for use in the GRS for these laser procedures. Eight practicing ophthalmologists with experience in performing the laser procedures were identified and agreed to be content experts. SimulEYE artificial eye models specifically designed for each laser procedure were used to develop the tools. The laser parameters and results in the checklist were adjusted to simulate real tissue effect. Content experts received copies of the assessment tools, videos of the eye models being used with the lasers, and a survey to collect feedback. The survey design was based off a previously study that utilized the Delphi method in ophthalmology education development. The comments were implemented into the assessment tools and redistributed to the content experts for further critiquing. The process was repeated until an 80% consensus on all survey items was achieved. Each round was completed over ten days, and consensus was reached after three rounds.
Results: A task-specific checklist for SLT and LPI, and a GRS to be used in conjunction with the checklists were produced with face and content validity.
Conclusions: Ophthalmology residency programs across Canada are implementing CBME into their curricula, and proof of competency in various procedural tasks will be required. These assessment tools can be used to evaluate resident performance in two commonly performed laser procedures that residents must be able to perform prior to graduation - selective laser trabeculoplasty and laser peripheral iridotomy. These tools allow for residents to develop their skills and receive feedback before performing these laser procedures on real patients. We have established face and content validity for these tools, however interrater and construct validity will need to be assessed in future studies.

Session Title: New Releases! The future of glaucoma management
Location: Room 2000 C
Session Time: Saturday, June 15, 2019, 10:45 AM – 12:15 PM

Title: SLX: Slit lamp ab externo (closed conjonctival) implantation of a gel microstent, an office based MIGS

Authors: Sébastien Gagné, Darana Yuen, Shawn Cohen

Abstract Body:

Purpose: The purpose of this study is to describe and evaluate efficacy and safety of an ab externo implantation (closed conjonctiva) of the (XEN) gel microstent perfomed at the slit lamp (SLX : slit lamp XEN).
Study Design: Retrospective chart review
Methods: Retrospective, multicentric review of charts of patients with uncontrolled glaucoma after receiving maximal tolerated medical therapy (MTMT) who underwent ab externo implantation of the XEN gel microstent performed at the slit lamp. Success rate of implantation (as defined as proper placement of the XEN from the subconjonctival space to the anterior chamber), changes in mean IOP, number of glaucoma medication, anti-metabolite usage and adverse events were analyzed at day 1, 7, 30, month 3 and 6 following SLX
Results: Twenty-nine (29) eyes of twenty-five (25) patients were included in the study. 13 patients received MMC (0.2mg/ml 0.1ml) and 16 patients received 5-FU (50mg/ml 0.1ml). Success rate of implantation was 93.1% (27/29) after one attempt, and 100% (29/29) after a second attempt. Mean baseline IOP was 24.9 +/- 7.5mmHg on 3.2 +/- 0.9 glaucoma medication. At 6 months, mean IOP was significantly reduced from baseline to 13.7 +/- 2.7mmHg ($P < 0.016$) and 0.1 glaucoma medication. No serious adverse events were reported.
Conclusions: Slit lamp ab externo implantation of the XEN gel microstent (SLX) is safe and effective in lowering IOP in patients with uncontrolled glaucoma. Office based MIGS as performed with SLX is the first glaucoma surgery not to rely on an operating room.

NEURO-OPHTHALMOLOGY | NEURO-OPHTALMOLOGIE

Session Title: Self-reflection: How things are now, are being done, and what should we change!
Location: Room 202
Session Time: Sunday, June 16, 2019, 1:30 – 3:00 PM

Title: Survey of the Incidence of Non-Arteritic Ischemic Optic Neuropathy Following Topical Clear Corneal Cataract Surgery

Authors: Joseph Kam, Jasmine Cheng, Samuel Wong, Hermina Strungaru, Allan Slomovic, Lawrence Weisbrod, Edsel Ing

Abstract Body:

Purpose: To investigate the incidence and characteristics of post-cataract surgery non-arteritic ischemic optic neuropathy (PCNAION) after topical clear corneal cataract extraction (CCCE) in Canada.
Study Design: Canada-wide internet survey followed by meta-analysis of the data.
Methods: Identical surveys were distributed to five regions in Canada in August 2018, and repeated one month later. CCCE surgeons were asked to provide an anonymous estimate the number of CCCE they had performed in their career, and the number of PCNAION events that occurred within one year following CCCE. The results were analyzed using a random effects meta-analysis of proportions for rare events.
Results: The 133 survey respondents estimated they performed a total of 1,094,455 CCCE with 84 events of PCNAION. Twenty-nine percent of surgeons had at least one patient with PCNAION. Meta-analysis revealed a pooled estimate incidence of 3.1 PCNAION events (95% CI, 1.7 - 5.5) per 100,000 cataract procedures. Seventy-five percent (63/84) of the PCNAION cases occurred within 3 weeks of surgery, and five patients had bilateral PCNAION. The estimated survey response rate was 15.4% (range 10.6% to 58.0%) and was likely a representative sample of Canadian surgeons as the survey responses per region were proportionate to the distribution of ophthalmologists in Canada, and the proportionate number of PCNAION events per region were comparable.
Conclusions: PCNAION is a rare complication following topical CCCE. Its incidence is important to estimate for patient care and epidemiologic reasons.

🎖 SECOND PRIZE, COS AWARDS OF EXCELLENCE 🎖
🎖 DEUXIÈME PRIX, PRIX D'EXCELLENCE DE LA SCO 🎖

Title: A large international study of LHON epidemiology

Authors: Alexander L. Pearson, Lissa Poincenot, Rustum Karanjia

Abstract Body:

Purpose: Leber's hereditary optic neuropathy (LHON) is the most common inherited mitochondrial disease. It results in acute/subacute, painless, profound loss of central and color vision. The current literature reports males as 4-5 times more likely than females to be affected by LHON, and that symptom onset occurs during late teen/young adult life. As a result, LHON is usually called a "young man's disease." However, this may be a self-fulfilling prophecy, with consequential underdiagnosis of females, older adults and children. The purpose of this study was to analyze the epidemiology of LHON using a large international database of people affected by LHON.
Study Design: Cross-sectional.
Methods: People with a diagnosis of LHON confirmed by genetic testing were contacted through the LHON community and provided self-reported data (age of symptom onset, gender, mutations, and location), which was compiled and analyzed.
According to the World Health Organization, young people are individuals between the ages of 10 and 24. As a result, we took "young men" to refer to males between the ages of 10 and 24.
Results: 1489 people affected by LHON were included. In contrast to the existing literature, 45% of our data set consisted of "young men". Unlike the traditional 5:1 male to female ratio, we found a 3:1 M:F ratio. The commonly reported peak in symptom onset (ages 14-26) was found only in males. 10.4% of those affected had LHON onset after age 50, whereas the current literature states only 5%. Below the age of 5 and after 45, the M:F ratio of conversion was approximately 1:1. As per the literature, we found that the m.11778 (69%), m.14484 (17%) and m.3460 (13%) were the most common mutations.
Conclusions: This is the largest epidemiological study of LHON to date. It suggests that females, older adults and children carrying a LHON mutation are at higher risk of losing vision than is generally expected. Contrary to the existing literature, LHON affects females and males of all ages, rather than just young men. This should prompt physicians to conduct genetic testing for LHON in patients who meet the clinical criteria, regardless of whether they fit the traditional demographics.

Title: A comparison of giant cell arteritis management in subspecialty and primary care settings.

Authors: Kim Vo, Rahul A. Sharma, Lucia C. Petito, Danah H. Albreiki

Abstract Body:

Purpose: Immediate administration of glucocorticoids is essential in the treatment of suspected giant cell arteritis (GCA). The choice of medication dose and route depends on patient-specific factors, but may also reflect physician-specific ones, including subspecialty discipline. We have compared the management of suspected GCA cases in subspecialty versus primary care settings to (1) identify possible discrepancies in management and to (2) promote broader understanding of the evidence-based management of GCA.
Study Design: Retrospective cohort study.
Methods: This retrospective cohort study includes 286 consecutive patients with a suspected diagnosis of GCA, all of whom were referred for temporal artery biopsy at a tertiary care centre between 2009-2016. Data from the initial clinical visit were collected, including: physician subspecialty, patient demographics, symptoms, laboratory investigations and therapies received. Logistic regression models were used to assess whether any covariates were associated with the use of glucocorticoid therapy.
Results: A total of 172 patients (60.1%) were prescribed glucocorticoids for suspected GCA. The majority (92.4%) of these patients were prescribed the medication orally; only 13 (7.6%) were prescribed intravenous medication. Compared to those evaluated in a subspecialty care setting, patients assessed in a primary care setting had 2.21 times the odds of receiving glucocorticoids (95% CI 1.31 - 3.73, $p < 0.01$); this association remained significant after adjustment of all patient-specific characteristics (OR 2.15, 95% CI 1.05 - 4.43, $p = 0.04$). Patients seen in subspecialty settings also received a higher dose (88.3 mg, IQR 0, 60 mg) than those seen in primary care settings (50.0 mg, IQR 0, 60 mg) and were more likely to receive medication intravenously (OR 3.05, 95% CI 0.66 - 14.0, $p = 0.15$).
Conclusions: Our results suggest that physicians with subspecialty expertise prescribe glucocorticoids more readily and at higher doses in cases of suspected GCA. These discrepancies indicate a potential area for improvement in achieving quality, evidence-based care for all patients with GCA.

Title: Clinical Evaluation of Giant Cell Arteritis-related Adverse Outcomes in Patients Diagnosed with Healing/Healed Arteritis on Temporal Artery Biopsy

Authors: Carter W. Lim, Harrish Nithianandan, Vinay Kansal, Sangsu Han, James Farmer, Danah Albreiki

Abstract Body:

Purpose: Temporal artery biopsy (TAB) is regarded as the gold standard investigation for confirming the clinical diagnosis of giant cell arteritis (GCA). Healing or healed arterial injury (HH) has been shown through serological markers to represent an intermediate between GCA-positive and GCA-negative TAB. The clinical outcomes of HH, however, have yet to be elucidated. The purpose of this study was to compare the rates of GCA-related adverse events in patients with an initial TAB diagnosis of HH to those with GCA-positive and GCA-negative diagnoses.
Study Design: Retrospective cohort study
Methods: This study examined 393 patients who underwent TABs for clinical suspicion of GCA at a single academic centre between 2009 and 2018. Rates of vision loss, stroke, aortitis, and aortic aneurysms (thoracic or abdominal) were compared between patients with histological TAB diagnoses of GCA-positive, HH, and GCA-negative.
Results: 76 GCA-positive, 77 HH, and 240 GCA-negative TABs were identified. Rates of vision loss, including amaurosis fugax and decreased visual acuity, were not significantly different between the groups (p=0.46). Rates of aortic aneurysms in the GCA-negative, HH, and GCA-positive groups were 3%, 8%, and 12%, respectively. Rates of aortic aneurysms between GCA-negative and HH were not significantly different, whereas patients with GCA-positive TABs demonstrated significantly greater rates of aortic aneurysms (p=0.01). There was no association between pathology results and the rates of future stroke. Findings of aortitis (pathological or radiological) were exceedingly rare, with only two diagnoses made in the GCA-positive group and none in the HH and GCA-negative groups.
Conclusions: TAB diagnosis of HH was not associated with significantly greater rates of vision or systemic adverse events compared to GCA-negative TABs. There was a dose-response trend in rate of aortic aneurysms between patients diagnosed with GCA-negative, HH, and GCA-positive TABs.

Session Title: New Literature in Neuro-ophthalmology?
Location: Room 202
Session Time: Sunday, June 16, 2019, 3:45 – 5:15 PM

Title: Transverse Venous Sinus Stenosis in Idiopathic Intracranial Hypertension - A Prospective Pilot Study

Authors: Wesley Chan, Laine Green, Anuradha Mishra, Charles Maxner, Jai J. Shankar

Abstract Body:

Purpose: Idiopathic intracranial hypertension (IIH) is characterized by increased intracranial pressure resulting in potentially irreversible vision loss and headaches. IIH primarily affects overweight women of child-bearing age with an incidence of 19 in 100,000. Ninety percent of patients with IIH have transverse venous sinus stenosis (TVSS) on contrast enhanced magnetic resonance venography (CEMRV) of the brain. Whether TVSS causes IIH or is an effect of the increased intracranial pressures is controversial. The aim of this study is to examine the feasibility of prospectively observing TVSS in patients with IIH from diagnosis, through treatment, and on follow up.
Study Design: Prospective observational cohort study
Methods: Patients diagnosed with IIH and TVSS on their CEMRV were recruited to the study over a one-year period. All patients received brain magnetic resonance imaging (MRI) with CEMRV and a lumbar puncture (LP) as part of their diagnosis for IIH. Patients were medically managed and followed with a CEMRV immediately following LP, 3-6 months after diagnosis with resolution of IIH symptoms, and one year after diagnosis. Ophthalmological data were collected at the time of diagnosis, 3-6 months, and one year after diagnosis. Feasibility data including patient recruitment rate, barriers, and logistical issues were recorded.
Results: A total of 20 suspected IIH patients were screened during a one-year study period and were followed over another year. Five of seven (71.4%; 95% CI: 36.21-100) patients were successfully enrolled. Thirteen patients did not meet study eligibility criteria, one declined participation, and one withdrew from the study. All recruited patients had clinical resolution of their IIH on medical therapy and none of them had any significant change in their TVSS.
Conclusions: It is feasible to prospectively examine TVSS in patients with IIH. All patients with IIH in our study improved clinically on medical management but none of them showed significant changes in their TVSS. A larger multi-centre prospective study would be beneficial to confirm our findings.

HOT TOPIC | SUJET PIQUANT

Title: Proteomic analysis of patient-derived fibroblasts harbouring the G11778A mutation of LHON

Authors: Heidi Britton, Bryce Pasqualotto, Leonard Foster, Gordon Rintoul, Claire Sheldon

Abstract Body:

Purpose: LHON is primarily associated with one of three point mutations in the mitochondrial DNA encoding NADH-ubiquinone oxidoreductase subunits 1, 4, or 6. However, these mutations are necessary but not sufficient for LHON to occur and both genetic and physiological conditions affect the onset and severity of LHON. As a result, analysis of the proteome is of significant interest to the field, however very limited data is available to the field (e.g. no entries in the ProteomeXchange or PRIDE databases).
Study Design:
Methods: In this pilot study, skin punch biopsies were obtained from a subject with vision loss, expressing the 11778 mutation of LHON, in addition to an age- and sex-matched control. Cultures were maintained in either glucose- or galactose-containing media, to assess the influence of metabolic conditions requiring exclusive use of oxidative phosphorylation. Liquid chromatography-tandem mass spectrometry, incorporating stable isotope labeling for quantitation, was used to compare the proteomic profiles of cells under these conditions. Data was analyzed with MaxQuant, a quantitative proteomics data package designed for large-scale MS data sets. All proteins with a ratio of LHON to control of ≥2-fold over- or under-expressed, or with a p-value < 0.05 and a minimum of 3 replicates, were further analyzed against the MitoMiner 4.0, neXtProt, and Open Targets Target Validation databases to assess mitochondrial association and function.
Results: 102 under-expressed and 115 over-expressed proteins were identified, of which 20 and 23 were found to be associated with the mitochondria, respectively. Under-expressed mitochondrial proteins included those associated with the electron transport chain, protein trafficking, oxidative stress, and the inner mitochondrial membrane. Over-expressed mitochondrial proteins were associated with mitochondrial protein synthesis and oxidative stress.
Conclusions: Understanding the proteome is important to identifying factors that result in symptomatic LHON, and thereby important to finding treatments to delay or prevent symptom onset. Our findings support the conventional models of pathogenesis in LHON involving impaired energy metabolism and ROS imbalance and identify several other potential targets for future study.

Title: Comparison of 24-2 sita fast humphrey visual fields verses octopus visual field testing in monitoring and following patients with neurological lesions impacting the visual field

Authors: Scott Anderson, Adrian Battiston, Donna Bong, Karim Damji

Abstract Body:

Purpose: Visual field testing is routinely used for analysis and management of patients with neurological pathology that impacts the visual fields such as stroke, metastatic and non-metastatic cancers, and trauma. This study investigates the validity of the Humphrey visual field (HVF) testing compared to the octopus visual field testing in detecting and following patients with neurological pathology impacting visual fields.
Study Design: A single centre, retrospective chart review at the Eye Institute of Alberta located at the Royal Alexandra Hospital in Edmonton, Alberta.
Methods: This study was approved by the University of Alberta research ethics board. Data were collected from the Eye Institute of Alberta visual field database. All Octopus visual fields used for detecting and monitoring neurological pathology impacting visual fields conducted on adults were conducted from September 2015 to September 2017. After collection of visual field data, 3 blinded reviewers with a prior established inter-rater reliability of >95% assessed if the findings from the octopus visual field assessment would be identifiable on 24-2 sita fast HVF testing based on degree of vision cut-offs of the test. Statistical analysis was conducted on SPSS version 25.0. Level of agreement between Octopus visual field and 24-2 sita fast HVF was measured using basic descriptive statistics.
Results: In total, 108 patients met inclusion criteria, resulting in 211 individual eye visual fields being scored. Overall 116 (55%) of individual visual fields were abnormal and the sita fast HVF was graded to report the same clinically relevant findings on visual field testing 197 times (93%). Of the 7% not detected 64% were due to the patient being unable to fixate on a I2E or I4E isopter, with and additional 18% suffering from movement disorders resulting in exam difficulty. In total only 1% of total visual fields with good fixation during the exam were graded as inaccurate using a sita fast HVF.
Conclusions: Octopus visual field testing is widely considered a gold standard visual field test. However, the examination is both burdensome on staff, patients, and overall clinical efficiency. Our results show that a more patient and staff friendly sita fast HVF may be an appropriate alternative test for monitoring, detecting, and following patients with neurological pathology impacting visual fields. However, for patients with severe vision loss or those not able to fixate on isopters I4e and lower in the sita fast HVF would benefit from a more rigorous testing.

Title: Predictive effect of ganglion cell analysis on visual function after episode of optic neuritis

Authors: Jérémy Claes, Emmanuelle Chalifoux, David Simonyan, Andréane Lavallée

Abstract Body:

Purpose: To evaluate the correlation between average ganglion cell layer (GCL) thickness at the time of diagnosis of optic neuritis and the resulting visual function at 6 months.
Study Design: This study is prospective, longitudinal and descriptive.
Methods: 25 patients with first episode of optic neuritis confirmed by a neuro-ophthalmologist were included. All patients had no risk factors for other optic neuropathy or macular pathology. Macular Ganglion Cell Analysis determined by Cirrus HD Optical Coherence Tomography was performed at diagnosis and repeated at 6 months with best corrected visual acuity (BCVA), HRR color vision test (HRR) and Humphrey 30-2 fast perimetry (VF). The study methods have been reviewed by a local ethic in research committee and respect the declaration of Helsinki.
Results: Demographic data were similar to those found in the literature. 84% of patients were women with a mean age of 35 years old. 60% of optic neuritis were associated with multiple sclerosis and 28% of patients received high-dose systemic steroids. Average GCL thickness dropped from 79.8 microns (75.9; 83.8) at baseline to 68.0 microns (62.7; 73.3) at 6 months. Statistically significant correlations were measured between average GCL thickness at baseline and BCVA (Spearman Correlation Estimate=-0.48, $p<0.05$) and HRR (Spearman Correlation Estimate=0.37, $p<0.15$) at 6 months. Correlation with VF mean deviation was not statistically significant (Spearman Correlation Estimate=0.27, $p=0.22$) at 6 months. Statistically significant correlations were found between average GCL thickness at 6 months and BCVA (Spearman Correlation Estimate=-0.60, $p=0.001$), HRR (Spearman Correlation Estimate=0.69, $p<0.0001$) and VF mean deviation (Spearman Correlation Estimate=0.30, $p<0.15$) at 6 months. Accessorily, 42.9% of patients with a confirmed multiple sclerosis diagnosis showed an abnormal baseline GCL thickness (≤75 microns) compared to 22.2% of other patients ($p=0.55$). Also, treated patients' average GCL thickness at 6 months (78.6 microns (67.9; 89.2)) was statistically different compared to untreated patients (65.5 microns (59.7; 71.3)) ($p<0.05$).
Conclusions: Baseline measurement of average GCL thickness does not represent the progressive atrophic structural damage induced by optic neuritis, nor the residual visual function at 6 months. Therefore, visual function cannot be predicted by Ganglion Cell Analysis.

OCULAR REGENERATIVE MEDICINE | MÉDECINE OCULAIRE RÉGÉNÉRATIVE

Session Title: Ocular Regenerative Medicine - Translational Medicine: From bench to bedside
Location: Room 205 BC
Session Time: Sunday, June 16, 2019, 10:45 AM – 12:15 PM

Title: Simple Limbal Epithelial Transplantation for Recurrent Pterygium

Authors: Tanya Trinh, Zale Mednick, Tanguy Boutin, Adi Einan, Nir Sorkin, Gisella Santaella, Allan Slomovic

Abstract Body:

Purpose: Pterygium recurrence is a common complication of pterygium removal. Multiple surgical and medical approaches have been utilized to reduce recurrence rates. The present case series proposes a novel way to treat recurrent pterygia, by using the simple limbal epithelial transplantation (SLET) technique.
Study Design: Case series of four patients who underwent SLET for recurrent pterygium.
Methods: The file of each patient treated with SLET for recurrent pterygium was reviewed. Any pterygium recurrences, subsequent treatments or post-operative complications were assessed and reported.
Results: In all four of the cases reported, the SLET procedure went without complication. There were no significant recurrences at each of the patient's most recent follow-ups.
Conclusions: This is the first report of SLET being used as a treatment modality for recurrent pterygium. Further studies are required to more reliably demonstrate the utility of the procedure in this clinical circumstance, but our results are encouraging that in select patients, this may be a viable option in treating aggressive recurrent pterygia.

OCULOPLASTIC & RECONSTRUCTIVE SURGERY | OCULOPLASTIE ET CHIRURGIE RECONSTRUCTIVE

Session Title: Course 2: Entrée - Getting to the meat of oculoplastics issues!
Location: Room 204 AB
Session Time: Friday, June 14, 2019, 1:30 – 3:00 PM

Title: Standardized orbital technique in the management of spheno-orbital meningiomas
Authors: Jorge Agi, Ezekiel Weis, Jaime Badilla, Alim P. Mitha, David Steinke
Abstract Body:
Purpose: To describe a standardized orbital resection technique and outcomes for orbital involving sphenoid wing meningiomas.
Study Design: Retrospective study
Methods: A retrospective chart review of 21 patients with sphenoid wing meningiomas with orbital invasion treated surgically between 2008 and 2017, via a modified orbitozygomatic approach using the Alberta Standardized Orbital Technique (ASOT), was performed.
Results: Fifty percent of cases had prior attempted resection prior to referral to our service. Complete resection of the meningioma was achieved in 42.8%, with no recurrences. In cases where the tumor was non-resectable, orbital debulking was performed (57.2% of cases). Among all the debulked patients, 75% had stable disease (with 25% requiring adjuvant external beam radiotherapy). Progressive disease was observed in 25% of the debulked cases. In general, stable orbital disease was obtained in 85.7% of all cases. Standardized follow-up examinations were accomplished in 15 patients. Of these, complications reported were extra-ocular movements restriction (3 cases/20%), visual acuity reduction (2 cases/13.3%), diplopia (2 cases/13.3%), edema (2 case/13.3%), wound infection (1 case/6,6%) and superior sulcus defect (1 case/6.6%)
Conclusions: The ASOT demonstrated to be secure with minimal morbidity. All patients with the pre-operative goal of complete excision had successful complete excision with no recurrence. 75% of patients with symptomatic unresectable tumors presented stable disease after debulking. Overall 85.7% demonstrated stability post-treatment. Complete resection of the tumor in the first surgery

Title: Clinical Experience with Proton Beam Radiotherapy as Adjunct Therapy for Adenoid Cystic Carcinoma of the lacrimal gland Following Tumor Debulking

Authors: Larry Allen

Abstract Body:

Purpose: To describe the outcome of 5 patients treated with proton Beam radiotherapy for adjunct therapy for adenoid cystic carcinoma.
Methods: A retrospective review of 5 patients who underwent Proton Beam therapy following debulking surgery for adenoid cystic carcinoma of the lacrimal gland from 20011 to 2015.
Results: 5 patients showed stability of the disease and much less morbidity and fewer treatment related complications as compared to conventional therapy .Vision remained 20/50 or better in 4 of the 5 patients The one patient had loss of vision related to Diabetic retinal complication following therapy . All had an element of dry eye and keratopathy but less so than conventional therapy.
Conclusions: Overall morbidity associated with adjunct Proton Beam therapy for remaining disease was much less than historical therapy for residual tumor. Stability of the tumor is noted over the time period .Proton Beam therapy offers alternative therapy to conventional Photon therapy with less morbidity and stability but at a much more expensive cost factor.

Title: Evolving Concepts in the Management of Orbital Metastasis

Authors: Christian El-Hadad, Maryam Alam, Joshua Dereck M. Ursua, Karina Richani, Bita Esmaeli

Abstract Body:

Purpose: Study the frequency of various histologies and management of orbital metastasis in patients from a tertiary cancer center.
Study Design: Retrospective Chart Review
Methods: A search of our departmental database for consecutive patients seen by the senior author (from 1998 to 2018) with a diagnosis of orbital metastasis. Data retrospectively collected: Age, gender, ethnicity, cancer type, presenting signs, imaging findings, treatments, and status at last follow-up.
Results: 99 patients **(**40 men, 59 women) had a median age of 52.5. Median time from cancer diagnosis to orbital metastasis was 31 months (range=0-304). The top 6 cancer types metastatic to orbit were: breast carcinoma (n=35), melanoma (n=15), lung carcinoma (n=11), adenocarcinoma (n=8), renal cell (n=5), neuroendocrine (n=5). 83 patients developed orbital metastasis after the diagnosis of their original cancer, 16 patients presented with orbital metastasis as the initial presentation of their metastatic cancer. . In 14 patients, the orbital lesion was the first metastatic site. . The presenting signs included: a painless mass (n=54), orbital congestion (n=58), proptosis (n=45), enophthalmos (n=8). 21 patients had bilateral orbital metastasis. The orbital metastatic lesion involved the soft tissue only in 65 patients, the bony walls in 20, and both soft tissue and bony walls in 14. 64 patients had involvement of at least one EOM. 32 patients (32 %) had an orbital biopsy to confirm the diagnosis of metastasis. 52 patients were treated with chemotherapy and/or immunotherapy after discovery of orbital metastasis. 62 patients were treated with palliative radiation therapy for a median total dose of 30 Gy (range: 8-99 Gy). 57 patients had a combination of systemic drug therapy and radiation. 18 patients had surgery (other than biopsy): 7 had debulking surgery, 10 had gross total resection,1 had orbital exenteration. Reliable follow-up data were available for 89 patients and ranged from 1 to 103 months (median 8). At last follow up, 7 patients had experienced complete resolution of the orbital lesion, 14 had partial response, 50 had stable disease, and 27 had progressed. 70 patients had died of disease at a median of 10 months after diagnosis of orbital metastasis (range: 0-107 months).
Conclusions: Breast cancer followed by cutaneous melanoma were the most common sources of orbital metastasis; the treatments for both have evolved significantly towards better systemic drug therapy and improved survival. Radical surgery or high dose radiation with its inherent ocular toxicity should be avoided in patients with orbital metastasis who have drug treatment options.

Title: Risk Factors for Local Recurrence, Exenteration, Metastasis and Death from Disease for Conjunctival Squamous Cell Carcinoma

Authors: Christian El-Hadad, Joshua R. Ford, Shiqiong Xu, Bita Esmaeli

Abstract Body:

Purpose: To investigate correlations between AJCC 8th edition TNM classification and local recurrence, nodal metastasis, distant metastasis and death from disease in patients with conjunctival squamous cell carcinoma.
Study Design: Retrospective chart review
Methods: Patients with a diagnosis of conjunctival squamous cell carcinoma who have been treated at M.D. Anderson Cancer Center between January 1999 through August 2018 were included in this study. Clinical data including age, gender, ethnicity, previous exposure to radiation, immunosuppression, AJCC TNM criteria, type of treatment, local recurrence, nodal metastasis, and distant metastasis were recorded.
Results: 44 patients (24 men, 20 women; median age: 63 years) had AJCC stage at presentation as follows: TisN0M0 (n=18; 41%), T2N0M0 (n=7; 16%); T3N0M0 (n=13; 30%); T4aN0M0 (n=5; 11%); T4bN1M0 (n=1; 2%). 5 patients had a history of chronic immunosuppression. 34 patients presented with primary tumors and 10 with recurrent tumors. Overall, 7 patients (16%) experienced local recurrence. T categories for these patients were: Tis (n=2), T2 (n=1), T3 (n=4). Time to local recurrence ranged from 4-44 months after definitive treatment (median 17 months). None of the patients presented with nodal metastasis at presentation; 3 patients developed nodal metastasis during the follow up period (at 11, 26 and 75 months); all had presented with T3 tumors. 11 patients had an exenteration: 8, at presentation and 3, after recurrence. T categories at presentation for these 11 patients were: Tis (n=1; diffuse involvement of anophthalmic socket), T2 (n=1; blind eye and diffuse conjunctival involvement), T3 (n=3), T4a (n=5), T4b (n=1). Two patients died of disease (T3N1M1 and T4aN1M1)
Conclusions: AJCC T category of T3 or more advanced was associated with a higher risk of local recurrence, orbital exenteration, nodal metastasis, and death from disease.

Title: Ocular Myiasis secondary to Dermatobia hominis

Authors: Amit Mishra, **Harald Gjerde**, Tim Mailman, Curtis Archibald

Abstract Body:

Purpose: Palpebral myiasis is a rare cause of persistent eyelid swelling. In the literature myiasis has been shown to lead to significant morbidity in certain cases. We present a case of palpebral myiasis in a pediatric patient with recent travel to Central America.
Study Design: Case Report.
Methods: Patient's clinical and surgical charts were reviewed. This included pertinent history, exams, investigations, and procedures. Review of the literature was also performed.
Results: A 15 year old male with recent travel to Costa Rica presented with a 2-week history of left upper eyelid swelling. Oral and subsequent intravenous antibiotics were initiated for preseptal cellulitis. On examination, the patient had a swollen, firm, erythematous left upper eyelid with a small pore on the skin and minimal purulence. CT scan was in keeping with preseptal cellulitis. Despite antibiotic treatment, the patient's symptoms did not improve, necessitating an incision and drainage (I&D) for a suspected abscess. During the procedure, a small foreign organism was isolated from the upper eyelid. The organism was determined to be a bot fly (*Dermatobia hominis*) by the microbiology consultant. Post I&D of the eyelid, topical and oral antibiotics were continued, and the patient showed significant improvement. He was discharged home in stable condition. He had no evidence of permanent sequelae on follow up exam.
Conclusions: According to our literature review, this is a rare case of palpebral myiasis caused by *Dermatobia hominis* in North America. *Dermatobia hominis* is native to Central and South America, and is typically not seen in Canada. Myiasis should be included on the differential for a non-resolving eye lid edema, with higher suspicion in those with a recent travel history to endemic regions. Prompt diagnosis would allow for limitation of morbidity related to the bot fly larvae.

Title: Neural Network and Logistic Regression Prediction Models for Giant Cell Arteritis

Authors: Edsel Ing, Neil Miller, Angela Nguyen, Wanhua Su, Lulu Bursztyn, Meredith Poole, Vinay Kansal, Andrew Toren, Dana Albreiki, Jack Mouhanna, Alla Muladzanov, Mark Gans, Mikael Bernier, Dongho Lee, Colten Wendel, Claire Sheldon, Marc D. Shields, Lorne Bellan, Matthew Lee-Wing, Yasaman Mohadjer, Navdeep Nijhawan, Felix Tyndel, Arun Sundaram, John Chen, Amadeo Rodriguez, Angela Hu, Nader Khalidi, Royce Ing, Royce Ing, Samuel W. K. Wong, Martin ten Hove, Nurhan Torun

Abstract Body:

Purpose: Oculoplastic surgeons are frequently called upon to perform temporal artery biopsy (TABx) for patients with suspected giant cell arteritis (GCA). However, TABx is an invasive procedure with a median utility rate of 25%. We aimed to develop and validate neural network (NN) and logistic regression (LR) diagnostic prediction models that might aid in the triage of patients with suspected GCA.
Study Design: Multicenter retrospective chart review
Methods: An audit of consecutive patients undergoing TABx was conducted at 14 international medical centers. The outcome variable was biopsy-proven GCA. The predictor variables were age, gender, headache (HA), clinical temporal artery abnormality (TAabn), jaw claudication (JC), vision loss (VL), diplopia, erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), and platelet level. The data were divided into three groups to train, validate and test the models. The dataset split ratio was approximately 64:18:18. Geographic external validation was performed using the test set.
Results: Of 1,833 patients who underwent TABx, there was complete information on 1,201 patients, 300 (25%) of whom had a positive TABx. On multivariable, cluster LR age, platelets, JC, VL, log CRP, logESR, HA and TAabn were statistically significant predictors of a positive TABx ($p<=.05$). The area under the receiver operating characteristic curve (AUC)/Hosmer-Lemeshow p for LR was 0.867 (95% CI, 0.794, 0.917)/0.119 versus NN 0.860 (95% CI, 0.786, 0.911)/0.805, with no statistically significant difference of the AUC curves ($p=0.316$). The misclassification rate/false negative rate of LR was 20.6%/47.5% versus 18.1%/30.5 for NN. The cut-off values for 95% and 99% sensitivity are provided. Missing data analysis did not significantly change the results.
Conclusions: Statistical models can aid in the triage of patients with suspected GCA, and potentially increase the positive yield of TABx. Misclassification remains a concern for both models, but the NN had fewer false negatives than LR.

Title: Radiographically occult breast cancer orbital metastases

Authors: Gabriela Lahaie Luna, Imran Jivraj, Navdeep Nijhawan

Abstract Body:

Purpose: To report a unique case of radiographically occult bilateral orbital metastases from breast carcinoma presenting with diplopia and enophthalmos
Study Design: Observational case report
Methods: The patient's clinical and surgical records were reviewed including history, clinical examinations, and investigations. A thorough review of the literature was also performed.
Results: A 59yo female presented to an outside ophthalmologist with complaints of blurry vision and diplopia. Her past medical history was remarkable for a five year history of lobular breast cancer with extensive bony metastases, treated with bilateral mastectomies and Tamoxifen. On examination, her visual acuity was 20/40 OD and 20/30 OS. She had both adduction and abduction deficits OD and near normal motility OS. A fundoscopic exam revealed choroidal folds OD. Two MRIs of the of the brain and orbits with contrast were reported as normal by the radiology service, describing only a previously seen mild non enhancing asymmetry of orbital soft tissue on T1 with no suggestion of orbital metastasis. The patient was referred to the oculoplastics service as her symptoms progressed.
Given that the clinical presentation was concerning for metastatic disease to the orbits, repeat imaging was requested. An unremarkable CT with contrast of the orbits showed bilateral enophthalmos and slightly asymmetric orbital fat medially on the left. No abnormal mass lesion, abnormal enhancement, and symmetric rectus muscles and optic nerves were noted. Despite the normal imaging a decision was made to perform a right orbital biopsy and pathology confirmed that the right levator muscle, superior orbital rim and orbit specimens were compatible with metastatic breast carcinoma. Given the stability of her disease and expected above average life expectancy she received bilateral whole orbit palliative symptomatic radiation as well as chemotherapy and aromatase inhibitor therapy. On this regiment, her visual acuity improved to 20/30 OU, her right ophthalmoplegia improved to only mild adduction and abduction deficits OD. She had resolution of her choroidal folds and was no longer diplopic.
Conclusions: Breast carcinoma is the most common primary cancer to cause ocular and orbital metastasis in women, with an incidence of ophthalmic involvement reported as high as 30%. Patients may present with proptosis or, in cases of infiltrative scirrhous breast carcinoma, enophthalmos, ptosis and restricted ocular motility. CT and MRI are currently the preferred diagnostic methods and typically demonstrate enophthalmos, soft tissue attenuation, infiltrating or well-defined lesions with possible bony destruction and enhancement with contrast on CT. MRI T1-weighted sequences often show soft tissue hyperintensity, enlarged EOM not sparing the tendinous insertions, with discrete masses often being isointense to muscle, and enhancement seen with gadolinium. T2 weighted sequences show hypointense EOM and orbital fat reflecting the fibrotic changes. To the best of our knowledge this is the first reported case of radiographically occult bilateral orbit metastases from breast cancer. In the presence of symmetric bilateral orbital infiltration, radiologic interpretation may be misleading. In such cases, clinical suspicion should prompt orbital biopsy to obtain pathologic confirmation of metastatic disease.

Title: A case series of orofacial granulomatosis treated with intralesional peribulbar triamcinolone complemented by surgical debulking

Authors: Derek Mai, Julie Morin, Allan Oryschak, Andrew Kulaga, Karim Punja

Abstract Body:

Purpose: This study showcases the utility of intralesional peribulbar triamcinolone injection complemented by surgical debulking in the management of orofacial granulomatosis (OFG).
Study Design: Retrospective case studies
Methods: Orofacial granulomatosis (OFG) is becoming an increasingly recognized entity in the differential diagnosis of patients presenting with chronic idiopathic periorbital and facial soft tissue swelling. The periorbital edema and erythema can be so remarkable as to mimic severe preseptal cellulitis and can cause visually obstructing blepharoptosis. The etiology of this rare clinical entity remains unknown. The classic histopathology shows peri-lymphatic non-caseating granulomatous inflammation in a background of dermal edema. When presenting with two additional features of fissured tongue and facial nerve palsy, the triad is referred to as Melkersson-Rosenthal syndrome. When presenting with the monosymptom of perioral swelling, it has been called granulomatous chelitis. OFG remains often a diagnosis of exclusion after other more common and potentially sight threatening etiologies such as thyroid eye disease and infectious diseases have been ruled out, which may explain for the typical delay in the diagnosis and treatment of OFG. Furthermore, there is a dearth of literature on treatment modalities of OFG.
We present a single-provider, single-institution retrospective case series from 2011 to 2018 of 6 eyes (4 patients) with biopsy-confirmed OFG who were treated with peribulbar triamcinolone acetonide injections, and in some cases, augmentation with surgical debulking.
Results: The ages of patients range from 30 to 71, with 1 male and 3 females. No patient had the complete Melkersson-Rosenthal syndrome triad. One patient had fissured tongue, and one patient had fissured tongue with intraoral lesions and lip edema. Three of the cases had surgical debulking of the upper eyelid in addition to peribulbar steroid injections. The other three cases experienced significant improvement of the periorbital edema and erythema with steroid injections alone. The number of injections ranges from 1 to 8 injections of 40 to 80mg of triamcinolone acetonide, with a frequency of injections ranging from once to every 2 to 6 months depending on clinical response. Patients were followed for a minimum of 6 months up to 24 months, and all cases experienced remarkable clinical improvement. None of the cases required concurrent long-term systemic immunosuppression.
Conclusions: Our study highlights the utility of intralesional peribulbar triamcinolone injection, and in some cases augmentation with surgical debulking, in the management of OFG.

Title: Incidence and Outcomes of Retrobulbar Hematoma Diagnosed by CT in Cases of Orbital Fracture

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

Abstract Body:

Purpose: Retrobulbar hemorrhage (RBH) has been reported to be a rare, potentially sight-threatening complication causing orbital compartment syndrome (OCS) in orbital fractures. RBH causing OCS is regarded as a clinical diagnosis when evidence of optic nerve compression is found. Nonetheless, many patients with facial trauma will have received imaging by computed tomography (CT) on which there is documented retrobulbar hematoma, with or without signs of OCS. The aim of this study was to identify the incidence and describe the outcomes of these CT-diagnosed retrobulbar hematomas.
Study Design: This is a retrospective observational cohort study of patients with orbital fractures and CT-diagnosed retrobulbar hematomas.
Methods: Patients with orbital fractures for which ophthalmology was consulted were included in the study. Confirmation of orbital fracture and dictated presence of a retrobulbar hematoma on facial-bones CT was recorded. Patient demographics, proptosis, visual acuity, intraocular pressure and interventions received at initial visit and follow-up were recorded.
Results: 292 orbits with wall fractures were identified. 94 (32.2%) were documented by CT report to have a retrobulbar hematoma. Of these orbits, only one (1.1%) was diagnosed with OCS receiving canthotomy and cantholysis. 53 orbits with initial CT-diagnosed retrobulbar hematoma were seen in follow-up a week or more later, none of which had developed signs of OCS or needed medical or surgical intervention for OCS.
Conclusions: Retrobulbar hematoma is a frequently reported finding on CT in cases of orbital fractures. However, the vast majority of these do not develop OCS initially or later. CT presence of retrobulbar hematoma is a non-specific finding and should not guide diagnosis and treatment of OCS.

Title: A case of fulminant periorbital necrotizing fasciitis and its outcome

Authors: Karim Punja, Derek Mai, Alexander Ragan, Brett Byers, Alejandra Ugarte Torres, Michael Ashenhurst

Abstract Body:

Purpose: We review the salient features of periorbital necrotizing fasciitis (NF) and showcase the medical, surgical and reconstructive outcome in a patient with fulminant Group A *Streptococcus* orbital and facial NF.
Study Design: Case study
Methods: Periorbital necrotizing fasciitis (NF) is a rare clinical occurrence in the spectrum of orbital infectious diseases, but one that requires a high index of clinical suspicion, timely diagnosis, and urgent treatment due to its blinding and life-threatening potential from systemic sepsis and shock. Periorbital NF can occur as a rapidly progressive and fulminant orbital cellulitis in a patient with immunosuppression, and Group A *Streptococcus* is the most common culprit. However, the causative source can be polymicrobial or even fungal and can also wreak havoc on immunocompetent individuals. Imaging studies may be helpful but not pathognomonic. Virtually all NF cases are treated with intensive intravenous antibiotics and urgent debridement.
We report a case of severe orbital and facial group A *Streptococcus* NF in a 58 year-old Caucasian male with multiple medical and socioeconomic issues including polysubstance abuse, blunt trauma, and homelessness. Computed tomography (CT) findings of possible infection were initially reported to be confined to the preseptal tissue. Within hours, the infection, which originated in the left medial orbit, progressed to affect the entire left orbit and extended toward the left ear and cheek.
Results: He was promptly treated with intravenous penicillin G and clindamycin in the intensive care unit and underwent urgent serial surgical debridements, which resulted in a large tissue defect approximately 12cm x 7cm in the left periorbital area and left face. Fortunately, the globe remained unpenetrated, and he was able to retain some vision in the setting of chronically poor visual acuity from previous traumatic optic neuropathy with pallor on dilated eye exam. The patient underwent successful left periorbital and eyelid reconstruction with composite graft consisting of free tarsoconjunctival graft, periosteal flaps, and tissue rotational flaps with axial blood supplies. At his 1-month follow up visit, the reconstructed tissue remained healthy, and the patient was convaslescing well. Vision had improved to hand motion, limited by baseline optic neuropathy superimposed by a brunescent cataract. The view of the fundus was extremely limited, and B-scan ultrasound did not indicate retinal pathology. Unfortunately, due to poor socioeconomic factors, the patient never returned for further follow-up despite numerous attempts to reach him.
Conclusions: We present the clinical and reconstructive course of a case of severe periorbital and facial necrotizing fasciitis (NF) and emphasize the need for timely diagnosis and management of this potentially life threatening disease.

Title: Efficacy of hedgehog pathway inhibition for locally advanced basal cell carcinoma (BCC) prior to surgical resection

Authors: Vivian T. Yin, Lara Dunn

Abstract Body:

Purpose: To describe the tolerability and efficacy of using hedgehog inhibition for locally advanced basal cell carcinoma (BCC) prior to surgical excision.
Study Design: Retrospective case series.
Methods: Consecutive patients presenting with locally advanced BCC of the medial canthus, stage T3b or higher, were treated with hedgehog inhibitors for 4 months prior to proceeding with surgical resections. The surgical specimen is serially sectioned to determine regression pattern of the tumor. The primary outcome is the regression pattern of the tumor. The secondary outcome measures include tumor response and tolerability and side effects. Patients with baso-squamous subtype were excluded.
Results: The median age was 69 years (65-81 years) with 2:1 female to male. All patients tolerated the drug therapy for 4 months with no grade 3 or 4 side effects. All patients showed partial response to the therapy with no cases of complete response. Resected specimens did not show satellite lesions.
Conclusions: The use of hedgehog inhibitors prior to surgical excision show promise as an approach reducing surgical morbidity in locally advanced (T3b or greater) BCC. Additional study is needed to confirm the lack of satellite lesions and define how surgical margins should be decided with this approach.

Session Title: Course 3: Dessert - Sweet morceaux of oculoplastics knowledge!
Location: Room 204 AB
Session Time: Friday, June 14, 2019, 3:45 – 5:15 PM

Title: Management of a Large Congenital Hemangioma Obstructing Visual Axis

Authors: Sara AlShaker, Imran Jivraj, Haiying Chen, Prakash Muthusami, John Phillips, Dan DeAngelis

Abstract Body:

Purpose: We describe a rare amblyogenic congenital hemangioma of the forehead and brow requiring early surgical management.
Study Design: Observational case report
Methods: The patient's clinical and surgical records were reviewed including patient history, clinical examinations, and investigations. A thorough review of the literature was also performed.
Results: An otherwise healthy boy was born with a large disfiguring vascular mass involving the forehead and eyebrow which obstructed the left visual axis. MRI demonstrated a T1-hyperintense facial and periorbital mass that avidly enhanced on contrast administration without intracranial or orbital extension. MRA demonstrated rich arterial supply arising from the left external carotid and left ophthalmic arteries while MRV demonstrated bilateral superior ophthalmic vein drainage. There was no evidence of thrombocytopenia, coagulopathy, high output heart failure, or other vascular lesions. The lesion remained stable in size over the subsequent three weeks and customized head gear was designed to elevate the mass away from the visual axis. At 23 days of age, following intraoperative ultrasound-guided ligation of the arterial supply to the lesion, surgical resection to clear the visual axis was performed necessitating intraoperative transfusion. Pathology revealed a large vascular lesion involving dermis and subcutis consisting of lobules of small vascular channels with many large interlobular vessels. Pathologic analysis revealed pericytes and CD31-positive GLUT1-negative endothelial cells consistent with a congenital hemangioma 1,. At six months of age, the patient had a markedly improved appearance with mild residual hemangioma and normal visual development.
Conclusions: Congenital hemangiomas are very rare benign congenital vascular tumours occurring on the face and extremities which are clinically and pathologically distinct from the more common infantile hemangiomas 2,3. They must be distinguished from malignant vascular tumours such as angiosarcomas, Kaposiform hemangioendotheliomas and other benign vascular tumours. Congenital hemangiomas are fully developed at birth and may be identified on routine second trimester unltrasonography 4,5. They are classified as rapidly-involuting, partially-involuting, or non-involuting based on their clinical course over the first year of life. 6,7 In the majority of cases, these lesions are observed for signs of regression, and surgery can be offered for persistent lesions. Our case highlights the challenging management of a large amblyogenic congenital hemangioma of the face which was successfully managed with customized headgear and subsequent resection.

Title: Oculoplastic Considerations in Keratoconjunctivitis Sicca

Authors: Mišo Gostimir, Ahsen Hussain

Abstract Body:

Purpose: Keratoconjunctivitis sicca, or dry eye disease, is a common condition that affects many patients with oculoplastic or orbital conditions. The potential impact of these conditions in causing or worsening dry eye disease must be considered while managing these patients. Furthermore, dry eye must be considered as a potential complication of oculoplastic or orbital procedures which may alter anatomical structures involved in the lacrimal system. Thus, the purpose of this review was to provide a comprehensive summary of all existing evidence related to oculoplastic conditions and procedures that may cause or worsen dry-eye disease.
Study Design: Systematic review.
Methods: A literature search of the MEDLINE, EMBASE, and Scopus databases was conducted to identify all relevant studies from 1946 to 2018. Publications describing (1) an oculoplastic or orbital disorder which can cause or contribute to dry eye, or (2) an oculoplastic or orbital procedure which can cause or worsen dry eye, were included. Studies reporting dry eye disease subjectively (e.g. patient-reported symptoms) and objectively (e.g. Schirmer test results, OSDI, tear breakup time, tear film analysis, exam findings, etc.) were included. There were no restrictions based on study type or subject type. Studies were excluded if the disorder or procedure of interest was not within the realm of ophthalmic plastic surgery, or if the outcome was an improvement, rather than the development or worsening, of dry eye disease.
Results: Following the review of 1437 search results, a total of 166 articles were included in the review. Of these, 52 articles described an oculoplastic or orbital disorder and 114 articles described procedure in association with the development or worsening of dry eye disease. The reported disorders included thyroid eye disease, IgG4-related disease, blepharospasm, lid wiper epitheliopathy, eyelid laxity, entropion/ectropion, lagophthalmos, and ptosis. The reported procedures included blepharoplasties, botulinum toxin injections, dacryocystorhinostomy, and various applications of radiation for orbital conditions. The most-studied conditions included thyroid eye disease, ptosis, and blepharospasm. The most-studied procedures included blepharoplasties, botulinum toxin injections, and radiotherapy.
Conclusions: Dry eye disease is well-reported in relation to orbital conditions and complications of oculoplastic procedures. The available evidence has been summarized and presented in a logical format for application to practice. While dry eye management must be considered in the context of certain orbital conditions, the evidence for dry eye disease as a complication of certain procedures warrants a more detailed and individualized management approach, especially in patients with already-present dry eye disease.

Title: The association of gastro esophageal reflux GERD and primary acquired nasolacrimal duct obstruction PANDO

Authors: John Harvey, Sonul Mehta, Ahsen Hussain, Niro Sivachandran

Abstract Body:

Purpose: This presentation will be the summary of 3 separate research projects that we have completed examining the relationship between PANDO and GERD.
We have shown that there is a relationship between these 2 conditions.We have shown that patients with PANDO and GERD have an increased likelihood of DCR failure.We have not been able to elucidate a mechanism to explain this association.

Title: DCR in children under the age of four years: outcomes and complications

Authors: Kailun Jiang, Valerie Juniat, Geoff Rose, Hannah Timlin, Jimmy Uddin, Yassir Abourayyah, Swan Kang, Vijay Wagh, David Verity

Abstract Body:

Purpose: Dacryocystorhinostomy (DCR) can be associated with peri- or post-operative epistaxis. Hemorrhage and circulatory compromise are safety concerns for children under 2 years old who undergo lacrimal drainage surgery. In this study, we reviewed the peri- and post-operative complications of external DCR surgery in children under the age of 4 at a single, stand alone ophthalmic unit.
Study Design: Retrospective case review.
Methods: This study reviewed all children under the age of 4 who had undergone DCR surgery at a hospital site between 1998 and 2013. Post-operative telephone survey of parents and guardians were conducted to identify specific post-operative complications.
Results: 67 patients under the age of 4 were treated with DCR (86 DCR procedures). 61% were male. The median age was 27.5 months (range 5-48 months). Median number of probing episodes prior to DCR was 1.8 (range 1-8). The indications for DCR included lacrimal mucocoele in 72%, epiphora in 28% despite probing and recurrent dacryocystitis in 16%. Surgery and anaesthesia were consultant-led in all cases. 72% of patients did not have intubation, while 28% were intubated. Success rate (defined as resolution of mucocoele and epiphora) following one DCR operation was 96%. 3 patients required further surgery for persistent epiphora. 2 patients were treated for soft tissue infection, which resolved with oral antibiosis alone. There were no peri- or post-operative hemodynamic complications. No emergency-room attendances or readmissions for epistaxis occurred, this was also confirmed by telephone survey.
Conclusions: In conclusion, external DCR in an ophthalmic stand-alone unit is safe and effective in young children when performed by experienced surgeons and anesthetists.

Title: Defining the dimensions of the pediatric conjunctival fornix

Authors: Imran Jivraj, Ahsen Hussain, Yaping Jin, Dan DeAngelis, Asim Ali

Abstract Body:

Purpose: Knowledge of the dimensions of the pediatric conjunctival fornix would be invaluable in the management of cicatricial ocular surface disease and reconstruction of congenital and acquired orbital disorders. While measurements of the adult conjunctival fornix among South Asian and Caucasian populations have been described, normative pediatric data have not been reported. The present study aims to describe the dimensions of the pediatric conjunctival fornix in the pediatric population using two measuring devices.
Study Design: Cross-sectional study.
Methods: Fifty-seven subjects of varied ethnicities who were less than 18 years of age undergoing ophthalmic procedures under general anesthesia were recruited. Patients with diseases affecting the conjunctiva or fornices were excluded. Measurements of the intercanthal distance (ICD), upper (UVF, UHF) and lower (LVF, LHF) vertical and horizontal fornix depths, and lateral fornix depth (LF) of both eyes were performed by two surgeons pre-operatively using a sterile plastic ruler and a Scott ruler. Linear regression and correlation analyses were used to assess if fornix measurements increased with age. Differences between plastic ruler and Scott ruler were assessed using the paired t test.
Results: The mean age of participants was 7.4 years (range: 0.5-17.0 years) and there was no statistically significant differences between male and female participants (p=0.90) or between Caucasians and non-Caucasians (p=0.93). Mean measurements and standard deviations using the plastic ruler were as follows: ICD: 28.4mm±3.0, UVF: 16.9mm±1.4, LVF: 12.6mm±1.7, UHF: 30.3mm±3.7, LHF: 28.5mm±3.4 and LF: 5.2mm±0.8. There was a statistically significant ($p<0.05$) increase in in ICD, UVF, LVF, UHF, and LHF with age as measured with the plastic ruler; LF did not change significantly with age. Measurements obtained with the Scott ruler were significantly greater (0.9mm) for UVF ($p<0.0001$) and smaller (-0.6mm) for LHF (p=0.0069), but not significantly different for UHF, LVF, and LF.
Conclusions: This is the first study to define the dimensions of the conjunctival fornix in an ethnically diverse pediatric population under general anesthesia. As would be expected, there was a statistically significant increase in various dimensions of the fornix with age. In comparison with the upper and lower fornix depths previously described among healthy adult South Asians (Khan et al, 2014) and healthy Caucasians (Jutley et al, 2007), we found slightly larger vertical fornix dimensions in the pediatric population. It is possible that greater elasticity of pediatric connective tissue, variable measurement technique, and the impact of eye position under general anesthesia may explain these differences.

Title: Success rates of 95 consecutive endoscopic endonasal dacrocystorhinostomy with and without preservation of nasal mucosal flaps

Authors: Vinay Kansal, Ali Jamal, Rick Jaggi

Abstract Body:

Purpose: Endoscopic, endonasal approach for dacrocystorhinostomy (DCR) is a popular approach in the treatment of chronic epiphora. Preservation of a nasal mucosal flap may reduce success rates. This study records outcomes of nasal mucosa preserving versus non-preserving techniques.
Study Design: Retrospective consecutive chart review
Methods: Retrospective chart review of sequential endonasal DCRs performed by a single surgeon in the Saskatoon Health Region between April 2014 and November 2017 was performed. Charts were divided into (i) mucosa preserving (n=50) and (ii) mucosa non-preserving (n=45) groups. Primary outcomes were nasolacrimal system patency on endoscopic examination and resolution of epiphora. Baseline characteristics were compared with Fisher Exact tests and Mann-Whitney U tests. Generalized estimating equations adjusted for baseline characteristics and accounting for correlation between eyes were used to compare interventions.
Results: Both groups had similar baseline characteristics ($p>0.05$). Median follow up was 7.9 (IQR 3.6-8.8) and 3.5 (IQR 1.6-4.9) months for groups (i) and (ii), respectively. The odds ratio for a patent lacrimal ductal system was 4.4 (1.2-16.9) with mucosa non-preserving technique. This translated to success in 76.0% (62.3-85.8) of mucosa-preserving and 93.3% (81.3-97.8) of non-preserving cases. Improvement in symptomatic epiphora was not statistically significant (Odds ratio 2.0 (0.7-6.0); 76.0% (62.3-85.8) in the mucosa-preserving group vs. 86.7% (73.3-93.9) in the non-preserving group) Rate of reintervention was significantly higher in the mucosa preserving group (18.0% versus 2.2%, $p=0.043$).
Conclusions: In this investigation, nasal mucosa non-preserving DCR technique was more likely than mucosa preserving technique to achieve nasolacrimal system patency. However, the improvement in epiphora was not significantly different between groups, although the trend appears to be clinically significant. Future studies should be prospective, randomized and exclude patients with other causes chronic epiphora.

PAEDIATRIC OPHTHALMOLOGY AND STRABISMUS
L'OPHTALMOLOGIE PÉDIATRIQUE ET STRABISME

Session Title: Do IOU an IOL? ...and other issues in pediatric anterior segment
Location: Room 202
Session Time: Friday, June 14, 2019, 3:45 – 5:15 PM

Title: Goniotomy for the childhood glaucomas: a 19-year outcome study

Authors: Sharon Armarnik, Stephen Farrell, Christopher J Lyons

Abstract Body:

Purpose: Glaucoma is an uncommon condition in childhood. Goniotomy is an attractive surgical solution since it is conjunctival-sparing, quick and relatively safe. We have used this technique across the whole spectrum of childhood glaucoma and report its long-term results for each condition.
Study Design: A retrospective, non-randomized, non-interventional, single center study
Methods: The charts of all children undergoing goniotomy from 2000 to 2018 were included in the study. Patients were excluded if they had previous glaucoma surgery at the time of the initial goniotomy, and if follow-up was less than 6 months. We defined complete success as final intraocular pressure (IOP) 21 mm Hg or less after one or two goniotomies without medications. Qualified success was defined as IOP of no greater than 21 mm Hg with medications. Failure was defined as IOP greater than 21 mm Hg despite medical therapy, requiring further surgical intervention.
Results: 90 eyes of 61 patients which had undergone initial goniotomy were included in this study. The mean age at initial surgery was 5.1 ± 4.8 years (range 37 days to 15.7 years, median 2.7 years). 34 eyes had a diagnosis of Primary Congenital Glaucoma (PCG), 16 of Juvenile open angle glaucoma (JOAG), 18 of Uveitic Glaucoma, 11 of Anterior Segment dysgenesis or Aniridia, 7 of Sturge Weber (SWS) or Klippel Trenaunay Weber Syndrome, and 4 of Aphakia. Mean follow up was 6.6 ± 4.4 years (Range 0.5 to 17 years). At the last follow up appointment 52 eyes (58%) were a complete success following either 1 or 2 goniotomy procedures without any pressure lowering medications, 8 eyes (9%) were a qualified success and 33% had failed to be controlled by goniotomy and required another surgical procedure. Complete success rates were as follows: PCG:85%, JOAG:31%, Uveitic glaucoma:67%, SWS / Klippen Trenaunay:0%, Anterior Segment Dysgenesis / Aniridia:45% and Aphakia:25%. When combining complete and partial success for PCG, JOAG and Uveitis the percentages are as followed 88%, 62% and 77%. One infant with PCG with unsuspected bleeding diathesis required surgical evacuation of a post-operative hyphema.
Conclusions: We found goniotomy to be very effective and safe for the treatment of primary congenital glaucoma and uveitic glaucoma in Western Canada. It was also successful in a high number of JOAG and patients with aniridia or ASD, but not in SWS / Klippel -Treanaunay syndrome. Long-term survival analysis of our children showed goniotomy results to be largely stable after the initial 6-month post-operative period with few failures beyond that period, though careful long-term follow-up remains indicated.

Title: The surgical outcomes of penetrating keratoplasty and Ahmed glaucoma valve implantation in complex anterior segment eye diseases in pediatric patients

Authors: Mansoureh Bagheri, Kamiar Mireskandari, Nasrin Najm Tehrani, Asim Ali

Abstract Body:

Purpose: To evaluate the outcomes of penetrating keratoplasty (PKP) and Ahmed glaucoma valve (AGV) implantation in pediatric patients with corneal opacity and glaucoma.
Study Design: This was a retrospective case series.
Methods: Clinical records of all children under 18 who underwent simultaneous or sequential PKP and AGV implantation from 2003 to 2017 were reviewed. Surgical success after AGV implantation was defined as a final IOP of 5 to 21 mmHg or a 30% reduction from baseline IOP after 3 months, and no secondary glaucoma surgery, loss of light perception, or devastating complications. Kaplan-Meier estimator was used for survival analysis.
Results: Twenty-five eyes of 20 patients met the inclusion criteria. Peters anomaly, Sclerocornea, congenital hereditary endothelial dystrophy, congenital aniridia, Axenfeld-Rieger anomaly, penetrating globe injury, as well as corneal opacity associated with childhood glaucoma were the underlying eye conditions. The mean age at the time of first AGV implantation and PKP were 42.7 ± 48.9 and 33.3 ± 42.9 months, respectively. The cumulative probability of success after AGV implantation was 97%, 96 %, 90 %, 46 %, and 23 % at 1, 2, 5, 7, and 10.5 years of follow up, respectively. Eighteen eyes (72%), met the success criteria, of whom 6 eyes (24%) did not need anti-glaucoma medications at last follow up. Pre-operative intra-ocular pressure (IOP) decreased significantly from 29.0 ± 6.3 to 17.2 ± 7.3 (P=0.000). The cumulative probability of corneal graft survival was 82%, 67%, 43%, 32%, and 30% at 1, 2, 5, 7, and 12.5 years of follow up, respectively. Sixteen eyes had clear graft at last follow-up and 7 eyes needed repeated PKP. Microbial keratitis occurred in 3 eyes which lead to graft failure.
Conclusions: PKP and AGV implantation can effectively reduce the IOP and restore corneal clarity with considerately significant success rate in pediatric patients with complex anterior segment eye diseases.

Title: Outcomes and Complications of Simultaneous Bilateral Cataract Surgery (SBCS) in Children - A 10-year Review

Authors: Vishaal Bhambhwani, Sina Khalili, Nasrin Tehrani, Asim Ali, Kamiar Mireskandari

Abstract Body:

Purpose: SBCS has been viewed with caution by the ophthalmology community, especially due to risk of devastating complications in both eyes. There is paucity of literature on the subject in children, for whom significant benefits can be derived by operating both eyes under the same anaesthesia. The purpose of our study is to analyse outcomes and complications of SBCS performed in children at our centre over a period of ten years.
Study Design: Retrospective cohort study.
Methods: Retrospective analysis of records of children who underwent SBCS from 2008-2018 at a single institute was performed. Procedures were consented to by parents following detailed discussion about risks and benefits of surgery in two sessions versus one. Data on outcomes and complications (ophthalmological, anaesthesia-related) up to 8 weeks post-operative is presented.
Results: 37 patients (74 eyes) (mean age 4.4 months) (21 Females, 16 Males) underwent bilateral lens aspiration with anterior vitrectomy (6 with, 68 without IOL). Contact lenses/glasses were used for post-operative visual rehabilitation.Average ASA score was 2.1 (1-4). 19 were admitted for observation overnight post-surgery (as per anesthesia protocol). There were no devastating anesthesia-related complications; however, one with aortic stenosis needed phenylephrine support, one was managed with re-intubation (laryngeal spasm post-operative) with no further complications. Average 3.89 post-operative follow-up visits (in 8 weeks post-operative) occurred. One patient had fibrinous reaction and another had glaucoma (needing goniotomy) in both eyes associated with Wolfram and Lowe syndromes, respectively. One eye had an epithelial defect, which resolved spontaneously. All eyes had clear visual axis at the end of follow up period. There was no endophthalmitis.
Conclusions: SBCS in children have several potential advantages including avoidance of multiple anaesthesia, faster visual rehabilitation, reduced post-operative follow-up visits, and cost savings to parents and healthcare systems. Outcomes and complication rates of SBCS in this study were comparable to reported literature for unilateral procedures. SBCS in children may be offered to parents as a viable option; however, studies with larger sample sizes are desirable.

Session Title: Looking Through the Pupils of Pupils: Pediatric retina, neuro and surgery
Location: Room 202
Session Time: Sunday, June 16, 2019, 1:30 – 3:00 PM

Title: Epidemiology of Retinoblastoma in Canada during 1992-2010

Authors: Rami Darwich, Feras Ghazawi, Elham Rahme, Nebras Alghazawi, Denis Sasseville, Miguel N. Burnier, Ivan V. Litvinov

Abstract Body:

Purpose: escriptive demographic statistics are important components of effective cancer control programs. The current study was conducted to examine the epidemiology of retinoblastoma (RB) in Canada during the period of 1992-2010 using 2 distinct population-based databases.
Study Design: Retrospective cross-sectional population-based study.
Methods: We examined data on the incidence of RB using 2 distinct population-based cancer registeries (Canadian Cancer Registry (CCR) and Le Registre Québécois du Cancer) for the period of 1992-2010 using International Classification of Diseases for Oncology ICD-O-3 codes. Data on sex and age of patients and laterality of RB were analyzed.
Results: There were 445 patients diagnosed with RB in Canada between 1992 and 2010. The average annual incidence rate of RB, for the period 1992-2010, was found to be 11.58 (95% CI 10.48-12.76) cases per million children under the age of 5 per year. Linear regression analyses of the RB incidence rates per million children younger than 5 years revealed no statistically significant changes in incidence during the study period (coefficient of determination [R2]= 0.08; p=0.60). The mean age ± standard deviation (SD) at the time of diagnosis was 2.35 ± 6.85 years, and the male-to-female incidence rate was 1:1.02 (M:F 220:225). The laterality of the reported cases of RB was found to be 81.48% for unilateral cases and 18.52% for bilateral cases. Provincially, Nova Scotia had an incidence rate of 23.93 (95% CI 14.62-36.96) which is up to three-fold the national average annual incidence rate. The incidence rates of RB across Canadian cities were comparable to the national average.
Conclusions: Our findings indicate continuity of clinical trends between Canada, United States and other developed countries. This study will provide a foundation on which to monitor Canadian RB incidence patterns and can serve to further stimulate etiologic research.

Title: Assessment of WINROP algorithm as a screening tool for detection of retinopathy of prematurity: the Montreal experience

Authors: Fatma Zaguia, Philippe Lamer, Jiaru Liu, Martine Claveau, Therese Perreault, Robert Koenekoop, Daniela Toffoli, Ayesha Khan

Abstract Body:

Purpose: Retinopathy of prematurity (ROP) is a leading cause of preventable blindness worldwide. Early detection and treatment are crucial in maintaining vision. Current screening techniques include routine dilated retinal exam of premature newborns by trained ophthalmologists. This can often be burdensome and distressing to infants and their families. While using the current screening criteria, less than 10% of screened patients will go on to require treatment. In recent years, Loqvist et al have developed WINROP (Weight, IGF, Neonatal ROP), as an alternative to traditional screening methods. WINROP is a free online surveillance algorithm that uses longitudinal postnatal weight measurements to better predict early risk for developing severe ROP that will require treatment. The WINROP algorithm has been validated in several countries around the world, however scarce data is available to support the program in geographically and racially diverse populations such as ours in Montreal. The aim of our study is to validate the WINROP algorithm as an ROP screening tool in our North American cohort of preterm infants.
Study Design: Study is a retrospective chart review between May 1st 2015 and August 1st 2017.
Methods: Study was conducted in the neonatal intensive care unit at the Montreal Children's Hospital at the McGill University Health Centre, Montreal, Quebec. 351 infants were eligible for ROP screening, and following our exclusion criteria, 240 infants were included in the study. Gestational age, birth weight and weekly weights were recorded and entered in the WINROP online surveillance algorithm.
Results: The prevalence of sight-threatening ROP requiring treatment was 1.7% in our population. The median time from birth to WINROP alarm was 16 days (range: 7-20 days). The median time from the alarm to the time of diagnosis of sight-threatening ROP was 13 weeks (range: 11.4 to 14.6 weeks), with infants being treated an average of 1.5 days following diagnosis. In our cohort, the sensitivity of the WINROP algorithm to detect vision-threatening ROP was 100%, with a specificity of 57%. The positive predictive value was 3.8% and negative predictive value was 100%. In total, WINROP alarm was activated for 106 infants, which would represent a decrease of 56% in dilated fundus examinations.
Conclusions: WINROP algorithm detected 100% of infants who developed ROP requiring treatment, suggesting optimal sensitivity to be used clinically in our population. Furthermore, time of alarm to proliferation ROP suggests early detection. Using this screening tool, stressful eye exams could be markedly reduced in our population.

Session Title: Alignment Assignment: Strabimus and amblyopia
Location: Room 202
Session Time: Saturday, June 15, 2019, 3:45 – 5:15 PM

Title: Cost of glasses and travel for pediatric ophthalmology

Authors: Sapna Sharan, Ryan Wilson, Erik Leci, Monali Malvankar

Abstract Body:

Purpose: Families travel long distances to access sub-specialty tertiary services like pediatric ophthalmology. These patients require intensive, regular, long follow-up. There is deficit of knowledge of direct and indirect costs associated. There is added financial burden to young families while travelling for their child's ophthalmic care. This interferes with consistent visits and compliance of care leading to irreparable vision loss. The aim of the study was to understand this burden of finances and travel for these families.
Study Design: Prospective cohort study.
Methods: Data was collected from questionnaire filled by 56 consecutive parents of patients who attended pediatric ophthalmology clinic at Ivey Eye Institute (IEI), London, ON. Answers included cost estimate of glasses, contact lenses/solution, parking, accommodation, child care, time-off work, age of parents, age of the child, disease etiology, comorbidities, number of children, other children requiring eye care, distance and time travelled to IEI, mode of transport, place of residence, amount of time required-off work, average annual household income, third-party insurance coverage, inability to pay prescription, number of times prescription changed and reasons for missed appointments. Ethics approval was obtained from the research ethics board (REB) at Lawson Health Research Institute, London, ON. Data was analyzed using STATA 15.0.
Results: Parent's mean age was 35 ± 6.4 years, mean age of the child was 4.92 ± 2.6, and 52% of children were females. Eye pathology included strabismus/amblyopia (71%). The rest 29% included brain injury, near sightedness, refractive errors, corneal pathology, optic neuritis, blindness, cataract, glaucoma, binocular vision dysfunction, ocular albinism and cortical visual impairment. Average number of children varied from 1 - 4. 27% of families had multiple children requiring eye care. Per child average annual cost of glasses was $554, lenses were $560, contact lenses/solution was $837. Prescription was damaged, or replaced 2.7 times per year. Average annual income was $60,000, average cost of travel was $160, average cost of childcare was $89.23, and average cost of time off work was $476. 22% families had no extra resources. 28% families had no insurance coverage.
Conclusions: Families incur significant direct and indirect cost for their child's ophthalmic care. Ways to mitigate these costs should be considered including discounted cost of glasses/frames, free parking, discounted accommodation for low-income families with young children requiring eye care by the Ministry of Health.

Title: Economic evaluation of universal pediatric vision screening programs: a systematic review

Authors: Stephanie Cheon, Amanda Ross-White, Christine Law

Abstract Body:

Purpose: The goal of pediatric vision screening is early identification of amblyopia or amblyogenic factors to decrease individual and societal disease burden. However, there is currently no national strategy or policy regarding pediatric vision screening within Canada. Furthermore, the cost-benefit of implementing total population pediatric vision screening has been debatable. We thus aimed to systematically review economic evaluations of universal vision screening programs for children in various healthcare systems around the world, with subsequent characterization and comparison of programs and their associated costs.
Study Design: Systematic review.
Methods: Articles published in English between January 2008 and September 2018 relevant to vision screening recommendations in the pediatric population were searched in Medline, Embase, the National Bureau of Economic Research, EconLit, and Business Source Premier. Two reviewers independently conducted title and abstract followed by full-text screening, using the pre-determined inclusion and exclusion criteria. All non-original articles and studies describing programs that targeted specific or sub-populations such as children with specific diseases, were excluded. Disagreements between reviewers were resolved through discussion and consensus established. Data was extracted from each article and compared for program features, study population, and economic evaluation of the program. All costs were converted to 2018 United States dollars for direct comparison.
Results: Our search returned 264 studies; 16 were eligible for inclusion in the review. The target ages of programs ranged from 6 months to 17 years of age. The majority of programs were school-based. The average cost of programs was $8.24/child (range: $0.12-$27.78). Half of all included articles described programs based in USA, with an average cost of $10.75/child (range: $0.14-$27.74). The remaining articles' country of publication consisted of UK, Taiwan, India, Iran, China, and Thailand, with an average program cost of $4.91/child (range: $0.12-$27.78). The devices and assessment tools used for screening varied across studies, with more than half employing instrument-based techniques that utilize technology such as photoscreeners and autorefractors; the average program cost was $11.35/child (range: $0.14-$27.78). The remaining articles used traditional methods of assessment including Snellen charts and direct ophthalmoscopy, costing the program on average $7.08/child (range: $0.12-$27.74). The percentage of children identified to have abnormal screens was highest in programs whose screening was conducted by eye care professionals as opposed to lay screeners, but the program cost did not affect rate of identification.
Conclusions: There is large variability in the average cost to implement a pediatric vision screening program. Throughout the world the average cost can increase comparatively to over 200 times. The average program cost per child in USA is more than double the average cost of programs elsewhere in the world. However, the percentage of children identified as having abnormal screens is not influenced by program cost. We hope our exploratory work will lay the framework for development of cost-effective programs within our Canadian public healthcare system.

Title: Validation of a novel strabismus surgery 3D-printed silicone eye model for ophthalmology resident simulation training

Authors: Lisa Jagan, Will Turk, Christian Petropolis, Rylan Egan, Nicholas Cofie, Kenneth Wright, Yi Ning Strube

Abstract Body:

Purpose: Ophthalmology residency programs traditionally rely on teaching strabismus surgical skills in the operating room on live patients, under direct supervision by experienced mentors. This dependence on live surgical experience is partly due to a lack of appropriate simulators available for practice. The purpose of this study was to demonstrate the validity of a newly designed 3D-printed silicone model for strabismus surgery, compared to the gold standard rabbit head, in terms of simulator fidelity.
Study Design: Multi-centered, Simulation Fidelity Study using Questionnaire-based approach and Modified Expert Delphi Iterations
Methods: A validated questionnaire was developed to assess the fidelity of the 3D-printed model and rabbit head for practicing and teaching strabismus surgical skills. It was subsequently disseminated at 3 separate Strabismus Skills Instruction Courses (76.6% of participants were pediatric ophthalmologists). Participants of two of the meetings practiced a defined set of strabismus surgical skills on the 3D-printed model and rabbit head prior to completing the questionnaire. The third meeting had expert strabismus instructors use solely the 3D-printed model to teach advanced strabismus surgical skills and then complete the questionnaire. The questionnaire probed participants on overall globe, conjunctiva, muscle and scleral fidelity. The participants rated their level of agreement for statements pertaining to the 3D-printed or rabbit model fidelity, using a 5-point scale. Repeated measures ANOVA compared ratings of the 3D-printed model and rabbit head. Pearson's or Spearman's correlation determined correlation of years of experience to participants' responses. Qualitative data was coded into themes.
Results: 47 participants completed the questionnaire. The 3D-printed model scored 18% higher than the rabbit head for anatomical accuracy (mean difference=0.697, $p=0.001$) and 25% higher than the rabbit head for position of eyes within the head (mean difference=0.846, $p=0.009$). The rabbit head rated 26% higher than the 3D-printed model for conjunctival elasticity (mean difference =-0.767, $p=0.009$). More experienced participants were more likely to strongly agree that the 3D-printed conjunctiva effectively mimics real conjunctiva (rho=0.337, $p<0.05$) and that the scleral tissue effectively mimics real sclera (rho=0.298, $p<0.05$). More experienced participants were less likely to strongly agree that the rabbit eye is anatomically accurate for strabismus surgery (rho=-0.344, $p<0.05$). Qualitative data supported these findings.
Conclusions: This study demonstrates the validity of a novel strabismus surgical model in terms of fidelity, compared to the gold standard rabbit head. This high-fidelity 3D-printed silicone simulator is both portable and cost-efficient, with applications for residency training curriculum, which is currently in development by the authors, and use in international surgical teaching endeavours.

Title: 'Restraining the over-achiever' in incomitant strabismus: Scott's resect-recess procedure re-visited

Authors: Sharon Armarnik, Vaishali Mehta, Christy Giligson, Christopher J Lyons

Abstract Body:

Purpose: In 1994 Scott (1) reported an alternative to the Faden operation for the management of incomitant horizontal strabismus due to muscle paresis or restriction, resecting and recessing a single yoke muscle in the fellow eye to match the duction deficit of the paretic eye. He advocated large surgical resections equivalent to the Faden procedure, resulting in post-equatorial insertion of each muscle, citing potential adjustment and greater effectiveness of lateral rectus weakening as advantages over Cuppers' Faden procedure (2). We adjusted his treatment recommendations, reducing the amount of surgery with the aim of 1: correcting the primary deviation while 2: leaving the muscle insertion posterior to the maximal recommended recessions performed in strabismus practice, so as to induce a matching duction deficit. We report our results using this alternative technique.
Study Design: A retrospective, non-randomized, non-interventional, single center study.
Methods: We reviewed the charts of all the adult patients who underwent the modified Scott procedure under our care from 2008 to 2018. Patients were included if they had a full orthoptic evaluation before and at least 10 weeks after the procedure. Main outcome measures were alignment at last follow up visit in primary position and in eccentric gaze.
Results: Nineteen patients (19 eyes) underwent this procedure for incomitant strabismus. The etiology was paretic (13) or restrictive (6 patients). Eleven had no previous strabismus surgery. Eight had isolated combined resect recess surgery and 11 others had simultaneous rectus/oblique muscle surgery. Rectus muscle operations were as follows: Medial: 9, Inferior: 6, Lateral: 3, Superior:1. An adjustable suture was used in every case but only in 5 of the 19 patients required adjustment. Average follow up was 1 year (range: 2.4 m- 7.7 y). This surgery resulted in reduction in the degree of incomitance in all patients (average 69.7%- 5 to 45Δ). The technique was particularly helpful for inferior rectus surgery (85.8% reduction). 74% became orthophoric in primary position. Both paretic and restrictive etiologies had good results (63%, 83%). Three of 19 patients (16%) were overcorrected. Two required prisms to control a small comitant deviation.
Conclusions: Adjustable resect-recess surgery is an effective treatment for patients with incomitant strabismus. Our results show greatest reduction in incomitance when used on the inferior and lateral rectus.

PUBLIC HEALTH AND GLOBAL OPHTHALMOLOGY
SANTÉ PUBLIQUE ET OPHTALMOLOGIE MONDIALE

Session Title: Leveraging Research and Partnership to Achieve Universal Eye Health
Location: Room 205 BC
Session Time: Sunday, June 16, 2019, 1:30 – 3:00 PM

Title: Unmet Eye Care Needs Among a Syrian Paediatric Refugee Population

Authors: Tarek A. Bin Yameen, Myrna Lichter

Abstract Body:

Purpose: There is a lack of data on vision problems in a paediatric refugee population in Canada. Given the recent arrival of 40,000 Syrian refugees, we performed a cross-sectional, descriptive study to assess the prevalence of visual impairment and unmet eye care needs of Syrian refugee children in Toronto.
Study Design: Five single-day clinics were organized. Enrolment was offered to Syrian refugees registered with resettlement agencies, not for profit organizations, and/or private sponsorship groups.
Methods: Through a structured interview from the accompanying legal guardian, socio-demographics, medical history, subjective visual acuity, and access to eye care information was collected. Comprehensive visual screening, slit-lamp, dilated direct funduscopy, and refractions were performed. Visual acuity data was compared to Canadian prevalence data. $\chi 2$ tests were used for statistical analysis.
Results: 526 (65.8%) out of the 800 adults and children offered enrollment participated in the study. 278 paediatric patients were examined. The median age was 8 years (interquartile range (IQR)= 5-11) and 52% were females. Most patients lived outside Syria as refugees for 1 to 5 years (75.5%) and were enrolled in elementary school or less (48.9%). The prevalence of reported uncorrected vision problems was 17.2% for distance vision, 4.7% for near vision, and 0.7% for both distance and near vision, including loss of vision. A majority had not visited an eye specialist in the past year (95.3%) and 25.2% of parents were dissatisfied with their children's vision. The presenting visual acuity in the better-seeing eye was 20/50 or worse in 5.8% (95% CI, 3.6%- 9.3%). By using pin-hole correction, this improved to 5.5% (95% CI, 3.3%-8.8%). Compared to the Canadian population (0.17%), Syrian refugee children were 32 times more likely to have 20/50 vision or worse ($p < 0.01$). The most common finding was refractive error in 25.9% (95% CI, 20.9%-31.5%). Six-year old Syrian children were 4 times more likely to suffer from myopia compared to their Canadian counterparts (26.1% v. 6.4%, $p< 0.01$). The prevalence of non-refractive error was 7.6% (95% CI, 4.7%-11.3%). The most frequent non-refractive errors were cataracts (1.8%), strabismus (1.8%), glaucoma (1.1%), and traumatic corneal scaring (0.07%).
Conclusions: This is the first study to assess ocular health in a paediatric refugee population in Canada. Syrian refugee children have a high prevalence of visual impairment, even when living within a system of universal healthcare. Vision-screening programs and accessible eye clinics may address this need.

Session Title: The Changing Landscape of Ophthalmic Disease and Vision Care
Location: Room 205 BC
Session Time: Sunday, June 16, 2019, 3:45 – 5:15 PM

Title: Association of Reproductive Factors with Visual Impairment & Eye Disease: The Canadian Longitudinal Study on Aging (CLSA)

Authors: Christy Costanian, Marie-Josée Aubin, Ralf Buhrmann, Ellen Freeman

Abstract Body:

Purpose: To determine the association of female reproductive factors, such as age, type of menopause, & hormone replacement therapy (HRT) use and duration, with visual impairment (VI) & eye diseases, including glaucoma, macular degeneration & cataract.
Study Design: This was a cross-sectional analysis of baseline data from the Canadian Longitudinal Study on Aging's Comprehensive Cohort, a population-based study of 30,097 persons aged 45-85 years, 15,320 of whom were women. Participants were representatively sampled from within a 25-50 km radius of one of 11 data collection sites from 7 Canadian provinces between 2012 and 2015.
Methods: The relationship of sociodemographic, reproductive, health behavior, and clinical factors with VI & eye diseases was examined among 10,827 postmenopausal women who met the eligibility criteria. Presenting visual acuity was measured using the Early Treatment of Diabetic Retinopathy Study letter chart & its standard protocol. VI was defined as binocular acuity worse than 6/12. Participants were asked in a face-to-face interview if they had ever been told by a doctor that they had either glaucoma, cataract, or macular degeneration. Logistic regression analyses adjusting for socio-demographic, reproductive, health behavior, clinical factors & province were used. All analyses were adjusted for the complex survey design. Approval for this study was obtained from the Research Ethics Board of the Ottawa Hospital Research Institute.
Results: Later age (≥ 55 years) at natural menopause was associated with a decreased odds of VI (adjusted odds ratio (OR)=0.75, 95% confidence interval (CI)=0.56-0.99). Women who were either past (OR=1.22, 95% CI=1.08-1.39), or current HRT users (OR=1.28, 95% CI=1.04-1.58) were significantly more likely to report cataract. Moreover, women who used HRT for less than 10 years (OR=1.29, 95% CI=1.13-1.48) had significantly greater odds of having cataract. No statistically significant associations between reproductive variables & either glaucoma or macular degeneration were detected.
Conclusions: This is the first study to our knowledge to report a relationship between age at natural menopause & VI. Also, HRT use & duration were associated with higher odds of cataract. Given the inconclusive evidence on the relationship of menopause & HRT use with cataract & VI, prospective studies are warranted to confirm these findings.

Title: Microbial prevalence and antibiotic susceptibility in ocular infections at London Health Sciences Center

Authors: Ritesh Gupta, Gayathri Sivakumar, Rookaya Mather

Abstract Body:

Purpose: To determine the profile of bacterial isolates from submitted ocular cultures in London, Ontario and evaluate their susceptibility to common antibiotic agents.
Study Design: A retrospective quality improvement analysis of all ocular culture specimens was performed using the electronic database hosted by the London Health Sciences Microbiology Lab in London, Ontario between 1999 to 2017.
Methods: Data was analyzed to determine most common bacterial specimens in submitted conjunctival, corneal, and vitreous fluid cultures. Antimicrobial susceptibility data was extracted only between 1999 to 2011 due to data availability.
Results: A total sample of 3,367 isolates were included from ocular cultures analyzed in the LHSC electronic database. In these specimens, there were 2,760 conjunctival, 390 corneal, and 217 vitreous fluid cultures with bacterial isolates. The leading bacterial pathogens associated with conjunctivitis in the geographic region of London, ON were Coagulase negative staphylococcus (CoNS; n=778, 28.2%), Staphylococcus aureus (n=552, 20.0%), Haemophilus species (n=292, 10.6%), and Streptococcus pneumoniae (n=147, 5.3%). Conjunctival isolates positive for Staphylococcus aureus and CoNS demonstrated 76% and 100% susceptibility to ciprofloxacin, respectively. CoNS (n=119, 30.5%), Staphylococcus aureus (n=49, 12.6%), Pseudomonas aureus (n=25, 6.4%), and Streptococcus species (n=29, 7.4%), were among the most prevalent pathogens associated with keratitis. Isolates from contact lens-wearers in ocular infections included Gram-negative pathogens such as Enterobacter, Klebsiella, Serratia, and Pseudomonas species. Gram-positive bacteria were predominant in endophthalmitis consisting of CoNS (n=88, 40.6%), Streptococcus species (n=15, 6.9%), and Staphylococcus aureus (n=10, 4.6%). Gram-positive organisms in keratitis and endophthalmitis culture specimens demonstrated 100% susceptibility to vancomycin. Cefazolin showed an antimicrobial efficacy of 86%, while gentamicin showed an efficacy of 90% for gram-negative endophthalmitis specimens.
Conclusions: Gram-positive cocci appear to be the most common cause of ocular infections in London, ON. Susceptibility data suggests that most gram-positive ocular pathogens showed in vitro susceptibility to ciprofloxacin and vancomycin. Currently, fourth-generation fluoroquinolones are not routinely tested for susceptibility at our centre. Gram-negative species should be borne in mind for keratitis, especially in the setting of contact-lens wear. Gram-positive bacteria are most commonly isolated from vitreous samples. Intravitreal vancomycin and ceftazidime is the current standard for empiric regimen in the treatment of endophthalmitis at our centre. While gentamicin demonstrated excellent efficacy against gram-negative species in the setting of endophthalmitis, there are concerns for possible retinal toxicity due to a narrow therapeutic range.

Title: The Prevalence and Impact of Eye Disease in an Urban Homeless Population

Authors: Collier (Shangjun) Jiang, Mirriam Mikhail, Jackie Slomovic, Austin Pereira, Gerald Lebovic, Christopher Noel, Myrna Lichter

Abstract Body:

Purpose: Homeless and marginally housed (HMH) populations have been shown to have a higher prevalence of visual impairment compared to the general population. This study is the first to conduct a comprehensive ophthalmic examination using portable equipment at various homeless shelter locations in an urban population to identify objective ocular pathologies in a randomized sample.
Study Design: This is a cross-sectional study.
Methods: 10 adult shelters were randomly selected in Toronto, Ontario, Canada. A number of individuals were randomly selected based on their shelter bed numbers at each shelter, in proportion to the shelter's bed capacity. A total of 143 participants were recruited between August 2017 to April 2018. Participants completed a sociodemographic survey and clinical eye exam. Finally, a dilated ocular exam was performed using a portable slit lamp, autorefractor, tonometer, indirect ophthalmoscope and fundus camera.
Results: The median age of participants was 53.3, with a gender breakdown of 82.5% male and 17.5% female. The age-standardized prevalence of visual impairment was 27.4% (95% CI, 20.6-35.1%) for study participants. Refractive error was present in 48% of participants, 34% with myopia and 11% with hyperopia. 37.8% (95% CI, 32.2-45.9%) of this study population were diagnosed with at least one nonrefractive ocular pathology. Low income and low educational attainment were associated with increased odds of being diagnosed with nonrefractive ocular pathologies.
Conclusions: A clear healthcare gap exists between the ophthalmological disease burden of the HMH population and the amount of resources allocated directed towards their needs. Addressing risk factors such as low income and education, as well as increasing access to free eye examinations and visual aids may be an effective method of attending to this lack of health equity.

Title: The Landscape of Ophthalmologists and Optometrists in Ontario from 2011 to 2016

Authors: Shicheng (Tony) Jin, Sherif El-Defrawy, Jonathan A. Micieli, Ya-Ping Jin, Peng Yan

Abstract Body:

Purpose: To assess trends in ophthalmology and optometry providers across Ontario, Canada.
Study Design: Retrospective population-based analysis.
Methods: Ontario Health Insurance Plan (OHIP) medical provider data from April 1st 2010 to March 31st 2016 was extracted from the Ministry of Health and Long Term Care IntelliHealth database. Ophthalmology and optometry provider data was analyzed by sex, age, municipality, Local Health Integration Network and population centre: large urban (≥100,000 persons), medium (30,000-99,999 persons), small (1,000-29,999 persons), and rural (<1,000 persons) as defined by Statistics Canada.
Results: From 2011 to 2016, Ontario's population increased by 5.4% while the number of optometrists increased significantly more than the number of ophthalmologists per 100,000 people (+14.6% vs +1.6%; $p<0.05$).
Over the 5-year period, on average ophthalmologists were 53±13 years old and 20±1% female. During this time, the ratio by sex stayed consistent at 1F:4M with no significant shifts among age groups: ≤34 (8%), 35-49 (33%), 50-64 (38%), 65+ (21%). By geography, ophthalmologists practiced in 61/444 (13.7%) municipalities where 77.9% of Ontarians live. Over the 5-year period, the change in ophthalmologists per 100,000 vs population was -20.1% vs +2.4% for small centres, +10.6% vs +2.0% for medium centres and -0.6% vs +8.5% for large urban centres. No ophthalmologists practiced in rural communities.
Over the 5-year period, on average optometrists were 43±12 years old and 51±2% female. During this time, the ratio by sex stayed consistent at 1F:1M with no significant shifts among age groups: ≤34 (30%), 35-49 (39%), 50-64 (27%), 65+ (21%). By geography, optometrists practiced in 160/444 (36.0%) municipalities where 92.2% of Ontarians live. From 2011 to 2016, the change in optometrists per 100,000 vs population was -2.7% vs +2.8% for small centres, +10.2% vs +4.0% for medium centres and +15.5% vs +8.5% for large urban centres. No optometrists practiced in rural communities.
Conclusions: From 2011 to 2016, per 100,000 population the number of optometrists has increased significantly more than the number of ophthalmologists. Compared to ophthalmology, the optometry workforce is younger and practices in significantly more communities across Ontario. In urban areas, there has been a large increase in optometrists while the corresponding number of ophthalmologists has decreased. In smaller communities, the number of both optometrists and ophthalmologists has decreased, with ophthalmology experiencing the largest decrease. Careful human resource planning is needed to prevent oversupply of optometrists and undersupply of ophthalmologists.

Title: De-listed Routine Eye Exams Significantly Reduced the Use of Government-insured Optometrists but Increased the Use of Government-insured Primary Care Providers for Ocular Diagnoses

Authors: Yaping Jin, William Jeon, Rick H. Glazier, Michael H. Brent, Yvonne M. Buys, Graham E. Trope

Abstract Body:

Purpose: In 2004, Ontario de-listed routine eye exams for individuals aged 20-64 unless they had a diagnosed ocular disease, diabetes or obtained a valid physician referral. We investigated if de-listing affected Ontarian's utilization of government-insured services provided by optometrists and primary care providers (PCPs, including family physicians, paediatricians, and nurse practitioners).
Study Design: A time-series analysis.
Methods: Yearly OHIP (Ontario Health Insurance Plan) billing data from 2000 to 2014 were analyzed. Included were individuals without diabetes and/or a visit to an OHIP-insured ophthalmologist/optometrist one year prior to the study year. The utilization of OHIP-insured services provided by optometrists and PCPs for ocular diagnoses was compared post- versus pre-2004 using the interrupted time-series analysis stratified by de-listing affected (20-64 age group) and unaffected (0-19 or 65+ age group) individuals. Ocular disease diagnoses were identified using ICD-9 diagnostic codes. Diabetes was first excluded and then included as a part of 'ocular diagnoses'. Practitioner's specialty was recognized using specialty codes.
Results: A significant decrease was seen in OHIP-insured optometric services post- versus pre-2004 among de-listed age group when diabetes was excluded as a part of ocular diagnoses: -57% ($p<0.0001$) for the 20-39 group and -42% ($p<0.0001$) for the 40-64 group. Among de-listing unaffected 0-19 and 65+ age groups, a non-significant change in use of OHIP-insured optometric services was observed ($p>0.05$). The use of OHIP-insured PCP services for ocular diagnoses post- vs. pre-2004 among de-listed age groups increased significantly: +30% ($p<0.0001$) for the 20-39 group, and +16% ($p<0.0001$) for the 40-64 group. This increase was observed in both males and females and in all income earners. Among de-listing unaffected age groups changes in use of PCPs for ocular diagnoses were non-significant ($p>0.05$ for both 0-19 and 65+ group). The use of PCPs for non-ocular diagnoses remained stable post- vs. pre-2004 in both affected and unaffected individuals. Trends were similar when diabetes was included as a part of 'ocular diagnoses'.
Conclusions: Post-delisting, OHIP claims by optometrists decreased significantly while PCP claims for ocular diagnoses increased among de-listed Ontarians. Due to different levels of equipment and skills among PCPs compared with optometrists, the efficiency and cost-effectiveness of increased use of PCPs for ocular diagnosis and management warrants further investigation.

Title: A Comparative Analysis of the Practice Profile of Ophthalmology to Other Surgical Specialties in Canada

Authors: Elizabeth Y. Lee, Jason Noble, Nirojini Sivachandran

Abstract Body:

Purpose: To compare the practice patterns and working conditions of ophthalmologists to other surgical specialists in Canada.
Study Design: Cross-sectional survey study.
Methods: Data regarding specialty surgeons' working conditions were extracted from the 2017 CMA Work Force Survey, a national survey of practicing physicians in Canada. Basic statistical analyses including chi-square analyses and t-tests, were used to compare the responses of ophthalmologists to other surgical disciplines using MedCalc® (Ostend, Belgium: MedCalc Software).
Results: Compared to other surgeons, ophthalmologists saw significantly more patients weekly excluding call (144 vs 70 patients, $p<0.01$, t-test). Ophthalmologists were more likely to provide same day urgent care services (77.0% vs. 30.8%, $p<0.01$, Chi-squared), despite a lower overall percentage reporting the provision of formal on-call duties (73.6% vs 85.4%, $p<0.01$ Chi-squared) and less formal on-call hours per week (110 vs 142 hours, $p=0.02$, t-test). There were no differences in the self-reported satisfaction in access to OR, procedural rooms, elective procedures and diagnostic tests between ophthalmology and other surgical specialties. Ophthalmologists tended to report feelings of being overworked more often than other surgeons (44.7% vs. 31.4%, $p=0.01$, Chi-squared). There was no statistical difference in professional life and work-life balance satisfaction between respondents in ophthalmology and other surgical specialties. Most ophthalmologists (92.5%) worked in a fee-for-service (FFS) model, whereas other surgeons had a mixture of FFS (67.9%) and blended (22.8%) models ($p<0.01$, t-test). Ophthalmologists reported a higher proportion of their income used for overhead compared to other surgeons (39.6% vs. 25.9%, $p<0.01$, Chi-squared).
Conclusions: The practice profiles and work patterns of ophthalmologists differ from those of other surgeons in Canada. Some of the differences in provision of on-call series may be due to the fact that ophthalmologists often see emergency cases in their private offices as opposed to an in-hospital setting. Although majority of ophthalmologists reported satisfaction with their professional life and work-life balance, the high percentage of respondents feeling overworked may contribute to physician burnout over the long-term.

Title: Frequency and source of eyeglass insurance coverage in Ontario: Results from 2003 to 2013/14

Authors: Prem Nichani, Graham E. Trope, Yvonne M. Buys, Samuel N. Markowitz, Sophia Liu, Gordon Ngo, Michelle Markowitz, Ya-Ping Jin

Abstract Body:

Purpose: To (1) determine the frequency and source of eyeglass insurance coverage in Ontario and changes from 2003 to 2013/14; (2) examine socio-demographic factors associated with eyeglass insurance; and (3) investigate if having eyeglass insurance is associated with increased utilization of eye care providers in a public-funded healthcare system.
Study Design: Cross-sectional survey.
Methods: Data from Ontario respondents aged 12+ to the Canadian Community Health Survey in 2003 (n=42,777), 2005 (n=41,766) and 2013/14 (n=42,553) was analyzed.
Results: Overall, insurance covered all or part of the cost of prescription eyewear for 62.3% of Ontarians in 2003, 62.1% in 2005, and 62.0% in 2013/14. In 2005, 86% of those covered had employer-sponsored insurance, 9% had government-sponsorship, and 6% had a private plan. Corresponding numbers were 84%, 10% and 7% in 2013/14. From 2005 to 2013/14, government coverage increased from 29% to 42% ($p<0.0001$) for Ontarians without secondary school graduation and from 30% to 38% ($p<0.0001$) for those with household income under middle-level. Employer-sponsored coverage remained unchanged (92%) for individuals with household income above middle-level but decreased from 67% to 55% ($p<0.0001$) for Ontarians without secondary school graduation and from 64% to 53% ($p<0.0001$) for those with under middle-level income. An estimated 4.2 million Ontarians did not have any source of insurance in 2013/14.
In all survey years, factors associated with having insurance were age younger than 65, post-secondary graduation, household income above middle-level, aboriginal status, and those in married/common-law relationships.
In age groups with routine eye exams insured by government, having eyeglass insurance was associated with a significantly higher chance of visiting eye care providers in both bivariate and multiple regression analyses, with a difference in visiting eye care providers of 6% for the 12-19 age group and 7% for the 65+ age group. In age groups without government-insured routine eye exams, the difference in visiting eye care providers between those with and without eyeglass insurance was larger: 15% for the 20-39 age group and 11% for the 40-64 age group.
Conclusions: Eyeglass insurance coverage was 62% in Ontario and varied little from 2003 to 2013/14. The largest source of insurance was employer-sponsored, primarily covering high income earners; government-sponsored insurance significantly increased in lower income and education groups in recent years. Over 4 million Ontarians had no insurance in 2013/14 and were vulnerable to cost barriers for eyeglasses. Having eyeglass insurance was associated with significantly increased utilization of eye care providers.

Title: Complaints Against Ophthalmologists in the Province of Ontario, Canada: A Five year Review

Authors: Rini Saha, Anna Kabanovski, Susan Klejman, Edward Margolin, Yvonne M. Buys

Abstract Body:

Purpose: Patient concerns represent opportunities for improvement in ophthalmology care. This study's objective is to present an overview of complaints against ophthalmologists in the province of Ontario, Canada.
Study Design: Cross-sectional study
Methods: All resolved complaints to the College of Physicians and Surgeons of Ontario (CPSO) against ophthalmologists from January 2013 to May 2018 were analysed. Data regarding the prevalence of complaints, physician characteristics, incident location, reason of complaint and outcomes as decided by the Inquiries, Complaints and Reports Committee (ICRC) was collected. Complaints were classified across three domains: clinical care and treatment, professionalism and conduct and practice management.
Results: During the study period there were 372 complaints against 211 ophthalmologists (82.9% male, median age 45-54 years) out of 448 practicing ophthalmologists (72.1% male, median age 45-54 years) in Ontario. Of the 211 complained-against ophthalmologists 125 (60%) had one complaint, 49 (23%) had 2 complaints and 37 (17.5%) and 3 or more complaints. 237 (53%) ophthalmologists had no complaints during this period. Most incidents (49.8%) occurred in a specialist's office and hospital settings (31.8%). A total of 896 issues were raised in 372 complaints, on average 2.4 issues per complaint. Complaints related to clinical care and treatment were most common (76.3%), followed by professionalism and conduct (55.4%) and practice management (24.7%). Within these domains, the five largest subcategories in order of occurrence were communication, billing practices, consent, procedural mishap and documentation. Of the 372 investigations, the ICRC took some form of action in 117 cases (31.4%) which was significantly less compared to investigations involving non-ophthalmologists during this period which resulted in some form of action in 40% of cases, $p<0.05$. The most common decisions issued by the ICRC were advice/remedial agreement (19.1%), caution (6.2%), and participation in a specified continuing educational or remediation program (3.5%). 4 cases (1.1%) were referred to the discipline committee.
Conclusions: Almost half of practicing ophthalmologists in Ontario (47%) had at least one formal CPSO complaint within the 4.5 year study period. Communication was the most common issue raised in complaints thus improving communication skills is an important goal for all practicing ophthalmologists in order to minimize the chances of receiving a formal complaint.

RETINA | RÉTINE

Session Title: Reducing Risk and Revamping Best Practices in Retinal Disease Management
Location: Room 204 AB
Session Time: Saturday, June 15, 2019, 10:45 AM – 12:15 PM

HOT TOPIC | SUJET PIQUANT

Title: Association of Baseline OCT Features with Visual Outcomes Following Retinal Detachment Repair: Post-Hoc Analysis of the PIVOT Trial

Authors: Carolina L. M. Francisconi, Verena Juncal, Roxane J. Hillier, Tina Felfeli, Louis R. Giavedoni, David T. Wong, Alan R. Berger, Filiberto Altomare, Peter J. Kertes, Rahda P. Kohly, Rajeev H. Muni

Abstract Body:

Purpose: To determine the baseline OCT features associated with poor visual outcomes following rhegmatogenous retinal detachment (RRD) repair in The Pneumatic Retinopexy versus Vitrectomy Outcomes Randomized Controlled Trial (PIVOT)trial.
Study Design: Post-hoc analysis of a randomized controlled trial.
Methods: PIVOT trial was a RCT that compared long-term outcomes of RRD repair in patients undergoing pneumatic retinopexy (PnR) vs. pars plana vitrectomy (PPV). Patients with 1-year follow-up from the PIVOT trial who had spectral-domain optical coherence tomography (OCT) at baseline were included in the study. We performed an analysis of the(SD-OCT)images from the participants with macula-off RRD. At baseline, microstructural retinal changes were assessed on serial cross-sectional SD-OCT scans of the macula. The following parameters were investigated by two independent masked graders with disagreement adjudicated by a third masked grader: subfoveal fluid height (SFH), intraretinal cysts, outer retinal folds (ORFs), and epiretinal membrane (ERM). SFH was further classified as high (>825um or the 50thpercentile) or low (<825um). Visual acuity (VA) was assessed at 3 and 12 months using ETDRS visual acuity and metamorphopsia was assessed using M-charts scores at 12 months. Data is reported as median (interquartile range) unless otherwise specified.
Results: The study included 46 eyes of 46 patients. Mean age was 62±9.6, 30 (65%) of patients were phakic, and 22 (48%) were treated with PnR. Median ETDRS VA at 3 and 12 months was 71 (25) and 78 (13) letters, respectively. The M-charts scores for vertical metamorphopsia at 12 months were significantly higher in the group that presented ORFs at baseline (0.0 [0.0] vs. 0.2 [0.4]; p=0.013). The M-charts scores for horizontal metamorphopsia at 12 months were significantly higher in the group that presented with ERM at baseline (0.0 [0.2] vs. 0.5 [0.7]; p=0.029). Presence of intraretinal cysts did not influence VA or metamorphopsia. Presence of a SFH greater than 825um was associated with decreased VA at 3 (Beta -.420; p=0.004) and 12 months (Beta -.333; p=0.018). Multivariable linear regression analysis including baseline SFH and lens status demonstrated that a SFH greater than 825um was an independent risk factor for lower VA at 3 months (SFH: Beta -0.428, p=0.004).
Conclusions: The presence of ERM and ORFs at baseline were associated with higher horizontal and vertical metamorphopsia scores at 1 year post RRD repair, respectively. Additionally, the presence of a SFH greater than 825um was associated with lower VA scores at 3 and 12 months following RRD repair.

Title: Retinal displacement after retinal detachment repair- retrospective study

Authors: Koby Yaacov Brosh Heshin, Carolina Francisconi, Verena Juncal, Alan Berger, Louis Giavedoni, David Wong, Fill Altomare, Roxane J Hillier, Francesco Sabatino, Mustafa Kadhim, Richard Newsom, Varun Chaudhary, Jenn Qian, Rajeev Muni

Abstract Body:

Purpose: To compare retinal displacement following retinal detachment repair with pneumatic retinopexy (PnR) versus pars plana vitrectomy (PPV).
Study Design: This retrospective cross-sectional study compared two surgical interventions (PnR and PPV) for post-operative retinal displacement using fundus autofluorescence imaging (FAF).
Methods: All patients over the age of 18, who had a retinal detachment repair with post-operative FAF imaging performed between September 1, 2017 and September 1, 2018 were included in the study. Exclusion criteria included patients with low quality FAF images or patients with other retinal diseases that could influence the interpretation of the FAF images. The primary outcome was proportion of patients with retinal displacement determined by the presence of retinal vessel printing (RVP) on FAF imaging. The study was approved by the institutional research ethics board. All FAF images were analyzed independently by two masked graders. In cases of disagreement between the two graders, the FAF images were reviewed by both authors together, and if there was no consensus, the difference was adjudicated by a third masked grader. When positive retinal displacement was found, the following parameters were assessed: direction of the displacement, which quadrants were involved in the displacement, presence of macular involvement in the displacement, maximum and minimum displacement values, presence of radial or rotatory displacement and the number of RVP lines seen.
Results: 156 eyes of 150 patients were included in the study. There were 48 patients who had PPV, 99 who had PnR, and 9 who had combined scleral buckle and vitrectomy (SB+PPV). Overall, the proportion of patients with retinal displacement was 50% for PPV (24/48), 8% for PnR (8/99), and 78% for SB+PPV (7/9). For macula off detachments, the proportion of patients with retinal displacement was 57% (20/35), versus 9% (6/66) versus 80% (4/5) for PPV, PnR and SB+PPV respectively. For macula on detachments the proportions were 30% (4/13) versus 6% (2/33) versus 100% (1/1) for PPV, PnR and SB+PPV respectively. A statistically significant difference in proportion of patients with retinal displacement was found between the PnR and PPV groups ($P<0.001$).
Conclusions: The proportion of patients with retinal displacement as measured with RVP on FAF was significantly less in patients undergoing PnR vs PPV. Patients who underwent combined SB+PPV had very high rates of retinal displacement.

Title: 27 Gauge vitrectomy: Is it any better for the Canadian environment?

Authors: Amin Kherani, Julia Farah, Robert Gizicki, Geoff Williams

Abstract Body:

Purpose: To report early experiences of Canadian vitreoretinal surgeons with 27 gauge technology
Study Design: A retrospective consecutive case series (surgeon's experience)
Methods: Small gauge vitrectomy technology has revolutionized modern vitrectomy surgery withminimally invasive techniques and instrumentation. Improvements in surgical technology continue topush the limits of smaller instruments and even smaller gauge vitrectomy platforms. Our pilot study willreview early experience of Canadian vitreoretinal surgeons with 27g technology and report on theperceived benefits of this novel technology. A brief historical review of vitrectomy technology and itsmodernization path to smaller gauge systems will highlight the surgical developments, advantages,efficiencies and limitations. Surgical images and videography will be used to highlight these outcomes.

Title: Determining the risk factors for the development of epiretinal membranes in patients presenting with and following repair of rhegmatogenous retinal detachments

Authors: Harrish Nithianandan, Avner Hostovsky, Rajeev Muni, Bernard Hurley, Peter J. Kertes

Abstract Body:

Purpose: Epiretinal membranes (ERMs) are a common cause of visual decline following the repair of rhegmatogenous retinal detachments (RRDs). The purpose of this study was to determine the risk factors associated with the formation of an ERM following RRD repair.
Study Design: This was a REB-approved multicentre retrospective case series.
Methods: Patients who underwent primary RRD repair at St. Michael's Hospital (R.M), the University of Ottawa Eye Institute (B.H) or the Sunnybrook Health Sciences Centre (P.K) from January 1, 2016 to December 31, 2016 were included. Patients who underwent either pneumatic retinopexy (PR) or pars plana vitrectomy (PPV) were included. Patients were excluded from the analysis if they had a prior history of any retinal disease or retinal surgery. All data was collected via electronic medical records. Variables of interest included patient sex, age, systemic comorbidities, lens status, macular status at presentation, visual acuity at baseline, RD characteristics and postoperative retinal findings. Odds ratios (OR) and their 95% confidence intervals (CI) were computed using multivariate logistic regression analyses to determine which characteristics were significantly associated with postoperative ERM development. $P<0.05$ was considered statistically significant.
Results: This study included 214 eyes of 214 patients, whose mean±SD age was 58.0±13.2 years and mean preoperative logMAR visual acuity at presentation was 1.1±0.99 (Snellen: 20/250). The patients presented with macula-off detachment in 52% of cases and had 1.7±1.1 retinal breaks on average. PR was employed in 159 eyes (74%) and PPV in 55 eyes (26%). There were no differences in rates of macula-off detachment (PR: 51% vs. PPV: 54%, p=0.85), number of breaks (p=0.27), or RD size (p=0.50) when comparing eyes treated by PR vs. PPV. The mean length of follow-up across all eyes was 21.6±8.1 months. Postoperative ERM was identified in 73 eyes, of which 19 underwent peeling. The only preoperative characteristic that was associated with ERM formation was the presence of macula-off RD (OR=2.2, 95%CI: 1.3-3.9, p=0.035). RD size (p=0.96) and the number of retinal breaks (p=0.59) were not significant risk factors for ERM formation. Patients were more likely to develop an ERM when treated by PPV vs. PR (OR=2.7, 95% CI 1.3-5.9, p=0.009).
Conclusions: Our results indicate that PPV for primary RRD repair in patients with no prior retinal disease history is associated with greater risk of ERM formation. Larger prospective studies are needed to discern whether RRD repair modality is truly a modifiable risk factor for postoperative ERM formation.

Title: Endophthalmitis rates following alcohol-based chlorhexidine and povidone-iodine antisepsis for intravitreal injections

Authors: C. Maya Tong, Marvi K. Cheema, Uriel Rubin, Bo Bao, Samir Nazarali, Steven R. J. Lapere, Rizwan Somani, Matthew T. S. Tennant

Abstract Body:

Purpose: Intravitreal injections (IVI) are the most frequently performed intraocular procedure in Canada. Povidone-iodine is the current gold standard for antisepsis for IVI and is widely used; chlorhexidine is a possible alternative antiseptic agent that has been shown to be equally effective. This study aims to compare our centre's rate of endophthalmitis after IVI with 0.05% chlorhexidine with 4% alcohol base antisepsis to the rate of endophthalmitis after IVI with povidone-iodine antisepsis.
Study Design: Retrospective cohort study
Methods: A retrospective electronic and paper chart review was conducted for all patients who received 0.05% CH in 4% alcohol antisepsis or PI for intravitreal injections at a group retina practice.
Results: 6445 IVI were performed using CH antisepsis, and 204 151 IVI were performed using PI antisepsis. Among the IVI patients that received CH antisepsis, there were 3 cases of endophthalmitis (0.047%). Among IVIs that received PI antisepsis, there were 35 cases of endophthalmitis (0.017%). There was no statistically significant difference in rates of endophthalmitis between the two groups ($p = 0.084$).
Conclusions: Alcohol based CH is non-inferior to using PI as antisepsis for IVI. It offers similar levels of protection from endophthalmitis and may be considered as a better tolerated alternative to PI.

Session Title: The Art of Science of Medical Retina
Location: Room 204 AB
Session Time: Saturday, June 15, 2019, 1:30 – 3:00 PM

Title: Ranibizumab and aflibercept levels and its impact on vascular endothelial growth factor in human breast milk following intravitreal injection

Authors: Verena Juncal, Quratulain Paracha, Motaz Bamakrid, Carolina Francisconi, Julia Farah, Amin Kherani, Rajeev Muni

Abstract Body:

Purpose: To measure the levels of VEGF-A and ranibizumab or aflibercept in the breast milk of 3 nursing women after receiving intravitreal anti-VEGF therapy.
Study Design: Prospective, multi-center study performed at St. Michael's Hospital and Calgary Retina Consultants, Canada.
Methods: Three nursing women were started on treatment with intravitreal anti-VEGF agents: patients 1 and 2 received treatment with ranibizumab for myopic choroidal neovascularization and patient 3 received aflibercept for diabetic macular edema. Breast milk samples from patients 1 and 2 were collected 1 hour before the first injection and at days 1-7, 14, 21, and 28 after the injection. Samples from patient 3 could only be collected until day 6 due to the lack of production of more breast milk. VEGF-A concentrations were determined using an immunoassay (R&D Systems Kit LXSAHM-01) with the Luminex platform. Ranibizumab and aflibercept levels were measured by enzyme-linked immunosorbent assay using a kit for detection of ranibizumab (Alpha Diagnostic Intl. Inc.) or aflibercept (Eagle Biosciences, Inc.).
Results: The following data correspond to the results encountered for patient 1: Ranibizumab levels were not detected in the breast milk at baseline, days 1 and 2. Ranibizumab was detected at day 3 (34.7ng/ml), with generally increasing levels over time; day 4, 50.3ng/ml; day 5, 53.2ng/ml; day 6, 52.1ng/ml, day 7, 38.6ng/ml; day 14, 75.1ng/ml; day 21, 121.1ng/ml; day 28, 128.9ng/ml. VEGF-A was significantly suppressed at day 1 compared to baseline and demonstrated a reduction over time: baseline, 22.8ng/ml; day 1, 12.3ng/ml; day 2, 7.1ng/ml; day 3, 7.2ng/ml; day 4, 6.1ng/ml; day 5, 5.9ng/ml; day 6, 5.4ng/ml; day 7, 6.4ng/ml; day 14, 2.2ng/ml; day 21, 3.2ng/ml; day 28, 4.9ng/ml. Data related to patients 2 and 3 are currently under analysis and will be added to the results.
Conclusions: Ranibizumab does pass into human breast milk and its levels increase up to day 28 following an intravitreal injection. During the same period, VEGF-A concentrations in the human milk decline with significant reduction detected by day 1. Based on our data, intravitreal ranibizumab treatment in nursing women raises a concern of possible adverse events in the developing infant. Further data from this study will allow us to know whether aflibercept also passes into the breast milk. This data is important to consider when counseling nursing women who develop retinal diseases requiring anti-VEGF injections.

Title: Canadian Treat and Extend Trial with Ranibizumab in Patients with nAMD: CANTREAT Study 24-month Results

Authors: Peter J. Kertes, Tom Sheidow, Geoff Williams, Mark Greve, Ivan Galic, Emmanouil Rampakakis, Marcel Lahaie

Abstract Body:

Purpose: Few large prospective randomized clinical studies have compared the effectiveness of a treat-and-extend (T&E) regimen to monthly dosing in neovascular age-related macular degeneration (nAMD). The purpose of this study was to assess the non-inferiority of ranibizumab using a T&E regimen to once-monthly (OM) dosing in treatment-naive nAMD patients over 36 months.
Study Design: Prospective, randomized, open-label, multicenter, post-authorization, non-inferiority trial.
Methods: Ranibizumab was prescribed at the physician's discretion according to the product monograph. Patients randomized 1:1 to the OM or T&E regimen were observed to assess best-corrected visual acuity (BCVA) and ranibizumab injection frequency. This analysis describes baseline characteristics, BCVA scores, and injection frequency at 24 months.
Results: The study was approved by all participating Research Ethics Boards. 580 patients (287 T&E: 293 OM) were randomized and 461 (235 T&E: 226 OM) had completed 24 months of follow-up. Most patients (60.3%) were female and the mean age was 78.8 years. A total of 130 (22.4%) patients (19.5% T&E; 25.3% OM) discontinued early, primarily due to withdrawal of consent (6.3% T&E; 8.2% OM). Baseline BCVA and disease characteristics were comparable between groups. At Month 24, an average of 17.6 (T&E) and 23.6 (OM) injections had been administered and BCVA improvement was comparable between groups with mean (SD) increases of 6.8 (14.1) and 6.0 (12.7) letters, respectively. BCVA non-inferiority was demonstrated with statistical significance at Month 12 (previously reported-primary outcome) and although BCVA with T&E was generally better than OM at Month 24, statistically significant superiority was not achieved (95% CI: -3.35, 1.61). Gains of ≥10 and ≥15 ETDRS letters were seen in 42.9% and 25.5% of T&E patients and 36.7% and 23.5% of OM patients, respectively; losses of >10 letters were similar between groups. In the T&E regimen, the interval between injections was extended to ≥8 weeks in 73.7% of patients and to the 12-week maximum in 43.1% of patients at 24-months, for a mean (SD) interval extension of 9.3 (2.8) weeks.
Conclusions: After 24 months, a T&E treatment regimen results in clinically meaningful improvement in BCVA with fewer injections and fewer visits compared to monthly ranibizumab administration in treatment-naïve nAMD patients.

Title: Changes in Aqueous and Vitreous Inflammatory Cytokine Levels in Retinal Vein Occlusion

Authors: Samuel A. Minaker, Ryan Mason, Motaz Bamakrid, Yung Lee, Rajeev Muni

Abstract Body:

Purpose: The role of inflammatory cytokines other than VEGF in RVO is increasingly recognized. Evidence suggests that inflammatory cytokines not only play a role in the pathogenesis of RVO but also may be useful as biomarkers to predict disease severity and response to treatment. We aimed to quantitatively summarize data on inflammatory cytokines associated with RVO.
Study Design: Systematic review and meta-analysis.
Methods: A systematic search of peer-reviewed English-language articles from PubMed, Ovid MEDLINE, Ovid MEDLINE Epub (ahead of print) and EMBASE Classic plus EMBASE without year limitation was performed from March to December 2017. Data was extracted from the 97 studies that encompassed 2809 study eyes with RVO and 1187 control eyes by two independent investigators. Data was pooled using a random-effects model with the Comprehensive Meta-analysis software. Effect sizes were generated as standardized mean differences (SMD) of cytokine concentrations between patients with RVO and healthy controls and converted to the Hedges g statistic.
Results: Among the 3996 eyes in 97 studies, concentrations of IL-4 (SMD = 0.52, 95% confidence interval (CI) = 0.15 to 0.88, p = 0.006), IL-6 (SMD = 0.76, 95% CI = 0.40 to 1.11, p < 0.0001), IL-8 (SMD = 1.03, 95% CI = 0.77 to 1.29, p < 0.00001), IL-10 (SMD = 0.69, 95% CI = 0.43 to 0.95, p < 0.00001), IL-15 (SMD = 0.55, 95% CI = 0.22 to 0.88, p = 0.001), ANGPT (SMD = 1.99, 95% CI = 1.06 to 2.92, p < 0.0001), IFN-γ (SMD = 0.69, 95% CI = 0.25 to 1.13, p = 0.002), MCP-1 (SMD = 1.21, 95% CI = 0.82 to 1.59, p < 0.00001), PDGF-AA (SMD = 0.68, 95% CI = 0.25 to 1.10, p = 0.002), and VEGF (SMD = 1.17, 95% CI = 0.91 to 1.43, p = 0.001) were significantly higher in patients with RVO when compared to healthy controls. No differences or failed sensitivity analyses were found between patients with RVO and healthy controls for the concentrations of IL-1α (SMD = 0.53, 95% CI = 0.11 to 0.94, p = 0.01), IL-1β (SMD = 0.76, 95% CI = -0.10 to 1.63, p = 0.08), IL-2 (SMD = 0.55, 95% CI = 0.14 to 0.96, p = 0.009), IL-12 (SMD = 0.61, 95% CI = 0.09 to 1.12, p = 0.02), IL-13 (SMD = 0.39, 95% CI = -0.20 to 0.97, p = 0.20), b-FGF (SMD = 0.64, 95% CI = -0.44 to 1.73, p = 0.25), PEDF (SMD = 0.36, 95% CI = -1.64 to 2.36, p = 0.73), TGF-β (SMD = 2.22, 95% CI = 0.42 to 4.03, p = 0.02), and TNF-α (SMD = -0.14, 95% CI = -0.80 to 0.52, p = 0.67) cytokines. Too little data made the comparison impossible for CXCL9, CXCL12, EGF, eotaxin, FGF-6, G-CSF, GM-CSF, ICAM-1, IGFBP, IL-5, IL-7, IL-9, IL-17, IL-18, IL-23, MIP-1, MMP, PDGF-BB, PGF, RANTES, SAA, sICAM-1, sVEGFR, TIMP-4, or TSG-14.
Conclusions: Our meta-analysis demonstrated higher aqueous and vitreous concentrations of IL-4, IL-6, IL-8, IL-10, IL-15, ANGPT, IFN-γ, MCP-1, PDGF-AA, and VEGF in patients with RVO, strengthening the clinical evidence that RVO is accompanied by an inflammatory response and that cytokines in addition to VEGF have the potential to be useful biomarkers and therapeutic targets in RVO.

🎖 FIRST PRIZE, COS AWARDS OF EXCELLENCE 🎖
🎖 PREMIER PRIX, PRIX D'EXCELLENCE DE LA SCO 🎖

Title: Intraocular antibodies as a novel target for understanding and treating vascular diseases of the eye

Authors: Jacob Rullo, Steven Bae, Wilma Hopkins, Isabella Irrcher, Manpartap Bal, Tom Gonder, Sanjay Sharma

Abstract Body:

Purpose: Neovascular diseases of the retina are the leading cause of legal blindness in the developed world. Treatment with anti-VEGF biologic agents has been shown to both prevent further deterioration and improve visual function. Considering up to one half of patients receiving anti-VEGF agents fail treatment, a greater understanding of failure is paramount. The development of systemic anti-drug antibodies against biologic agents has been proposed as one mechanism.
Considering the focal nature of VEGF-mediated diseases in the eye, sampling of the intraocular milieu would improve the diagnostics of disease and our understanding of treatment failure. Therefore, we hypothesized that the aqueous humour in patients with VEGF-mediated eye diseases receiving intravitreal anti-VEGF injections contain antibodies that reflect disease activity and may be responsible for treatment failure.
Study Design: Prospective, cross-sectional study
Methods: Aqueous humour was obtained from participants undergoing intravitreal injections for retinal edema and neovascularization (cases) or routine cataract surgery (controls). Antibody isotyping of aqueous humour and serum was performed using MILLIPLEX® MAP Human Isotyping Multiplex Assay. Variables were tested using the one-way ANOVA (Tukey's post-hoc test) and the Kruskal-Wallis test as appropriate. Pearson correlations were used to test associations. $P<0.05$ was used as the criteria for statistical significance.
Results: Nintey-seven samples of aqueous humour were removed from 106 eyes (45 male, 61 female). Mean number of intravitreal injections was 14 (range 0-77). Mean duration of treatment was 46 months (range 0-120). Antibodies were detected in the aqueous humour of participants in microgram per milliliter concentrations. The aqueous to serum antibody ratio was 2 to 12-fold higher in cases as compared to controls. IgM titres were 19-fold higher in cases, $p<0.0007$. Higher titres of intraocular IgG_{1-3} and IgA antibodies were detected in eyes with retinal edema or neovascular disease undergoing treatment compared to those undergoing cataract surgery ($p<0.0001$). Number of intravitreal injections and the type of anti-VEGF agent injected correlated with higher titres of antibodies ($p<0.001$). Intraocular antibodies also correlated with patient outcomes. In all diseased eyes receiving intravitreal injections, there was a medium strength of association between IgG_{1-3}, IgA and worse BCVA [$R=0.47$ (CI:0.30 to 0.62), $p<0.001$). Diabetic retinopathy eyes had the largest strength of association [$R=0.84$ (CI: 0.57 to 0.94), $p<0.001$] between aqueous antibodies and worse visual acuity. Persistent intra/sub- retinal fluid was associated with higher mean titres of antibodies, but statistical significance was only achieved in the IgG_3 group.
Conclusions: The presence of intraocular antibodies in patients receiving intravitreal injections represent a novel mechanism to help explain poor visual outcomes in patient's receiving anti-VEGF agents. This study highlights an important potential cause of treatment failure, namely the creation of antibodies that might affect drug efficacy. The measurement of peak and trough levels of intraocular antibodies may allow for more personalized dosing of medications; further study is recommended.

Title: Impact of Obstructive Sleep Apnea on the expression of inflammatory mediators in Diabetic Macular Edema

Authors: Yelin Yang, Sohel Somani

Abstract Body:

Purpose: Obstructive sleep apnea (OSA) is characterized by intermittent nocturnal hypoxemia, which may lead to increased inflammatory markers. Many of the same inflammatory mediators have also been found to be elevated in patients with diabetic macular edema (DME). However, the relationship between OSA and DME is not well defined. The objective of this study is to determine differences in inflammatory markers expressed in DME patients in the presence or absence of OSA.
Study Design: Prospective, cross sectional study
Methods: Patients with optical coherence tomography (OCT) proven, treatment naive DME were enrolled in the study. All patients were stratified into 2 groups based on the result of their overnight polysomnography testing: OSA positive (OSA+) was defined as having an apnea-hypopnea index (AHI) of greater than 15, and OSA negative (OSA-) was defined as having an AHI <15. Aqueous humor and serum samples were collected prior to their first anti-VEGF injection. Multiplex immunoassay was performed for cytokines including VEGF, intercellular adhesion molecule (ICAM-1), IL2, IL3, IL6, IL10, IL17, vascular cell adhesion molecule (VCM1), monocyte chemo-attractant protein (MCP1) and pigment epithelial derived factor (PEDF).
Results: 24 DME positive patients were enrolled in the study. Mean age was 62 years, and 18 patients (75%) were male. At baseline, the median BCVA in the study eye was 20/50, and the mean central retinal thickness on OCT was 412µm. 19 patients were OSA+. The mean and minimum O2 saturation in the OSA+ group was 93.4% and 80.7% respectively, while in the OSA- group it was 95.1% and 87.6 %, respectively. The OSA+ group had statistically significant higher levels of IL8 ($p<0.01$), IL 17 ($p=0.01$) and MCP1 ($p<0.01$) in aqueous humor, but not in serum samples. There were also higher aqueous VEGF levels in the OSA+ group, but this was not statistically significant. There were no significant differences between the two groups in both aqueous and serum samples of ICAM1, IL3, VCAM1 and PDGF. IL10, IL2 and EGF levels were unmeasurable in both serum and aqueous samples.
Conclusions: Several pro-inflammatory cytokines, including IL8, IL17 and MCP1, are increased in aqueous humor of DME patients with OSA. This suggests that nocturnal hypoxemia associated with OSA may further exacerbate the inflammatory pathway in DME.

Session Title: Innovations in Retinal Imaging
Location: Room 204 AB
Session Time: Sunday, June 16, 2019, 1:30 – 3:00 PM

Title: Prospective Analysis of Retinal Vessel Printing on Fundus Autofluorescense following Pneumatic Retinopexy

Authors: Carolina Francisconi, Koby Brosh, Verena Juncal, Alan R. Berger, Filiberto Altomare, David R. Chow, David T. Wong, Louis R. Giavedoni, Rajeev H. Muni

Abstract Body:

Purpose: Previous studies have demonstrated that approximately 30 to 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. However, the rates of retinal displacement following pneumatic retinopexy have never been reported. In the present study, we aim to report the rates of retinal displacement following PnR.
Study Design: Prospective cohort study.
Methods: The study included patients presenting with primary macula-off RRD where PnR was the treatment of choice. Patients with previous retinal surgery or severe media opacity were excluded. The incidence of retinal displacement was assessed by FAF imaging between 2 and 4 months post RRD repair. The images were evaluated by 2 independent masked graders for the presence of retinal vessel printing (RVP).
Results: We evaluated 20 eyes of 20 patients. Fifteen patients were male, the median age was 59 (range 24-79) and 12 patients were phakic. All patients had injection of SF6 gas and had steam-roller maneuver. Four patients required additional gas injection and 5 patients failed PnR treatment and underwent subsequent PPV. The median follow-up period was 77 days (range 46-133). Three patients were excluded from analysis as the FAF images could not be assessed for RVP due to development of media opacity following PPV. Of the remaining 17 patients, 2 patients (11.8%) had retinal displacement following pneumatic retinopexy.
Conclusions: In this prospective cohort study 11.8% of patients who underwent primary pneumatic retinopexy developed subsequent retinal displacement on FAF imaging. These results suggest that PnR for RRD repair is associated with far less retinal displacement than that described with PPV based on the published literature.

Title: Multimodal analysis of hyperautofluoresent ring size in retinitis pigmentosa

Authors: Collier (Shangjun) Jiang, Netan Choudhry

Abstract Body:

Purpose: Retinitis pigmentosa (RP) is a group of inherited retinal diseases characterized by progressive degeneration of photoreceptor cells. The ring of hyperautofluorescence is a well-recognized feature in retinitis pigmentosa (RP). These areas of increased autofluorescence correspond to an increase of lipofuscin in the retina pigment epithelium, which indicates increased metabolic activity and oxidative stress. However, little is known about the relationship between the area of hyperautofluorescence and vascular perfusion parameters as obtained by optical coherence tomography angiography (OCT-A).
Study Design: In this retrospective, cross-sectional study, we measured the area of the hyperautofluoresent ring in patients with RP, to determine correlation with visual acuity, foveal avascular zone (FAZ) size, and retinal capillary perfusion density (CPD).
Methods: 9 patients with bilateral RP were identified using fundus autofluorescence (AF) (California; Optos, Dunfermline, Scotland), totaling 18 eyes. Patient medial records were reviewed to obtain demographic and visual acuity data. Spectral domain optical coherence tomography angiography (OCT-A) (AngioVue; Optovue, Fremont, CA) was used to assess retinal vascular perfusion and calculate CPD in the superficial capillary plexus (SCP) and the deep capillary plexus (DCP) using both a 3.0 mm x 3.0 mm strategy, and a 6.0 mm x 6.0 mm strategy. In addition, OCT-A was used to measure and calculate the size of FAZ. ImageJ software (version 1.51k) was used to measure the area of the hyperautofluoresent ring in each eye with RP. Pearson correlation coefficients were calculated to determine the strength of linear relationship between hyperautofluoresent ring size and the following variables: visual acuity, SCP parafoveal CPD, DCP parafoveal CPD, and FAZ area. Regression analysis was performed to determine if the correlation between two measured variables were statistically significant.
Results: Hyperautofluoresent ring area was highly concordant between the right and left eyes in each patient ($R = 0.99$, $P < 0.001$). While hyperautofluoresent ring size and FAZ size were inversely correlated, the results were not significant ($R = -0.36$, $P = 0.14$). Visual acuity was not correlated with hyperautofluoresent ring size ($R = 0.24$, $P = 0.33$). There was no correlation between hyperautofluoresent ring size and parafoveal CPD using the 3.0 mm x 3.0 mm strategy or 6.0 x 6.0 mm strategy in the SCP ($R = 0.08$, $R = 0.19$; respectively), or DCP ($R = 0.28$, $R = 0.27$; respectively).
Conclusions: Assessing the hyperautofluoresent ring in RP is an important clinical tool for determining disease severity and progression. Previous studies have indicated that RP eyes had a significantly lower SCP and DCP parafoveal flow density compared to age-matched controls. Additionally, disease progression in RP has been shown to correlate with constriction in hyperautofluoresent ring size and decrease in visual function. While hyperautofluoresent ring size may be negatively associated with FAZ size, it is not a reliable predictor of visual acuity or retinal capillary perfusion density.

Title: Early signs of microangiopathy secondary to diabetes measured with swept source OCTA

Authors: Sonja Karst, Morgan Heisler, Natalia Page, Timothy Yu, Julian Lo, Mahyar Etminan, Simon Warner, Marinko Sarunic, David Maberley, Eduardo Navajas

Abstract Body:

Purpose: To find new imaging biomarkers of disease onset in patients with diabetes but without diabetic retinopathy.
Study Design: Prospective cross-sectional analysis of diabetic patients without diabetic retinopathy and healthy controls.
Methods: Seven standardized 3x3 mm areas were recorded with Swept Source Optical Coherence Tomography Angiography (OCTA, Plex Elite 9000 ©, Zeiss Meditec): one was centered on the fovea, three were recorded temporally of the fovea and three were recorded nasally to the optic disc. Raw data was exported to MATLAB for segmentation of the capillary network. The intermediate and deep capillary plexus (CP) were summarized as deep vascular complex (DVC). Capillary density of the superficial CP and DVC and the mean capillary diameter were generated for each area imaged, after subtracting the area occupied by blood vessels greater in diameter than capillaries. The fractal dimension was also generated for each image. In the 3x3 mm area centered on the fovea, size and circularity of the FAZ was analyzed. Statistical analyses were performed with SPSS (version 25). The study was reviewed and approved by the ethics review board of the University of British Columbia.
Results: 74 eyes of 28 patients and 19 controls (mean age 60 ± 15yrs, 26 female) were included in this study. In the healthy controls the mean vessel density of the superficial CP was significantly less in the temporal areas (0.469) compared to the nasal areas (0.484) or the fovea (0.497; $p<0.000$). There was no difference in the DVC between the areas imaged ($p=0.207$). Patients with diabetes but without DR had significantly less capillary density in the DVC in the superior temporal area and the nasal area compared to healthy controls. The vessel density in the superficial and deep CP around the fovea and the FAZ parameters were similar in both groups.
Conclusions: OCTA allowed a new insight into the pathogenesis of microvascular changes secondary to diabetes and might allow for the identification of patients with diabetes before clinical signs become apparent in the fundus biomicroscopy or fundus photography. Early changes seem to affect the deep CP first and areas outside the fovea might be more sensitive to early changes.

Title: Use of Multimodal Imaging in the Diagnosis and Management of Intraocular Lymphoma

Authors: Wai-Ching Lam, Nick Fung, Qing Li, Ian Wong

Abstract Body:

Purpose: Intraocular lymphoma represents a diverse group of hematologic malignant neoplasm involving different tissues with the eye. Often the pathological changes are limited in the ocular tissue without systemic manifestation. It is difficult to monitor the disease progression and treatment response when there is no systemic manifestation of the disease.
Study Design: Retrospective case series.
Methods: Three patients diagnosed with relapsing intraocular lymphoma was treated with intravitreal methrotrexate(MTX) from Jan 2016 to Dec 2017 were reviewed for diagnosis, visual acuity, treatment regimen, treatment response and side effects, biweekly OCT and FAF features before and after treatment.
Results: In all 3 patients, Spectral Domain-OCT showed initially increased hyper-reflective lesions in the sub-RPE area with disease progression. Other findings include rim of subretinal fluid, disruption of junction of inner segment/outer segment and rippling of retinal pigment epithelium. The fundus autofluorescence(FAF) also showed granular hyper-fluorescene pattern. After the patients were treated with intravitreal MTX, many of the OCT features and FAF resolved.
Conclusions: In intraocular lymphoma, lymphoma cells typically infiltrate between the RPE and Bruch's membrane. OCT and FAF features are useful in diagnosis and assessment of treatment response of patient with intraocular lymphoma receiving intravitreal MTX.

Title: A Novel Multifocal Electroretinography Stimulus for Detecting Hydroxychloroquine Retinal Toxicity.

Authors: Adrian C. Tsang, Gianni Virgili, Ange-Lynca Kantungane, Chloe Gottlieb, Stuart Coupland

Abstract Body:

Purpose: To evaluate a novel 5-ring multifocal electroretinogram (mfERG) stimulus as a screening test for detecting hydroxychloroquine (HCQ) retinopathy.
Study Design: A stratified case-control study conducted in accordance with the Standards for Reporting of Diagnostic Accuracy Studies (STARD).
Methods: Consecutive patients referred to the University of Ottawa Eye Institute for HCQ retinopathy screening from July 2018 to September 2018 underwent testing using a novel 5-ring mfERG stimulus and the standard 61-hexagon mfERG stimulus. Patients with amblyopia, high myopia or hyperopia, coexisting retinal disease, and prior retinal surgery were excluded. mfERG parameters were compared between protocols and against cumulative dose (CD), dose by real body weight (RBW), and duration of HCQ therapy. Ring amplitudes (R1-R5) and ring ratios (R1-R4/R5) were collected for each stimulus protocol. mfERG data was collected from an additional group of controls with no previous exposure to HCQ. Stata 15.1 software was used to perform the regression analyses, and to compute Spearman correlation coefficients between variables.
Results: 24 eyes (10 patients, 2 controls) were included in the final analysis. The novel R2/R5 and, R2 and R3 amplitudes, were moderately correlated with the respective R2/R5 ($r= 0.422$, $p=0.040$), and R2 ($r= 0.434$, $p=0.034$) and R3 ($r= 0.429$, $p=0.036$) amplitudes of the 61-hexagon stimulus. The novel R2 P1 amplitude was highly correlated with CD ($r=-0.687$, $p<0.001$), treatment duration ($r=-0.687$, $p<0.001$), and dose by RBW ($r=-0.763$, $p< 0.001$). Similarly, novel R2/R5 was highly correlated with CD ($r= -0.743$, $p< 0.001$), treatment duration ($r= -0.743$, $p< 0.001$), and dose by RBW ($r= -0.567$, $p=0.004$). The correlations between the 61-hexagon stimulus R2/R5 and HCQ exposure risk factors also reached significance, but were not as robust. Linear regression analysis showed that CD may account for almost half of the variance in the novel R2/R5. ($r2= 0.486$, $R2/R5 = 9.68063 + CD*-0.00286$)
Conclusions: The 2016 AAO guidelines focused primarily on the use of subjective functional and objective structural testing, and relegated mfERG based on a lack of accessibility. This pilot study describes a new 5-ring mfERG protocol specific for HCQ retinopathy screening and suggests equivalence to the 61-hexagon protocol at characterizing parafoveal function. This novel 5-ring stimulus has a significantly shorter acquisition period and the ring design may be more sensitive to HCQ induced electrophysiologic change in the parafoveal region. R2 P1 amplitude and R2/R5 ring ratios acquired using this novel mfERG stimulus are strongly correlated to treatment duration and HCQ dosing. Additional prospective cohort studies are needed to validate this novel stimulus which may decrease the resource burden associated with objective functional testing.

UVEITIS | UVÉITE

Session Title: Latest Updates in Uveitis
Location: Room 202
Session Time: Friday, June 14, 2019, 1:30 – 3:00 PM

Title: The Relationship between Relapse and Remission Rates and Treatment and Disease Etiology in Patients with Non-infectious Ocular Inflammation

Authors: Saanwalshah S. Saincher, Chloe Gottlieb

Abstract Body:

Purpose: The relationship between different immunosuppressive treatments and etiologies of ocular inflammation with inflammation relapse is not well understood. To address this, this study investigates the prevalence of relapse and the association between different immunosuppressive treatments and etiology of ocular inflammation for non-infectious ocular inflammatory disease with the duration of quiescence following treatment discontinuation.
Study Design: Retrospective chart review from The University of Ottawa Eye Institute, Ottawa, Ontario, Canada.
Methods: Inclusion criteria were: patients with non-infectious ocular inflammatory disease (uveitis, scleritis, and episcleritis) and patients with ≥2 visits spanning ≥90 days and follow-up within 12 months. Patient demographic information, age, and data from patient visits were collected at defined time points. For patients that had achieved complete remission, the time before treatment discontinuation and the duration of quiescence (after treatment discontinuation) was calculated. For those patients with a relapse in ocular inflammation, the time to treatment discontinuation and the duration of quiescence until treatment re-initiation was calculated.
Results: 145 patients (29.29%) were weaned off treatment while the other 350 patients (70.7%) continued treatment. 125 patients (25.25%) achieved complete remission while 20 patients (4.04%) had a relapse in inflammation after treatment discontinuation. Mycophenolate mofetil had the longest period of remission (68 months) among patients with ocular inflammation with no systemic disease. Methotrexate and corticosteroids had the longest period of quiescence for ocular inflammation with systemic disease (51 months and 50.1 months respectively). 88.88% of patients with panuveitis treated with corticosteroids achieved complete resolution. Patients with birdshot chorioretinopathy discontinued treatment after 64 months and had a relapse in inflammation after 15 months. 40% of patients with scleritis/episcleritis (the highest) achieved complete remission while 1 patient (2.22%) had a relapse in inflammation following treatment discontinuation. 50% of these patients were treated with corticosteroids and another 33.33% were treated with methotrexate.
Conclusions: In this study period, most patients required long term therapy. Among those that discontinued treatment, it was more common to achieve complete remission rather than have a relapse in inflammation. Mycophenolate mofetil was the best treatment for ocular inflammation with no systemic disease while methotrexate and corticosteroids were best for ocular inflammation with systemic disease. Corticosteroids were also effective treatments for panuveitis. Patients with scleritis/episcleritis treated with corticosteroids or methotrexate had the best outcomes, while patients with birdshot chorioretinopathy had the poorest outcomes.

Title: Linear chorioretinal lesions as a diagnostic sign of West Nile virus infection

Authors: Marie-Josée Aubin, Cristina Bostan, Mariam T. Ibrahim, Mark Bamberger, Karin M. Oliver

Abstract Body:

Purpose: To describe the ocular clinical features and imaging findings associated with West Nile virus (WNV) infection and raise awareness as to their diagnostic importance in the context of the current resurgence of human WNV cases in Canada.
Study Design: Case series.
Methods: Medical chart review of three patients (one male, two females; 41 to 62 years old) seen in two tertiary eye care centers in Montreal, Canada, who had confirmed WNV infection. Their ophthalmologic evaluation included Snellen visual acuity (VA), complete slit-lamp dilated eye exam, spectral domain optical coherence tomography (SD-OCT), and fundus fluorescence angiography (FFA).
Results: The first patient experienced mild fever and generalized malaise, for which she did not seek medical care. She presented due to unilateral decreased visual acuity and floaters and her ophthalmic evaluation led to the WNV diagnosis. The other two patients had been admitted to the intensive care unit with an altered level of consciousness and fever, and were diagnosed with meningoencephalitis. An ophthalmology consultation for these patients was sought after serologic identification of WNV infection, which only became available two weeks after admission. All patients presented typical unilateral (1) or bilateral (2) multifocal placoid yellow-white chorioretinal lesions with variable pigmentation, and linear clustering following the course of the nerve fiber layer, consistent with WNV chorioretinitis. FFA revealed centrally hypofluorescent round lesions with peripheral hyperfluorescence and late staining. On SD-OCT the lesions appeared as hyper-reflective foci located at the outer retinal and sub-retinal pigment epithelial levels.
Conclusions: The public health implications of WNV infection lend special importance to early diagnosis. Clinical suspicion can be challenging since systemic manifestations are not specific. Confirmatory identification of the virus relies on serologic testing, which is associated with a significant delay. WNV chorioretinitis is characterized by placoid multifocal linearly distributed chorioretinal lesions. It develops in the acute phase in up to 80% of hospitalized WNV patients and has been found to have 100% specificity for WNV infection. Despite supporting evidence in the literature, the diagnostic value of these chorioretinal lesions is little known by medical practitioners. With increased awareness of this pathognomonic ophthalmic involvement in WNV, patients will potentially benefit from early ophthalmologic assessment, earlier access to appropriate services for their systemic disease, and appropriate ocular treatment to reduce potentially vision-impairing complications.

Title: Pediatric intermediate uveitis associated with progressive central nervous system demyelinating lesions

Authors: Maryam I. T. Al-Najjar, Eric Fortin

Abstract Body:

Purpose: To report a younger child presented with symptoms and signs of chronic bilateral intermediate uveitis associated with progressive demyelinating lesions on brain magnetic resonance imaging(MRI).
Study Design: Case Report.
Methods: Retrospective medical chart review including full ophthalmological examination ,ocular imaging and brain imaging.
Results: A five year old healthy child presented for the first time to our clinic complaining of symptoms of blurry of vision and floaters. Full ophthalmological examination as well as ocular imaging was performed. He was diagnosed to have bilateral intermediate uveitis as defined by the SUN criteria. Complete work-up was initiated to exclude the infectious and non-infectious causes. Brain MRI was obtained prior to initiate anti-TNF-alpha therapy and revealed multiple non enhancing foci of hyperintense signal within subcortical and periventricular white matter at the supratentorial level. The patient was neurologically asymptomatic. A follow-up brain MRI was done after one year which revealed new demyelinating lesions. The patient was considered to have radiologically isolated syndrome(RIS) and he did not receive anti-TNF-alpha agents.
Conclusions: A quarter of pediatric uveitis cases are intermediate uveitis(IU) and are mostly idiopathic. In comparison with intermediate uveitis in adults, pediatric IU has a worse visual prognosis. Some of the diseases associated with adult intermediate uveitis, such as multiple sclerosis(MS) and intraocular lymphoma, are rare in children but the association between IU in childhood and an increased risk of developing MS as an adult has been reported. However, there are no reports in the literature of patients with intermediate uveitis developing MS or RIS during childhood. The case that we are reporting has important clinical implications in the present era of increased use of anti-TNF-alpha agents to treat pediatric uveitis. Anti-TNF-alpha agents are contraindicated in patients with MS as the early studies show worsening of neurological signs and symptoms in these patients. Although pediatric MS is an uncommon condition, thought should be given to CNS MRI screening of patients with IU if anti-TNF-alpha therapy is considered. To our knowledge, this is the first case report of a child with intermediate uveitis associated with central nervous system(CNS) demyelinating lesions. However, it is highly probable that this association is under estimated because clinicians do not routinely obtain CNS MRIs in pediatric patients with intermediate uveitis.

🎖 SECOND PRIZE, COS AWARDS OF EXCELLENCE 🎖
🎖 DEUXIÈME PRIX, PRIX D'EXCELLENCE DE LA SCO 🎖

Title: Acetylation of COX-2: An immunoresolving therapy

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

Abstract Body:

Purpose: Lipid autacoids derived from n-3 and n-6 polyunsaturated fatty acids are some of the earliest inflammatory signals. Phospholipase A2 (PLA2) generates substrates for the biosynthesis of these mediators, and is upstream of the cyclooxygenase (COX) and lipoxygenase (LOX) pathways. The COX pathway's products, the prostaglandins, are responsible the cardinal signs of inflammation. The LOX pathway's products, the lipoxins and specialized pro-resolving mediators, are essential endogenous signals mediating the resolution of inflammation. Acetylsalicylic acid (ASA) can acetylate the cyclooxygenase-2 isoform, such that its enzymatic activity becomes lipoxygenase-like. Unfortunately, the amount of LOX-derived mediators produced by acetylated-COX *in* vivo is limited by the salicylate ion from ASA competitively inhibiting the acetylated enzyme. We hypothesized that by acetylating COX-2 with ASA in the presence of a PLA2 agonist, increased upstream metabolites will out compete salicylate for the active site, and more acetylated-COX2 derived products will be produced than with ASA alone.
Study Design: In vitro cell-based model of inflammation
Methods: Human ocular fibroblasts were induced with 1ug/ml each of INFy, TNFa and IL-1B for 24 hours before being treated with one of three experimental treatments: 1) vehicle (DMEM), 2) ASA 200ug/ml, 3) Melittin 5ug/ml (a PLA2 agonst) or 4) ASA 200ug/ml and Melittin 5ug/ml combined. Supernatant was collected at 6, 12, 24 and 48 hours after experimental treatment and analyzed for lipid mediators of inflammation / resolution using denutered internal standards and liquid chromatography tandem mass spectrometry.
Results: ASA alone did not cause a significant increase in acetylated-COX2 products compared to control ($p > 0.05$), however it did significantly inhibit prostaglandin production. The PLA2 agonist alone significantly increased the abundance of PLA2 products arachadnic acid, eicosapentaenoic acid and docosahexaenoic acid relative to control ($p < 0.001$) and a corresponding increase in all COX and LOX derived downstream metabolites was also observed. The combination ASA and PLA2 agonist resulted in a 200 to 400 times increase in acetylated-COX2 derived products compared to ASA only treated replicates ($p < 0.001$), further there was only a 20 times increase versus control in the production of prostaglandins.
Conclusions: Taken together these data support the competitive inhibition of acetylated-COX2 by salicylate. We have shown that this inhibition can be "out competed" by agonizing production of COX2 substrates. To our knowledge, this is the first treatment strategy that modulates autacoid signalling to promote early engagement of the resolution axis of inflammation.

Title: Unilateral reactivation of West Nile Virus chorioretinitis with occlusive vasculitis

Authors: Maryam I. T. Al-Najjar, Marie Josse Aubin, Cristina Bostan

Abstract Body:

Purpose: To report a case of unilateral reactivation with occlusive vasculitis after West Nile virus (WNV) meningoencephalitis and bilateral chorioretinitis resolution.
Study Design: Case report.
Methods: Retrospective medical chart review. Ophthalmologic examination included Snellen visual acuity (VA), complete ocular examination, macular optical coherence tomography (OCT), fundus fluorescence angiography (FFA), and Humphrey standard 24-2 visual fields.
Results: A 63-year-old immunocompetent diabetic Caucasian male was seen in the Ophthalmology Department three weeks after hospital admission for fever and lethargy. A diagnosis of meningo-encephalitis secondary to WNV had been retained following serologic confirmation of infection. The patient's neurological status had been improving with supportive therapy. A consultation in ophthalmology was requested for new onset of decreased vision. The initial evaluation revealed pinhole VA 20/30 in the right eye (OD) and 20/50 in the left eye (OS), bilateral punched-out inactive chorioretinal lesions distributed in a linear pattern in the posterior pole and mid-periphery, and macular edema OS, but no signs of vasculitis in either eye. Topical prednisolone acetate 1% and nepafenac 0.1% were started OS. At follow-up two weeks later, there was further reduction in VA OS to 20/70. Examination revealed mild posterior vitritis, diffuse retinal arterioral attenuation and sheathing, scattered cotton-wool spots and intra-retinal hemorrhages OS. Vascular leakage and areas of capillary non-perfusion, but no macular ischemia, were evident on FFA. A tapering regimen of oral prednisone was started. Two months later, the occlusive vasculitis had resolved, the VA had recovered to baseline levels, but scotomas corresponding to involved retinal areas persisted on the patient's visual field OS, while his visual field OD showed no deficits.
Conclusions: WNV infection is associated with ocular manifestations, of which chorioretinitis is the most common, occurring in up to 80% of patients with neuroinvasive disease. Reactivation of WNV-associated ocular involvement after resolution of the systemic disease has only been reported in one case. Although rare, occlusive vasculitis can be a late-onset feature of WNV infection and may be more common in diabetics. Continued follow-up after resolution of the systemic disease is important, as early detection and treatment of ocular recurrences may reduce irreversible vision loss.

Title: Atypical Presentations of Ocular Toxoplasmosis at a Tertiary Centre Uveitis Clinic

Authors: Fargol Mostofian, Solin Saleh, Irfan Kherani, Chloe Gottlieb

Abstract Body:

Purpose: Worldwide, Toxoplasmosis is the leading cause of posterior uveitis. Atypical presentations increase misdiagnosis and risk steroid monotherapy. We discuss characteristics of atypical presentations encountered at a tertiary uveitis clinic.
Study Design: Retrospective, observational case series
Methods: Data was collected retrospectively on patient visiting an adult tertiary uveitis clinic from January 2010 to December 2017.
Results: From 55 patients with ocular toxoplasmosis, 7 cases (12.7%) were considered atypical presenting with: retinal infiltrates with history of malignancies (3 cases), optic nerve involvement (2), punctate outer retinal toxoplasmosis (PORT) (1), bilateral panuveitis (1). Diagnosis was made based on positive toxoplasmosis IgG (5 cases); positive toxoplasmosis DNA from anterior tap (1) and treatment response (1). Five patients received Trimethoprim/sulfamethoxazole (Bactrim DS) for one month and oral prednisone; the inflammation resolved in 4 cases. The PORT presentation resolved without treatment and one patient was lost to follow-up.
Conclusions: This observational study characterizes seven cases of atypical presentations of ocular toxoplasmosis. The study underlines the importance of high clinical suspicion in all age groups and diagnostic ocular and laboratory testing (intraocular and blood antibodies, PCR). Early diagnosis ensures timely treatment with anti-parasitic and improves outcomes.

Title: OCT as a tool to detect early sympathetic ophthalmia in an asymptomatic patient

Authors: Zainab Khan, Sabrina Bergeron, Miguel Burnier, Marie-Josee Aubin

Abstract Body:

Purpose: Sympathetic ophthalmia (SO) is a rare and dreaded complication of trauma resulting in granulomatous panuveitis in both the injured (inciting) and contralateral (sympathizing) eyes. SO typically comes to the attention of physicians after unequivocal disease onset, at which point vision may be permanently affected. This case is the first in which spectral-domain optical coherence tomography (SD-OCT) lead to diagnosing early SO in an otherwise asymptomatic patient.
Study Design: Case report.
Methods: Chart review. Histopathological examination of the enucleated eye. Ophthalmological evaluation, including Snellen visual acuity (VA), complete ocular examination, macular SD-OCT and fluorescein angiography (FA), over a 6 month period.
Results: A 23 year-old male sustained penetrating ocular trauma to his left eye while trimming trees. Initial globe repair occurred within hours of the injury and resulted in chronically exposed uvea. He was referred to the Oculoplastics service at Maisonneuve-Rosemont Hospital (HMR) in Montreal, Canada, for a painful eye with no visual potential and uneventful enucleation of the traumatized eye was performed 3 weeks following initial injury. One month postoperatively, the patient was referred to an optometrist for fitting of protective polycarbonate lenses. Routine SD-OCT of the right eye revealed retinal pigment epithelium abnormalities. The patient had no visual complaints and his VA was 6/6. SD-OCT was repeated at HMR and revealed a small serous retinal detachment with irregularity of the retinal pigment epithelium. FA showed a small pinpoint leak and optic disc leakage in the late-phase. The patient was diagnosed with SO on the basis of his history and imaging findings, and started on a tapering course of oral prednisone. The SD-OCT and FA abnormalities resorbed and at 6 months follow-up, ophthalmologic exam and imaging remained normal while solely on long-term immunosuppression with Mycophenolate mofetil. Histolopathologic examination of the enucleated left eye demonstrated non-granulomatous chorioidal inflammation thought to be compatible with a diagnosis of SO.
Conclusions: SD-OCT and FA are key tools in the diagnosis of SO. Currently, no guidelines exist for screening patients who sustained globe-penetrating injuries, This case report demonstrates that abnormalities on OCT can precede symptoms and clinical ocular findings typical of SO, and suggests that SD-OCT screening for SO should be recommended every 2-4 months within the first year of trauma and annually thereafter.