

2017 COS Annual Meeting Abstract Booklet – Paper Presentations

Session Title: Going for Broke: Vitreoretinal Surgery Throwdown!

Subspecialty: Retina

Location: 519AB

Session Time: Friday, June 16, 2017, 10:45 am - 12:15 pm

1. Effect of prophylactic 360 laser treatment on prevention of recurrence of retinal detachment after pars plana vitrectomy with gas tamponade in patients with primary uncomplicated rhegmatogenous retinal detachment • **Ali Dirani**, Marc-Andre Rheaume, Danny Gauthier, Jean-Daniel Arbour, Louis Corriveau, Karim Hammamji
2. Surgical outcomes for retinal detachment repair in the province of Alberta: Results of the Physician Learning Program Initiative • **Assaf Dotan**, Dianne Johnson, Amin Kherani, Khurram Jahangir, Matt Tennant
3. Vitrectomy with subretinal tissue plasminogen activator for submacular hemorrhage: Experience of a large Canadian centre • **Verena Juncal**, Mostafa Hanout, David Chow, Rajeev Muni, Louis Giavedoni, Filiberto Altomare, David Wong, Alan Berger
4. A novel surgical technique for treatment of large, chronic or surgically failed macular holes • **Efrem Dov Mandelcorn**, Tina Felfeli
5. Vitrectomy and injection of subretinal tissue plasminogen activator for subfoveal hemorrhage: Prognostic factors and clinical outcomes • **David Plemel**, Steve Lapere, Christopher Rudnisky, Matthew Tennant
6. Design and Validation of a Training Simulator for Laser Capsulotomy, Peripheral Iridotomy and Retinopexy • **Sarah M. Simpson**, Kelly Schweitzer, Davin E. Johnson
7. Predictive Factors for Proliferative Vitreoretinopathy Formation After Uncomplicated Primary Retinal Detachment Repair • **Kunyong Xu**, Eric K. Chin, Steven R. Bennett, David F. Williams, Edwin H. Ryan, Sundeep Dev, Robert A. Mittra, Polly A. Quiram, John B. Davies, D. Wilkin Parke III, H.Culver Boldt, David RP Almeida

Abstract 1

Title: Effect of prophylactic 360 laser treatment on prevention of recurrence of retinal detachment after pars plana vitrectomy with gas tamponade in patients with primary uncomplicated rhegmatogenous retinal detachment

Authors: Ali Dirani, Marc-Andre Rheaume, Danny Gauthier, Jean-Daniel Arbour, Louis Coriveau, Karim Hammamji

Abstract Body:

Purpose: To investigate the effect of intraoperative 360 laser retinopexy anterior to the equator for the prevention of recurrence of retinal detachment in patients with primary uncomplicated RRD who underwent 23 gauge PPV with gas tamponade.

Study Design: Retrospective single institutional study.

Methods: All consecutive patients with uncomplicated primary RRD who underwent 23 gauge PPV with gas tamponade between July 2013 and July 2016 were included in the study. Group A consisted of patients who had intraoperative laser retinopexy only around identified tears, holes and lattice zones. Group B consisted of patients who had intraoperative laser retinopexy around identified tears, holes and lattice zones with additional 360 prophylactic laser. The decision to do 360 prophylactic laser was based on the discretion of the operating retina specialist.

Results: Overall, 151 eyes of 151 patients with a mean age of 62.7 years were included, with 64.2 percent being males. The mean follow-up time was 372 days. There was no difference between Group A and B in terms of age, sex, duration of symptoms prior to presentation, macula status at surgery, presence of inferior tears/holes, lens status at surgery and type of gas tamponade. Overall, single-surgery anatomical success was achieved in 85 percent (129/151) with final anatomical success achieved in all cases. Single-surgery anatomical success was achieved in 80 percent (68/86) of Group A and 94 percent (61/65) of Group B patients ($P = 0.03$). In regression analysis, prophylactic 360 laser retinopexy was significantly associated with the variation in single-surgery success (OR of redetachment in subgroup with no 360 laser was 4, $p=0.006$). Survival analysis curves for redetachment showed that patients with no 360 laser were at higher risk ($p=0.01$).

Conclusions: Intraoperative 360 laser retinopexy following PPV with gas tamponade resulted in a significant reduction in the rate of postoperative retinal redetachment in eyes with uncomplicated primary RRD.

Abstract 2

Title: Surgical outcomes for retinal detachment repair in the province of Alberta: Results of the Physician Learning Program Initiative

Authors: Assaf Dotan, Dianne Johnson, Amin Kherani, Khurram Jahangir, Matt Tennant

Abstract Body:

Purpose: The Physician Learning Program (PLP) is a physician driven, collaborative program between the University of Alberta, University of Calgary, and the Alberta Medical Association (AMA). The PLP works with physicians to co-designs quality improvement projects to encourage practice change and self-reflection. PLP and the surgical retina specialists of Alberta worked together to identify the primary surgical success rate for retinal detachment repair in Alberta and to compare success rates between vitrectomy, combined scleral buckle and vitrectomy and scleral buckle alone.

Study Design: This project is a retrospective observational study of administrative health records. Ethics approval was obtained from the Health Research Ethics Board at the University of Alberta, Pro00057763.

Methods: ICD-10 diagnosis codes for retinal detachment and CCI procedure codes for vitrectomy, scleral buckle, pneumatic retinopexy, laser, and cataracts were identified. Data was extracted from the Alberta Health Services Discharge Abstract Database (DAD) and the National Ambulatory Care Reporting System (NACRS) for patients with a diagnosis of retinal detachment and at least one of the above listed procedures during the 2008/09 to 2012/13 fiscal years. Records with invalid Personal Health Numbers (PHN) and records that did not include the specific procedure codes were excluded. The health records were analyzed to capture right and left eyes; first, second, third, etc., surgery and whether or not repair or not repair was achieved. The records were also sorted by anonymous treating physician and procedures used. Primary success was calculated as number of first visit successful procedures divided by the total number of first visit procedures.

Results: A total of 5,380 surgeries for retinal detachment were identified during the study period. 201 were excluded due to invalid provincial health numbers, unidentified procedure location, and/or treating physician was not an Alberta retina surgeon. The average primary retinal detachment success rate was 84.7%. Primary success rates varied for vitrectomy (84.8%), vitrectomy and scleral buckle (84.4%) and scleral buckle (85.2%).

Conclusions: This study provides statistical analysis of success rates for the most commonly performed surgical procedures for primary retinal detachment repair in Alberta.. Alberta retina surgeons have an average success rate of 84.7%. This result is in keeping with other national success rate studies. Future analysis of the results should allow comparison between anonymized surgeons, thereby enabling results based surgical outcomes improvement.

Abstract 3

Title: Vitrectomy with subretinal tissue plasminogen activator for submacular hemorrhage: Experience of a large Canadian centre

Authors: Verena Juncal, Mostafa Hanout, David Chow, Rajeev Muni, Louis Giavedoni, Filiberto Altomare, David Wong, Alan Berger

Abstract Body:

Purpose: To evaluate the anatomical and visual outcomes of pars plana vitrectomy (PPV) with subretinal recombinant tissue plasminogen activator (rt-PA) infusion and gas tamponade for the treatment of submacular hemorrhage.

Study Design: Single-centre, retrospective study.

Methods: This is a retrospective study where patients who underwent PPV with subretinal rt-PA infusion and gas tamponade between 2004 and 2016 for the treatment of submacular hemorrhage in a Canadian retina referral centre had their records reviewed. The surgical procedure was performed similarly by 6 surgeons and post-operative anti-VEGF injections were left to the discretion of the treating physician. Main measured outcomes were blood displacement from the fovea, final visual acuity (VA), recurrence and complication rates.

Results: A total of 99 patients with mean age of 77.66 ± 12.26 years and follow-up of 18.39 ± 22.27 months were included. Wet age-related macular degeneration was present in 80.6% of the cases, polypoidal choroidal vasculopathy in 8.2%, arterial macroaneurysm in 8.2%, myopic choroidal neovascularization (CNV) in 1.0% and idiopathic CNV in 2.0%. Most cases (60.3%) had submacular hemorrhages larger than 10 disc diameters (DD), while 25.0% measured 5-10DD and 14.7% 1-4DD. One week after surgery, 24.2% of the patients showed a complete blood displacement from the fovea, 60.2% partial and 6.1% none. Due to media opacity, 9.2% could not have a proper assessment of blood displacement at 1 week. The rate of complete blood displacement increased to 85.9% by final follow-up, with no significant association with final VA, use of post-operative anti-VEGF injections or submacular hemorrhage size at baseline. Mean preoperative logMAR VA was 2.03 ± 0.81 and improved to 1.76 ± 0.91 at month 1 ($p=0.004$), 1.86 ± 0.90 at month 3 ($p=0.027$), 1.84 ± 0.95 at month 12 ($p=0.090$) and 1.80 ± 1.00 at final follow-up ($p=0.009$). There was a trend towards a greater final VA improvement in eyes that received anti-VEGF injections ($p=0.057$). Postoperative complications occurred in 27 (27.3%) cases, being vitreous hemorrhage and retinal detachment the most common findings (15 and 9 cases, respectively). Recurrence of submacular hemorrhage was present in 12.1% of the patients and was associated with a worse final visual outcome (2.52 ± 0.069 versus 1.70 ± 1.00 logMAR, $p=0.010$).

Conclusions: Vitrectomy with subretinal rt-PA infusion and gas tamponade is effective in providing blood displacement and visual improvement in patients with submacular hemorrhage. To our knowledge, this is the largest retrospective series evaluating the experience of this procedure in Canada.

Abstract 4

Title: A novel surgical technique for treatment of large, chronic or surgically failed macular holes

Authors: Efrem Dov Mandelcorn, Tina Felfeli

Abstract Body:

Purpose: Pars plana vitrectomy (PPV) is the current standard technique for repair of full thickness macular holes (FTMH). Despite the evolving surgical treatments of FTMH over the past decades, the prognosis of large, chronic and surgically failed macular holes remains poor. The success rate of closure for failed macular holes after initial vitrectomy is only 46.7%. Other challenges of the surgical treatment of FTMH include cases of chronic and large FTMH, which have a reported closure rate of 33-80% and 56%, respectively. We reviewed our cases in which we employed a novel surgical technique using the backflush cannula with proportional reflux to see if this improved our postoperative closure rate and functional outcomes for large, chronic or surgically failed FTMH.

Study Design: Retrospective consecutive case series.

Methods: A total of 33 eyes with a large ($\geq 400 \mu\text{m}$ in diameter), chronic (symptoms of FTMH for ≥ 2 years or a clinical diagnosis and not treated for ≥ 1 year) or previously failed surgical idiopathic FTMH underwent our Backflush technique, from January 2014 to August 2016. The Backflush technique was employed as a supplement to the standard PPV, removal of posterior cortical vitreous and epiretinal membrane, indocyanine green dye assisted peeling of the internal limiting membrane around the hole, and a complete fluid-gas exchange, which were completed for all cases. Preoperative and postoperative visual acuity (VA), ocular examination findings, and optical coherence tomography (OCT) images were reviewed retrospectively.

Results: Successful closure was achieved with the Backflush technique in 81.8% of all cases of FTMH that met our inclusion criteria. Rate of anatomical closure was 84.6% (22/26) for primary surgery of large and chronic FTMH, and 71.4% (5/7) for previously failed surgical cases. The mean preoperative VA was 1.24 ± 0.51 logMAR and the postoperative VA, at one month or longer, was 0.92 ± 0.52 logMAR. At presentation, the mean duration of symptoms was 331 ± 764 days and the mean size of the MH was $542 \pm 139 \mu\text{m}$. The mean time from clinical diagnosis of MH to surgical procedure date was 140 ± 207 days. Among all patients treated, 11 were pseudophakic, 6 underwent combined phaco-vitrectomy and 6 required laser treatment for retinal breaks identified intraoperatively. Significant improvement from baseline VA was noted for holes that closed ($p < 0.001$), and for six holes that did not close following Backflush surgery ($p = 0.002$). The preoperative duration of symptoms and size of FTMH were predictive of anatomical closure postoperatively ($p = 0.04$). No intraoperative or postoperative complications related to the Backflush technique were noted.

Conclusions: Large, chronic or surgically failed FTMH show improved anatomical and visual outcomes postoperatively with our Backflush technique. This technique is favorably supported as an efficacious and viable treatment option for challenging cases of FTMH.

Abstract 5

Title: Vitrectomy and injection of subretinal tissue plasminogen activator for subfoveal hemorrhage: Prognostic factors and clinical outcomes

Authors: David Plemel, Steve Lapere, Christopher Rudnisky, Matthew Tennant

Abstract Body:

Purpose: To study the prognostic factors and clinical outcomes of patients who underwent pars plana vitrectomy, subretinal injection of tissue plasminogen activator (tPA) and gas tamponade for the treatment of subfoveal hemorrhage (SFH).

Study Design: A retrospective non-comparative interventional case series.

Methods: Charts were reviewed pre-operatively and at two-months for spectral domain optical coherence tomography (SD-OCT) morphologic findings and Snellen visual acuity. Six-month visual acuity was assessed for clinical outcome.

Results: Seventy-eight eyes from 78 patients were included, 84% of which had age-related macular degeneration (AMD). Partial or complete displacement of the SFH was achieved in 91.5% of eyes at 2 months. Visual acuity improved from 20/1449 pre-operatively to 20/390 at 6-months (mean 6.3 months), corresponding to approximately 5 lines Snellen acuity ($P < 0.001$). Reduced visual acuity was associated with AMD ($P = 0.016$) and extension of hemorrhage superior the fovea (0.0095). Visual acuity was not associated with the area of SFH ($P=0.17$), use of anticoagulants ($P=0.14$), or visibility of the ellipsoid layer ($P=0.64$). Nine patients (11.5%) developed a recurrence of subfoveal hemorrhage within the follow-up period.

Conclusions: Preoperative extension of SFH superior to the fovea and the diagnosis of AMD predict worse outcomes. The time to surgery, use of anticoagulants, features of associated pigment epithelial detachments, ellipsoid layer presence or degree of preoperative retinal edema did not influence final visual acuity.

Abstract 6

Title: Design and Validation of a Training Simulator for Laser Capsulotomy, Peripheral Iridotomy and Retinopexy

Authors: Sarah M. Simpson, Kelly Schweitzer, Davin E. Johnson

Abstract Body:

Purpose: To design and validate an eye model that can be used by ophthalmology trainees to simulate commonly performed ophthalmic laser procedures.

Study Design: This was a 2 part study including the design of an eye model capable of simulating laser posterior capsulotomy, peripheral iridotomy and retinopexy procedures (part 1) and a prospective validation study of the eye model for training (part 2).

Methods: A model consisting of an artificial globe that housed an exchangeable lens was designed and fitted with disposable simulated iris, posterior capsule opacification and retinal tissue at the appropriate anatomic positions. These artificial tissues were shown to react similarly to corresponding human ocular tissues when performing laser posterior capsulotomy, peripheral iridotomy and retinopexy. Following the design of the model, 13 ophthalmology residents and staff at Queen's University, were then divided into 2 groups: limited experience ($n = 6$; PGY1-3 ophthalmology residents) and experienced ($n=7$; PGY 4-5 ophthalmology residents and staff ophthalmologists). Each participant performed yag:Nd posterior capsulotomy, yag:Nd peripheral iridotomy and argon laser retinopexy on the artificial eye. The total time and total number of shots were recorded for all laser procedures. In addition, the total number of lens pits that occurred during posterior capsulotomy and the average amount of power used during laser retinopexy were recorded. Each simulated laser retinopexy result was assigned a grade of 1 (incomplete), 2 (complete) or 3 (excessive).

Results: When compared to the experienced group, the limited experience group required more shots for posterior capsulotomy, $p = 0.044$, and had more resultant lens pits, $p = 0.047$. The less experienced group also had significantly more incomplete laser retinopexy results than the experienced group, $p = 0.039$. The groups did not differ in total shots required for peripheral iridotomy, average power for retinopexy or the total time required for any of the laser procedures, $ps \geq 0.12$.

Conclusions: Our results suggest that less experienced individuals have more negative outcomes when completing posterior capsulotomy and retinopexy on an eye model than those who are more experienced. Although our model only approximates human tissue, it is a good representation and the results of our study are likely similar to the performance of these procedures on patients. Therefore, our simulator is a valid training model for improving skill and confidence with these laser procedures. Given its simple, reusable and inexpensive design, this model may be a valuable tool for training future ophthalmologists.

Abstract 7

Title: Predictive Factors for Proliferative Vitreoretinopathy Formation After Uncomplicated Primary Retinal Detachment Repair

Authors: Kunyong Xu, Eric K. Chin, Steven R. Bennett, David F. Williams, Edwin H. Ryan, Sundeep Dev, Robert A. Mittra, Polly A. Quiram, John B. Davies, D. Wilkin Parke III, H.Culver Boldt, David RP Almeida

Abstract Body:

Purpose: To determine predictive factors of proliferative vitreoretinopathy (PVR) formation after uncomplicated primary retinal detachment (RD) repair.

Study Design: Retrospective single-center consecutive case-control study.

Methods: 74 consecutive patients with (37 eyes) and without (37 eyes) PVR formation after undergoing uncomplicated primary surgery for RD repair. Logistic regression was used to assess factors associated with PVR formation.

Results: RD involving the macula was 4.2 times (adjusted odds ratio, AOR; 95% confidence interval, CI, 1.4 -12.9, $p = 0.0119$) more likely to have PVR formation compared to those without. Patients who were current or former smokers were 3.6 times (AOR, 95% CI: 1.1 - 11.7, $p = 0.0352$) more likely to have PVR formation compared to non-smokers. Compared to 25 gauge (g) vitrectomy, larger gauge vitrectomy (20-g or 23-g) was 3.6 times (AOR, 95% CI: 1.2- 11.3, $p = 0.0276$) more likely to have PVR formation. Duration of RD symptoms, high myopia, lens status, lattice degeneration, location of retinal break, number of retinal breaks, and surgical technique (e.g. scleral buckle with or without vitrectomy versus vitrectomy alone) were not predictive of PVR formation.

Conclusions: Cigarette smoking, macular involvement, and large-gauge vitrectomy are significant risk factors predictive of PVR formation after uncomplicated primary RD repair.

Session Title: Towards a better understanding of some neuro-ophthalmic conditions

Subspecialty: Neuro-ophthalmology

Location: 522ABC

Session Time: Friday, June 16, 2017, 10:45 am - 12:15 pm

8. Evaluating and Improving the Management of Neuro-ophthalmic Emergencies by Emergency Medicine Residents at The Ottawa Hospital • *Danah H. Albreiki, **Harrish Nithianandan**, Irfan N. Kherani*
9. The role of dynamic contour tonometry in patients undergoing temporal artery biopsy for suspected giant cell arteritis • ***Edsel B. Ing**, Nurhan Torun, Brian Healey, Jennifer Rider, Felix Tyndel, Kay Lam, Harleen Bedi, Christian Pagnoux, Tran Le, Lucas M. Bachmann, Seymour Hershenfeld, Susan Rutherford, Carla Lutchman, Patricia Hinton, Patricia Teal*
10. Characterization of Serological Markers (ESR, CRP And Platelets) Of Healed/Healing Arterial Injury And Biopsy Positive Giant Cell Arteritis • ***Vinay Kansal**, Sangsu Han, James Farmer, Danah Albreiki*
11. Causes of Reduced Visual Quality of Life in Patients with Migraine • ***Anastasia Neufeld**, Seniha Ozudogru, Susan Baggaley, Judith Warner, Bradley Katz, Alison Crum, Melissa Cortez, Kathleen Digre*
12. Transient smart phone blindness: A case series • ***Nirojini Sivachandran**, Amadeo Rodriguez*

Abstract 8

Title: Evaluating and Improving the Management of Neuro-ophthalmic Emergencies by Emergency Medicine Residents at The Ottawa Hospital

Authors: Danah H. Albreiki, **Harrish Nithianandan**, Irfan N. Kherani

Abstract Body:

Purpose: The purpose of this study was to identify and reduce any variability in the management of neuro-ophthalmic emergencies by emergency medicine residents at The Ottawa Hospital.

Study Design: Prospective Survey Study.

Methods: Ethics approval of this study was not required, as it fell under the category of Quality Improvement. Emergency medicine residents at The Ottawa Hospital were asked to complete a survey consisting of a series of 7 neuro-ophthalmic patient case descriptions that can be encountered in the emergency department and are considered of high morbidity and mortality. This was followed by multiple choice questions asking participants about their management of the patient scenario having had to recognize the diagnosis from the description of the case. After completing the survey, all participants attended an educational lecture outlining appropriate approaches to various neuro-ophthalmic emergencies by a staff neuro-ophthalmologist at the Ottawa Eye Institute. After having attended the lecture, all participants were asked to complete the same survey a second time to determine if the lecture led to better performance on the survey. Junior residents were trainees with no more than two years of postgraduate experience and senior residents were trainees with more than two years of postgraduate experience. One point was awarded for each correct answer on the survey with a maximum possible score of 7.

Results: Eight junior and 10 senior emergency medicine residents participated in this study. The average scores for the junior and senior residents on the first attempt of the survey were 2.75 ± 1.66 and 3.80 ± 1.03 respectively. The median scores for the junior and senior residents on the first attempt of the survey were 3 and 4 respectively. The average survey scores between both groups of residents on the first attempt of the survey were not significantly different ($p > 0.05$). The average score across all residents on the first attempt of the survey was 3.33 ± 1.41 and 6.50 ± 0.62 on the second attempt of the survey following the educational lecture. This improvement was statistically significant ($p < 0.05$). There were no perfect scores on any of the initial attempts of the survey, but there were 10 perfect scores on the second attempts of the survey.

Conclusions: There is considerable room for improvement in the management of neuro-ophthalmic emergencies by emergency medicine residents. The educational lecture utilized in this study led to significantly improved management of neuro-ophthalmic emergencies by the participating residents. This concludes that lectures in neuro-ophthalmic emergencies should be considered as part of the emergency residency curriculum as proper recognition and management can significantly reduce the risk of morbidity and mortality in these cases.

Abstract 9

Title: The role of dynamic contour tonometry in patients undergoing temporal artery biopsy for suspected giant cell arteritis

Authors: Edsel B. Ing, Nurhan Torun, Brian Healey, Jennifer Rider, Felix Tyndel, Kay Lam, Harleen Bedi, Christian Pagnoux, Tran Le, Lucas M. Bachmann, Seymour Hershenfeld, Susan Rutherford, Carla Lutchman, Patricia Hinton, Patricia Teal

Abstract Body:

Purpose: Patients with giant cell arteritis (GCA) may show decreased ocular perfusion. Pascal dynamic contour tonometry (DCT) provides a painless and quick measurement of ocular pulse amplitude (OPA), which can reflect ocular perfusion. Our primary aim was to delineate the role of DCT in patients with suspected GCA undergoing temporal artery biopsy (TABx). We determine if there is a diminished OPA in patients with positive TABx compared to patients with negative TABx. Our secondary aim to develop a logistic regression risk score for temporal arteritis using the *a priori* objective criteria of age, OPA, and C-reactive protein (CRP).

Study Design: Prospective validation study

Methods: Patients undergoing TABx for suspected GCA were enrolled in this IRB-approved study from June 2015 to present. The pre-steroid treatment CRP was obtained from the referring doctor. The DCT was used to measure the OPA immediately before the TABx which were all performed in the afternoon. Stata 13 was used for statistical analysis. To develop the risk score, a logistic regression model was fit with the pathology result of TABx as the outcome and age, CRP and OPA as continuous predictors. Given the wide range for the upper limit of normal of CRP across the labs in our geographic region, the CRP was divided by its upper limit of normal, as is convention. The OPA was averaged between the two eyes (avgOPA) of each subject to keep each patient as the unit of analysis. The pathologists were blinded to all OPA and CRP information.

Results: 76 temporal artery biopsies were performed, and fifteen were positive. In patients with negative TABx, the mean OPA was 2.8 ± 1.01 . In patients with positive TABx, the mean OPA was 2.50 ± 1.33 . OPA less than 2.0 was in the lower 25th percentile of subjects with negative TABx. The use and time of initiation of steroids varied widely amongst the biopsy patients. One patient would not allow OPA assessment. Six patients did not have CRP drawn before the referring doctor started steroids leaving 70 patients with complete information for multivariate logistic regression. The estimated odds ratios for the three predictors were 1.000 ($p=.993$, 95%CI 0.934, 1.071) for age, 1.096 ($p=.055$, 95%CI 0.998, 1.204) for CRP, and 0.449 ($p=.038$, 95%CI 0.210, 0.958) for avgOPA. The area under ROC curve for this model was 0.8046.

Conclusions: On multivariate regression, ocular pulse amplitude (OPA) was a statistically significant predictor of the TABx result, and CRP approached statistical significance. OPA less than 2.0 are in the lower 25th percentile for subjects with negative TABx. The risk score calculation derived from the logistic regression coefficients will be refined as more patients are recruited. Further work is needed to determine if OPA can guide steroid dosing.

Abstract 10

Title: Characterization of Serological Markers (ESR, CRP And Platelets) Of Healed/Healing Arterial Injury And Biopsy Positive Giant Cell Arteritis

Authors: Vinay Kansal, Sangsu Han, James Farmer, Danah Albreiki

Abstract Body:

Purpose: Temporal artery biopsy (TAB) confirms the diagnosis of giant cell arteritis (GCA). However, the histopathologic diagnosis of healed/healing arterial injury is not well understood. The purpose of this study was to further elucidate the clinical significance of this finding on TAB, by determining its association with seromarkers typically predictive of giant cell arteritis (GCA).

Study Design: Retrospective cohort study.

Methods: 385 consecutive TABs for clinically suspected GCA between January 2009 and January 2016 were reviewed. Elevations of inflammatory seromarkers, erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), and platelets were compared between patients with negative, GCA positive, and healed/healing (HH) arterial injury TAB using statistical trend testing (Mantel-Haenszel and Jonckheere-Terpstra tests). Odds ratios of seromarker elevations for healed/healing arterial injury versus GCA were calculated.

Results: 76 GCA positive, 69 HH, and 240 negative TABs. Trend tests indicated that platelets $>400,000/\mu\text{L}$ ($p < 0.01$), $\text{ESR} \geq 50\text{mm/hr}$ ($p < 0.01$) and $\text{CRP} \geq 24.5\text{mg/L}$ ($p < 0.01$) occurred most frequently in the GCA positive group, least frequently in the negative group, and with intermediate frequency in the HH group. The odds ratio for HH TAB was 3.6 (1.5-8.5) with platelets $>400,000/\mu\text{L}$. Neither ESR nor CRP were predictive of HH TAB. The odds ratio of positive TAB was 7.1 (3.3-15.6) with platelets $>400,000/\mu\text{L}$, 2.2 (1.2-3.8) with $\text{ESR} \geq 50\text{mm/hr}$, and 3.2 (1.8-5.8) with $\text{CRP} \geq 24.5\text{mg/L}$. Combined elevated platelets, ESR and CRP had odds ratio of predicting HH TAB of 3.9 (1.2-16.1). Elevated platelets combined with ESR had odds ratio of 4.0 (1.1-14.4). Elevated platelets combined with CRP has odds ratio of 4.8 (CI95% 1.5-15.1). Combining elevated ESR and CRP was not predictive of healed/healing TAB.

Conclusions: In the proper clinical setting, HH TAB should be treated as GCA to prevent potential adverse outcomes. This study shows that thrombocytosis is an independent predictor of HH TAB. Thrombocytosis might be considered when deciding to treat this entity. Further studies are required to better understand this entity.

Abstract 11

Title: Causes of Reduced Visual Quality of Life in Patients with Migraine

Authors: Anastasia Neufeld, Seniha Ozudogru, Susan Baggaley, Judith Warner, Bradley Katz, Alison Crum, Melissa Cortez, Kathleen Digre

Abstract Body:

Purpose: The purpose of the study is to determine the causes of reduced vision-specific quality of life (QOL) in patients with migraine. Our group previously showed that visual QOL scores of patients with migraine are significantly reduced, and are similar to those with other neuro-ophthalmic disorders, such as multiple sclerosis and optic neuritis. Possible causes of reduced visual QOL are photophobia, visual aura, and dry eye syndrome.

Study Design: Ethics approval was obtained from the Institutional Review Board at the University of Utah. Patients with chronic and episodic migraine were recruited from the Headache Clinic at the University of Utah. We administered validated Visual Function Questionnaire-25 (NEI-VFQ-25), the 10-item NEI-VFQ-25 Neuro-Ophthalmic (NO) Supplement, the Headache Impact Test (HIT-6), aura questionnaire, photophobia questionnaire, and ocular surface disease index (OSDI) questionnaire. We plan to enroll 150 participants.

Methods: We used Pearson's correlation coefficients to determine the relationship between VFQ-25, HIT-6, OSDI, aura and photophobia scores.

Results: We report initial findings on patients with chronic and episodic migraine with (n =11) and without aura (n=12). Mean age was 45 years, with a female to male ratio of 3:1 in both groups. In the migraine with aura group, a statistically significant relationship was found between VFQ25 and aura scores (p = 0.032), and HIT-6 and OSDI scores (p = 0.044). In the migraine without aura group, a significant correlation was found between the VFQ25 and OSDI scores (p = 0.021), and HIT-6 and photophobia scores (p = 0.037).

Conclusions: Migraine with aura patients' reduced visual QOL correlated most closely with aura symptoms. Migraine without aura patients' reduced visual QOL correlated most closely with dry eye symptoms, and their HIT-6 scores correlated most closely with photophobia scores. These early findings support targeted treatment of dry eye, photophobia and aura symptoms to improve visual QOL in migraine patients. Further data will allow us to address differences between episodic and chronic migraine patients.

Abstract 12

Title: Transient smart phone blindness: A case series

Authors: Nirojini Sivachandran, Amadeo Rodriguez

Abstract Body:

Purpose: Herein we describe two patient encounters where the differential for transient monocular vision loss, a common presentation to the ophthalmology clinic, is beyond thromboembolic events.

Study Design: Case series.

Methods: Two cases referred to Hamilton regional eye institute were seen and reviewed using detailed history and complete ocular exam.

Results: In the first case, a 44F complains of visual impairment in her left eye typically occurs at night while reading her iPad in bed, after which she notices her left eye is slow to adapt to the dark. Her complete workup is negative for any thromboembolic events including normal ERG results. In the second case, a 32F complains of transient vision loss in her left eye lasting five minutes at night after reading on her phone while in bed. She is otherwise healthy and her ocular exam is unremarkable. Both patients present with transient monocular vision loss or decreased vision in their left eye after several minutes of exposure to a smartphone screen in the dark while lying in bed on their right side. Patients were able to reproduce their symptoms where the vision loss was always contralateral to the side on which the patient was lying. This is consistent with recent publication by Alim-Marvasti et al. 2016, where differential bleaching of photopigments occur as a result of the viewing eye becoming light adapted while the eye covered (by pillow) becoming dark-adapted. When both eyes are exposed to the dark, the light adapted eye is perceived to be blind or have decreased vision. This lasts for several minutes, similar to the time course of scotopic recovery after a photo bleach.


Conclusions: Here we present two cases that are more likely present to Ophthalmologists given the wide spread use of smartphones. These cases highlight that detailed history taking along with an understanding of retinal physiology can avoid costly investigations and more importantly unnecessary anxiety for the patient and doctor.

Session Title: Bumpy eyelids and watery eyes - Oculoplastic free papers

Subspecialty: Oculoplastic & reconstructive surgery

Location: 518AB

Session Time: Friday, June 16, 2017, 1:30 pm - 3:00 pm

13. Meta-Analysis of the Utility of Stents in Dacryocystorhinostomy • **Edsel B. Ing**, Royce C. Ing, Harleen Bedi, Ahsen Hussain, Amal Al-Sayyed, Helen Zakrzewski, Navdeep Nijhawan, Ming Ding, Bryan J. Winn
14. Is the Non-Endoscopic Endonasal Dacryocystorhinostomy (NEED procedure) the Gold Standard • **Bayasgalan Purevdorj**, Can Öztürker, Gamal Seif, Yasser Khan
15. Involvement of lacrimal structures in floppy eyelid surgery • **Avi Rubinov**, Allan Oryschak, Karim Punja, Michael Ashenhurst
16. Explosive Growth of Two Periobital Tumours • **Debra-Meghan Sanft**, Pablo Zoroquiain, Kevin Watters, Miguel N. Burnier Jr., Alex Mylnarek, Salim Korban, Bryan Arthurs
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Abstract 13

Title: Meta-Analysis of the Utility of Stents in Dacryocystorhinostomy

Authors: Edsel B. Ing, Royce C. Ing, Harleen Bedi, Ahsen Hussain, Amal Al-Sayyed, Helen Zakrzewski, Navdeep Nijhawan, Ming Ding, Bryan J. Winn

Abstract Body:

Purpose: The benefit of silicone lacrimal stents for dacryocystorhinostomy (DCR) has been questioned. We try to clarify the role of stents in endonasal and external DCR.

Study Design: Meta-Analysis

Methods: Randomized controlled trials (RCT) on the success rate of primary DCR with and without stenting were reviewed on PubMed and Embase from inception to November 2016. The Cochrane risk of bias tool was used. Statistical analysis was performed using the metan commands in Stata 13.

Results: Eleven RCT were found with 1215 subjects, and 1224 procedures. (There was inadequate information to exclude 9 bilateral procedures.) There were 487 external DCR procedures, and 737 endonasal procedures. The 608 DCR procedures performed with stent had a 93.3% success rate. The 616 procedures performed without a stent had a 88.1% success rate.

Random effects meta-analysis of all DCRs showed a DerSimonean and Laird (D+L) pooled risk ratio of 1.047 (95% CI 1.003, 1.093) which was statistically significant in favour of stenting. $I^2=29.8\%$, $p=0.162$. There was mild funnel plot asymmetry, but Egger bias was -1.009149 95%CI (-2.922782 , $.9044851$) $p=0.263$ suggesting the asymmetry may be due to random error. Subgroup analysis of the external DCR studies and the endonasal DCR studies separately showed pooled estimates in favour of stenting that were not statistically significant. [External DCR: D+L pooled risk ratio of 1.068 (95% CI 0.995, 1.146) $I^2=26.2\%$, $p=0.162$. Endonasal DCR: pooled risk ratio of 1.031 (95% CI 0.970, 1.096) $I^2=43.6\%$, $p=0.115$] Sample size calculation for the Chi-squared test comparing two independent proportions with success rates of 88% in the non-stented group and 93% in the stented group require a sample size of 978 to have 80% power.

Conclusions: There was a modest but statistically significant benefit to lacrimal stenting for DCR. Meta-analyses should be interpreted with caution when there may be small study effects, examiners are not blinded, if there is no allocation concealment, or when there is variation in surgical technique, sites of stenosis, and the endpoints for success. Lacrimal stenting is expensive, can be uncomfortable for patients, with potential complications of prolapse, cheese-wiring and granuloma formation.

Notwithstanding, adequately powered studies are required before the benefit of lacrimal stents in DCR is discounted. Time-to-failure studies of DCR with and without stenting require very long follow-up, but would also be informative.

Abstract 14

Title: Is the Non-Endoscopic Endonasal Dacryocystorhinostomy (NEED procedure) the Gold Standard

Authors: Bayasgalan Purevdorj, Can Öztürker, Gamal Seif, Yasser Khan

Abstract Body:

Purpose: To compare outcomes after dacryocystorhinostomies (*DCRs*) performed by the traditional external approach (*EX-DCR*) or by a non-endoscopic endonasal approach (*EN-DCR*).

Study Design: Retrospective, non-randomized, comparative interventional case series.

Methods: *Participants* - A total of 1078 consecutive cases of *DCR* were performed over a 14-year period with a minimum 12 months of follow-up using either *EX-DCR* or *EN-DCR*. Only patients with primary nasolacrimal duct obstruction and no eyelid, lacrimal sac, or canalicular pathology were included. *Intervention* - A total of 290 *EX-DCR* and 788 *EN-DCR* patients were identified. *EX-DCR* was performed under sterile conditions, and *EN-DCR* was performed with a clean setup. Silicone stents were placed for 6 weeks. *Main Outcome Measures*- Full success was defined as no symptoms of tearing after surgery and anatomical patency with fluorescein flow on nasal endoscopy or patency to lacrimal syringing. Partial success was defined as a tearing decrease compared with prior to surgery and with anatomical patency, and failure was defined as no significant improvement in persistent tearing.

Results: There was no significant difference in age or gender distribution between the two groups. The mean operative duration was 28.5 minutes for *EX-DCR* and 10.2 minutes for *EN-DCR* ($P = 0.0001$, t test). Surgical success rate was achieved in 95.1% of *EX-DCRs* and 96.4% of *EN-DCRs*. The failure rate was 0.05% for *EX-DCR* and 0.03% for *EN-DCR*. There was no statistical significance between these outcomes with a two-sample test for equality of proportions with continuity correction ($P = 0.75$). The average follow-up time was 10.5 months in *EN-DCR* and 11.4 months in *EX-DCR*.

Conclusions: Surgical scarring on the face and disrupted anatomy in the medial canthal area following *EX-DCR* can be avoided by an endonasal approach. The *EN-DCR* approach is more rapid than the traditional external approach, has an equivalent surgical success rate, and was preferred by patients who had alternative techniques performed on opposite sides.

Abstract 15

Title: Involvement of lacrimal structures in floppy eyelid surgery

Authors: Avi Rubinov, Allan Oryschak, Karim Punja, Michael Ashenhurst

Abstract Body:

Purpose: To assess presence of lacrimal gland or ductules in histopathological specimens collected from upper eyelid tissue that has been surgically removed for the treatment of floppy eyelids.

Study Design: Histopathological case series.

Methods: Wedges of full thickness upper lid tissue, removed as part of a Bick's procedure for treatment of floppy eyelid were assessed histopathologically for the presence of lacrimal ductules or lacrimal gland tissue.

Results: Ten full thickness lateral upper lid wedges were resected, stained and examined for the presence of lacrimal tissue or ductules. Two of the wedges showed lacrimal glandular tissue and one specimen showed ductules.

Conclusions: These results show that in performing a lateral full upper eyelid wedge resection (Bick's procedure) for the treatment of floppy eyelids, there is a risk of inadvertently removing healthy lacrimal structures.

Abstract 16

Title: Explosive Growth of Two Periobital Tumours

Authors: Debra-Meghan Sanft, Pablo Zoroquiain, Kevin Watters, Miguel N. Burnier Jr., Alex Mylnarek, Salim Korban, Bryan Arthurs

Abstract Body:

Purpose: Merkel cell carcinoma (MCC) is a rare, rapidly progressive tumour of neuroendocrine origin. It carries a poor prognosis, and by the time it is detected, metastases are frequently already present. The purpose of this case report is to describe a case of Merkel cell carcinoma, as well as to discuss the clinical and pathological features of these tumours.

Study Design: This is a retrospective case-series.

Methods: Two cases of MCC of the periorbital region were identified at a tertiary eye center. The clinical features and pathological characteristics in this case were examined.

Results: The patient was found to have parotid metastasis as well as 2/3 positive regional lymph nodes. Case 2 was also a rapidly growing tumor, with maximal dimensions of 5.2x4.1x4cm. Surprisingly, despite the size, no metastasis or lymph node involvement was present. To the best of our knowledge, this case is the largest Merkel cell carcinoma of the face without lymphadenopathy or distant metastases despite orbicularis invasion. Microscopically, an organoid tumor composed of small cells with scant cytoplasm and granular, hyperchromatic nuclei is seen. The tumor was not connected to the epidermis. The tumor was positive for synaptophysin, chromogranin and cytokeratin 20 with a perinuclear dot enhancement. The neoplastic cells were negative for CD45. The final diagnosis was MCC, small cell type. Lymph node and parotid metastasis were observed.

Conclusions: Due to the rarity of MCC, a thorough clinical history and timeline are essential to the diagnosis. Short time to excision with the hopes of minimizing nodal spread is important. The pathologist should be alerted to the clinical suspicion of MCC so that the appropriate immunohistochemical stains can be performed.

Abstract 17



Title: How reliable are frozen sections for periocular tumors?

Authors: William Turk, Lorne Bellan, Matthew Lee-Wing, Janice Safneck

Abstract Body:

Purpose: Frozen section pathologic assessment of periocular tumor margins are routinely used to assist surgeons anticipating the need for complex reconstructions. At our institution it was recognized there were a few cases over a short period of time where there was a discrepancy between the intra-operative and final pathology reports. This led us to undertake a one year review of all frozen section cases and determine our rate of accuracy and compare it with the published literature.

Study Design: Retrospective chart review of 88 patients from 01/May/2015 - 30/May/2016 of two surgeons who account for all the frozen sections of periocular tumors at a single institution. The primary outcome was determining the accuracy of intra-operative frozen section analysis for tumor margins compared to final pathologic diagnosis. The secondary outcomes were cases where final margin accuracy was indeterminate based on the final pathology report and cases where a margin was called positive by frozen section but was later determined negative based on the final pathology report.

Methods: All surgical reports and final pathology reports where frozen sections were used were obtained either from the hospital records or from the surgeons own records. Charts were then reviewed to identify the pathologist present intra-operatively performing frozen section analysis as well as the pathologist doing the final pathologic analysis. Any discrepancies between the two reports were noted and total number of cases were determined for each pathologist.

Results: Overall there was 96.6% (n = 88) accuracy in determining correct tissue margins intra-operatively with frozen sections (primary outcome). Broken down by pathologist the accuracy rates were 100% (n = 30), 100% (n = 19), 92.9% (n = 14) and 92.0% (n = 25). The tissue margins were indeterminate on final pathology in 2.5% (n = 2) of cases. There was one case (1.2%) where more tissue was taken based on frozen section analysis than was needed when compared to final pathology reported.

Conclusions: Overall our results exceed the published literature on the rates of margin accuracy for frozen sections of 85-91.1%. Broken down by pathologist all of them were 92% or greater in accuracy. While these findings are reassuring incidentally it was found in 7 cases the final pathology report did not make it in to the hospital records and in 1 case it did not make it into the surgeons medical record. This raises concerns that rare inaccurate frozen section reports may not be seen and acted upon.

Abstract 18

Title: 5-year multicenter prospective randomized trial comparing three conservative chalazion treatments

Authors: Albert Y. Wu, Kalla A. Gervasio, Kellie N. Gergoudis, Chen Wei, James H. Oestreicher, John T. Harvey

Abstract Body:

Purpose: To compare the efficacy of three conservative treatment options for chalazia: hot compresses, hot compresses plus tobramycin (Tobrex), and hot compresses plus tobramycin/dexamethasone (Tobradex).

Study Design: Multicenter, randomized, non-blinded clinical trial.

Methods: Setting: Two clinical sites in New York, USA and two clinical sites in Ontario, CANADA. Study Population: 149 patients with one or more chalazia on separate eyelids were randomly assigned to three treatment groups: hot compresses alone (n=50), hot compresses plus tobramycin (n=50), and hot compresses plus tobramycin/dexamethasone (n=49). Intervention: Patients received 4-6 weeks of assigned treatment. They were measured objectively by slit lamp for chalazion horizontal width and subjectively by questionnaire for pain levels and treatment satisfaction. Main Outcome Measures: Primary outcome was 10% chalazion size regression. Secondary outcomes were complete resolution, mean size difference, actual percent size improvement, 10% size reduction based on lesion chronicity, and pre and post treatment patient pain and satisfaction levels.

Results: 10% size reduction occurred as follows: 33% hot compress, 50% hot compress plus tobramycin, and 43% hot compress plus tobramycin/dexamethasone, with no significant difference between them ($p = .14$). There was no significant difference in complete resolution between groups: hot compress 21%, hot compress plus tobramycin 16%, and hot compress plus tobramycin/dexamethasone 18% ($p = .78$). Individually by paired t-test, there were statistically significant post-treatment mean size differences: hot compress 1.20 mm ($p < 0.001$), hot compress plus tobramycin 1.69 mm ($p < .001$), and hot compress plus tobramycin/dexamethasone 1.54 mm ($p < 0.001$). However, there was no significant difference in post-treatment mean size difference between the three groups on ANOVA ($p = .61$).

Conclusions: Hot compresses alone or in combination with tobramycin or tobramycin/dexamethasone are all effective options in the conservative treatment of chalazia, though all have a low success rate in completely resolving lesions. Since there is no difference in efficacy between them, hot compresses alone should be used as the first line option, as they are cheaper and equally effective as when combined with antibiotic or combination antibiotic/steroid drops. Although not statistically significant, there is a trend toward increased size improvement based on lesion chronicity, with hot compress and tobramycin most effective in the acute phase, hot compress plus tobramycin/dexamethasone in the sub-acute phase, and hot compress plus tobramycin in the chronic phase.

Abstract 19

Title: Basal cell carcinoma of the eyelid with sebaceous differentiation

Authors: Pablo Zoroquiain, Carlos Moreira, Evangelina Esposito, Bryan Arthurs, Beatriz Dias, Miguel Burnier

Abstract Body:

Purpose: Basal cell carcinoma is the most frequent malignant tumor of the eyelids. Although it exhibits broad morphological diversity, histopathological diagnosis is straightforward and the treatment is successful in the vast majority of cases. However, some cases are more difficult to diagnose as they may show overlapping similarities to adnexal tumors. Moreover, they can also possess areas of different cellular lineages, such as sebaceous differentiation. As the main differential diagnosis is sebaceous carcinoma and treatment management of this tumor is often very aggressive, accurate diagnoses are of critical importance.

Study Design: Case series

Methods: Clinical information of all the cases seen between 2006-2015 with the pathological diagnosis of BCC with sebaceous differentiation from the Henry C. Witelson Ocular Pathology Laboratory were obtained and included in the analysis. All slides were re-evaluated, and expression of the immunohistochemical markers adipophilin, EMA, BRST2 and BER-Ep4 were evaluated. The clinical diagnosis, surgical report and follow-up information were analyzed for each case.

Results: Nine cases of BCC with sebaceous differentiation were retrieved. The mean age of the patients was 75.9 ± 13.6 years, with a male bias ($n=7$). The most common lesion location was the lower eyelid ($n=8$). The average lesion size was 6.4 ± 3.4 mm. All areas with sebaceous differentiation were positive for adipophilin, while EMA was positive in 6/9 of these areas. Conversely, BCC areas without sebaceous differentiation were negative for these markers. None of the cases reviewed had recurrences or metastases.

Conclusions: BCC with sebaceous differentiation is a recognizable entity that can be easily confused histopathologically as neoplasms with sebaceous differentiation, including adnexal tumors and sebaceous carcinoma. Adipophilin and EMA are good immunohistochemical markers to aid in achieving the correct diagnosis. The prognosis of this tumor seems to be similar to common BCC types.

Session Title: Clinical Trials & Injectables: Think before you inject

Subspecialty: Retina

Location: 519AB

Session Time: Friday, June 16, 2017, 1:30 pm - 3:00 pm

20. Real World Practice Patterns in the Treatment of Wet Age-Related Macular Degeneration • **Netan Choudhry**, *Eric Tourville, Pierre Turcotte*
21. A Clinico-Pathological Study of the Structural and Functional Changes to the Retina and Optic Nerve following anti-VEGF Treatments for Diabetic Macular Edema • **Richard Filek**, *Phil Hooper, Tom Sheidow, John Gonder, Subrata Chakrabarti, Cindy Hutnik*
22. Assessment of Retinal Pigment Epithelium Changes in Eyes with Diabetic Macular Edema undergoing Multiple Intravitreal Dosing with Ranibizumab • **Mostafa Hanout**, *Filiberto Altomare, Louis Giavedoni, Alan R. Berger, Rajeev H. Muni, David R. Chow, Robert Gizicki, Adam K. Rudkin, David T. Wong*
23. Ocriplasmin versus vitrectomy for treatment of macular holes • **Verena Juncal**, *David Chow, Natàlia Grané, Michael Kapusta, Geoff Williams, Amin Kherani, Alan Berger*
24. Canadian Treat and Extend Analysis Trial with Ranibizumab in Patients with Neovascular AMD: Interim Analysis of the CANTREAT Study • **Peter Kertes**, *Tom Sheidow, Geoff Williams, Mark Greve, Ivan Galic, Emmanouil Rampakakis, Joanne Gavalakis, Andrea Scarino*
25. The effects of dexamethasone intravitreal implant in cystoid macular edema recalcitrant to anti-VEGF therapy • *Salina Teja*, **Lauren Sawatzky**, *Theresa Wiens, David Maberley, Patrick Ma*

Abstract 20

Title: Real World Practice Patterns in the Treatment of Wet Age-Related Macular Degeneration

Authors: Netan Choudhry, Eric Tourville, Pierre Turcotte

Abstract Body:

Purpose: To collect real-world Canadian data on the management of wet age-related macular degeneration (wAMD) in order to evaluate the potential differences between routine clinical practice and controlled clinical trials.

Study Design: Retrospective chart review.

Methods: 70 Canadian ophthalmologists (49% QC, 43% ON, 5% Western, 3% Eastern; 91% urban location, 9% rural; 43% solo practice, 42% group practice, 15% hospital/academic centre) answered a practice profile questionnaire and completed chart audits using an online platform, Vivomap™, on their 50 most recent wAMD patients that met the inclusion criteria. No patient identifiers were collected.

Results: 2824 chart audits were completed (39% male, 60% ≥80 years, 92% with provincial drug coverage, 33% bilateral wAMD) Current treatment showed 46% receiving intravitreal aflibercept (IVA), 12% receiving intravitreal bevacizumab (IVB), and 41% receiving intravitreal ranibizumab (IVR). Anti-VEGF loading results revealed 97% initiate with a loading phase: 70% load 3 monthly, 25% load monthly until patient is dry, and 5% load more than 3 monthly. The average number of injections in year 1 was 6.9 for naïve patients (n=1051), and 6.8 for switch patients (n=439). The average number of IVA and IVR injections was 6.4 (n=149) and 6.9 (n=737) in naïve patients; and 6.7 (n=310), and 7.2 (n=105) in switch patients. In year 2, the average number of injections was 6.2 for both naïve patients (n=594) and switch patients (n=166). The average number of IVA and IVR injections was 5.6 (n=23) and 6.2 (n=466) in naïve patients; and 5.9 (n=79) and 6.6 (n=68) in switch patients.

21% of patients (n=1490) required ≥10 injections in treatment year 1 [12% of IVA patients (n=459), 22% of IVB patients (n=189), 25% of IVR patients (n=842)].

94% of respondents estimated their patients aren't able to adhere to regularly scheduled injections, and miss approximately 1-3 injections per year. Collected data showed 25% (n=1490) and 28% (n=760) of patients missed at least one appointment in treatment years 1 and 2. 69% of patients relied on a caregiver to take them to their appointments.

Conclusions: This study demonstrated significantly higher variability in wAMD management and lower injection frequency compared to results from wAMD clinical trials. The results of this analysis may be due in part to a high rate of missed appointments. A focus on clinical practices that increase patient appointment adherence may limit the negative impact that missed injections can have on patient outcomes.

Abstract 21

Title: A Clinico-Pathological Study of the Structural and Functional Changes to the Retina and Optic Nerve following anti-VEGF Treatments for Diabetic Macular Edema

Authors: Richard Filek, Phil Hooper, Tom Sheidow, John Gonder, Subrata Chakrabarti, Cindy Hutnik

Abstract Body:

Purpose: To evaluate and analyze the safety and efficacy of anti-VEGF drugs on the retina and optic nerve in patients with DME and varying levels of diabetic retinopathy (DR)

Study Design: Translational study design

Methods: DR patients with underlying DME underwent pre-injection, 6, 12 and 24 month follow-up tests using visual fields, Heidelberg retinal tomography, optical coherence tomography and OPTOS fluorescein angiography. *In vitro*, rat retinal cell cultures were exposed to 0, 0.0625, 0.125 (clinical dose), and 0.25 mg/mL of ranibizumab (Lucentis) for 48 hours. Cytotoxicity was measured by LDH, apoptosis by cell death ELISA and MTT assay for cellular metabolic activity.

Results: A total of 31 patients were enrolled in the study. From baseline, the average macular thickness significantly decreased ($p<0.0001$) at 6 months ($-33.3\ \mu\text{m}$), and 12 months ($-35.0\ \mu\text{m}$) compared to baseline. Average retinal nerve fiber layer thickness significantly decreased ($P<0.0001$) by 12 months (6 months $-9.5\ \mu\text{m}$; 12 months $-11.4\ \mu\text{m}$). Visual field mean deviation (MD) improved non-significantly compared to baseline (6 months $+1.59\ \text{dB}$; 12 months $+0.90\ \text{dB}$). Average cup to disk ratio ($+0.045$) and vertical cup to disk ratio ($+0.049$) significantly increased ($p<0.0001$) by 12 months. Cup volume significantly increased ($p<0.009$) at 6 months ($+0.0060\ \text{mm}^3$), and 12 months ($+0.0066\ \text{mm}^3$) compared to baseline. *In vitro*, MTT showed a significant decrease ($p<0.003$) in cellular metabolic activity at the clinical dose (0.125 mg/mL -5.6%) and double the clinical dose (0.25 mg/mL -4.4%) compared to control. LDH showed a significant increase ($p<0.004$) in cytotoxicity at the clinical dose (0.125 mg/mL $+36.6\%$) and double the clinical dose (0.25 mg/mL $+39.2\%$) compared to control.

Conclusions: Clinically, anti-VEGF appears to be potentially detrimental to the optic nerve by decreasing retinal nerve fiber layer thickness, increasing cup/disk ratio and cup volume over time. *In vitro*, anti-VEGF treatment appears to be detrimental to the retina by decreasing cellular metabolic activity and increasing cytotoxicity of retinal cells. The results provide a cautionary note to monitor both the retina and optic nerve status in patients undergoing frequent injections.

Abstract 22

Title: Assessment of Retinal Pigment Epithelium Changes in Eyes with Diabetic Macular Edema undergoing Multiple Intravitreal Dosing with Ranibizumab

Authors: Mostafa Hanout, Filiberto Altomare, Louis Giavedoni, Alan R. Berger, Rajeev H. Muni, David R. Chow, Robert Gizicki, Adam K. Rudkin, David T. Wong

Abstract Body:

Purpose: Several studies reported development or exacerbation of already present RPE atrophy as a consequence of repeated intravitreal ranibizumab therapy in exudative age-related macular degeneration. The purpose of this study is to evaluate the effect of multiple intravitreal injections of ranibizumab on the RPE in the setting of DME

Study Design: retrospective image analysis

Methods: Retrospective review of medical records and SD-OCT images acquired with Cirrus HD-OCT (Carl Zeiss Meditec, Dublin, CA) was performed for patients with DME managed at a tertiary care center between May, 2012 and November, 2015. Patients who 1) received 4 or more doses of RBZ, 2) have SD-OCT scans with 6/10 quality or better, and 3) are not receiving treatment in the fellow eye were recruited. Fellow eyes were used as control. RPE was evaluated using advanced RPE analysis tool of the Cirrus HD-OCT software. RPE changes between baseline and final visit were compared between the study and control eyes using independent *t*-test and Levene's test for equality of variances (IBM SPSS® software v 23.0)

Results: 224 charts were reviewed. 23 study eyes and 21 control eyes (from 23 patients) met the inclusion criteria and were analyzed. Mean age was 68.2 (± 11.8); 16 (70%) were males. Mean number of RBZ injections was 10.6 (± 7.1); and mean duration between baseline and final study visit was 15.7 (± 11.5) months. At baseline, 7 study eyes (30%) had atrophic RPE changes detectable by the Cirrus HD-OCT advanced RPE analysis software, only 1 (14.3%) eye showed progression at final visit, whereas, remaining 6 (85.7%) eyes showed regression. RPE atrophic changes were detectable in 4 (19%) eyes in the control group at baseline, however, all showed regression. 3 (14.3%) study eyes and 3 (14.3%) control eyes developed new RPE atrophic changes during the course of the study which persisted until the final visit. Mean area of RPE atrophy was 0.087 mm² (± 0.08) in study eyes, and 0.095 mm² (± 0.13) in control eyes (*p*=0.39). No statistically significant difference was observed between study and control eyes

Conclusions: Eyes with DME receiving frequent IVI of RBZ are not statistically different from control eyes in rate of developing RPE atrophy. Further, descriptive analysis shows low rate of incidence or progression of RPE atrophy in both groups. Therefore, IVI of RBZ may not be associated with deleterious effect on RPE in eyes with DME. To the best of our knowledge, this observation was not previously reported

Abstract 23

Title: Ocriplasmin versus vitrectomy for treatment of macular holes

Authors: Verena Juncal, David Chow, Natàlia Grané, Michael Kapusta, Geoff Williams, Amin Kherani, Alan Berger

Abstract Body:

Purpose: To compare the anatomical and visual outcomes of patients with bilateral macular holes (MH) treated with pars plana vitrectomy (PPV) in one eye and intravitreal ocriplasmin injection in the fellow eye.

Study Design: Multi-centre, retrospective case series.

Methods: Eleven patients with bilateral MH that had PPV as primary procedure in one eye and ocriplasmin in the other were included. All charts were reviewed for data collection and optical coherence tomography (OCT) scans pre and post treatment were qualitatively analyzed. The main outcome measures were MH closure rates, final best corrected visual acuity (BCVA) and OCT structural alterations following each intervention.

Results: Macular hole closure following injection was achieved in 36.4% of the eyes (4/11) versus 90.9% (10/11) of the PPV treated eyes ($p=0.031$). Ocriplasmin treated holes were classified as small ($\leq 250\mu\text{m}$) in 63.6% of the cases, medium (250-400 μm) in 27.3% and large (>400) in 9.1%, and 3 of the 4 closed MH were small at baseline and 1 was medium. 36.4% of the PPV treated holes were small, 45.4% medium and 18.2% large, and all except for 1 medium-sized MH closed with primary PPV. VMT release was found in 63.6% (7/11) of the ocriplasmin eyes, of which 57.1% also achieved MH closure. All remaining open ocriplasmin treated holes later underwent a successful surgical repair, with no significant difference in final BCVA between those who achieved MH closure with primary or secondary interventions ($p=0.073$). Mean logMAR BCVA at baseline was 0.85 ± 0.34 and 0.56 ± 0.28 in PPV and ocriplasmin eyes, respectively. Final BCVA improved to 0.37 ± 0.22 ($p=0.005$ compared to baseline) for the PPV and 0.28 ± 0.16 ($p=0.009$ compared to baseline) for the ocriplasmin eyes, with no statistical significance between groups ($p=0.306$). When comparing OCT structural changes in each eye of the same patient using paired scans from similar time periods following surgery and injection, transient and persistent outer segment reflectivity changes and disruption were more frequent in PPV treated eyes. There was a trend towards a better final BCVA in eyes that did not show outer segment changes following the procedures (0.14 ± 0.06 versus 0.35 ± 0.19 , $p=0.078$).

Conclusions: This is the first study that compares PPV and ocriplasmin performed in different eyes of the same patient. Even though both procedures were significantly associated with a better final visual outcome, PPV treated eyes had a higher primary successful MH closure rate. However, patients were found to have more OCT structural changes in PPV than ocriplasmin treated eyes.

Abstract 24

Title: Canadian Treat and Extend Analysis Trial with Ranibizumab in Patients with Neovascular AMD: Interim Analysis of the CANTREAT Study

Authors: Peter Kertes, Tom Sheidow, Geoff Williams, Mark Greve, Ivan Galic, Emmanouil Rampakakis, Joanne Gavalakis, Andrea Scarino

Abstract Body:

Purpose: Age-related macular degeneration (AMD) is the leading cause of severe, irreversible vision loss in developed countries. To date, no large prospective randomized clinical studies have assessed the efficacy of a treat-and-extend (T&E) regimen compared with monthly dosing for the treatment of neovascular AMD. The purpose of this analysis was to compare the effectiveness of ranibizumab using a T&E regimen to once-monthly (OM) dosing in treatment-naïve neovascular AMD patients.

Study Design: 24-month prospective, randomized (1:1), open-label, multicenter, post-authorization study.

Methods: This is a 24-month, prospective, randomized (1:1), open-label, multicenter, post-authorization study. In this interim analysis, baseline characteristics, visual acuity, and injection frequency were evaluated. Summary statistics including the mean and standard deviation for continuous variables and counts and percentages for categorical variables were produced.

Results: As of November 10th, 2016, 580 patients (T&E=287; OM=293) were recruited; 404 patients (T&E=209; OM=195) and 201 patients (T&E=102; OM=99) had 12-month and 24-month follow-up, respectively. Mean (SD) age was 79.3 (7.9) years, 60.3% were females, 94.3% were Caucasian, and 22.5% had a family history of AMD. No significant between-group differences were observed. Mean (SD) baseline BCVA was 58.7 (14.2) and 59.4 (13.5) for T&E and OM, respectively, and was comparable for both groups. At Month 12, after an average of 9.2 (T&E) and 11.8 (OM) injections, mean (SD) BCVA improvement was 8.0 (12.6) and 6.2 (12.6) letters, respectively. At Month 24, after an average of 18.2 (T&E) and 23.6 (OM) injections, mean (SD) BCVA improvement was comparable between groups with 6.5 (15.3) and 6.0 (13.0) letters, respectively.

Conclusions: The results of this interim analysis show that comparable improvement in BCVA can be achieved in a real-world setting with fewer injections using a T&E compared to a monthly dosing regimen.

Abstract 25

Title: The effects of dexamethasone intravitreal implant in cystoid macular edema recalcitrant to anti-VEGF therapy

Authors: Salina Teja, **Lauren Sawatzky**, Theresa Wiens, David Maberley, Patrick Ma

Abstract Body:

Purpose: To examine the effects of dexamethasone intravitreal implant (ozurdex) on structural and functional parameters of anti-VEGF recalcitrant patients with cystoid macular edema (CME) secondary to pseudophakia, retinal vein occlusion (RVO), diabetic retinopathy, uveitis or age-related macular degeneration (AMD).

Study Design: Retrospective chart review

Methods: 144 patient charts were identified from 2 centres as having ozurdex prescriptions. 105 eyes met inclusion criteria with the remaining not having sufficient follow up data. Primary outcome measures included central retinal thickness (CRT) on optical coherence tomography (OCT) and best-corrected visual acuity (BCVA) over 6-month follow up. Secondary outcome measures included time to retreatment post ozurdex. Adverse outcomes including rise in intraocular pressure (IOP) requiring medication or surgery were documented.

Results: Patients received ozurdex for CME secondary to RVO (n=28), diabetic retinopathy (n=30), pseudophakia (n=18), uveitis (n=24) or wet AMD (n=5). The mean age was 67.2 ± 14.6 with an equal number of males and females. When looking at all patients together, BCVA did not change significantly between baseline at 0.80 ± 0.61 (logMAR) to 3 months at 0.83 ± 0.700 ($p=0.42$), or 6 months at 0.77 ± 0.60 ($p = 0.93$). In the BRVO group, CRT improved from $484 \pm 143 \mu\text{m}$ at baseline to $307 \pm 80 \mu\text{m}$ ($p = 0.09$) at 6 months. In the pseudophakic CME group, CRT improved from $495 \pm 168 \mu\text{m}$ at baseline to $354 \pm 86 \mu\text{m}$ ($p = 0.06$) at 6 months. In the diabetic retinopathy group, CRT improved from $492 \pm 174 \mu\text{m}$ at baseline to $324 \pm 90 \mu\text{m}$ ($p = 0.25$) at 6 months. In the uveitis group, CRT improved maximally from $456 \pm 163 \mu\text{m}$ at baseline to $271 \pm 34 \mu\text{m}$ ($p = 0.002$) at 1 month. The number of eyes that required retreatment were 40 at 3 months and 16 at 6 months. Adverse outcomes included 34 eyes requiring medical glaucoma treatment and 3 requiring surgical glaucoma treatment.



Conclusions: In eyes with CME refractory to anti-VEGF therapy, the dexamethasone intravitreal implant (ozurdex) results in improvements in CRT thickness measured on OCT as early as 1 month after treatment and lasting for most patients at 6 months. However, with subgroup analysis many of the results did not show statistical significance nor did they parallel measurable improvements in BCVA. Retreatment with intravitreal therapy was most frequently required at 3 months post ozurdex.

Session Title: Emerging Observations in Imaging, Inflammation & Oncology

Subspecialty: Retina

Location: 519AB

Session Time: Friday, June 16, 2017, 3:45 pm - 5:15 pm

26. Local failure after episcleral brachytherapy for posterior uveal melanoma: Patterns, risk factors and management • **Claudine Bellerive**, Hassan A. Aziz, James Bena, Allan Wilkinson, John Suh, Thomas Plesec, Arun Singh
27.  Gene Therapy for Choroideremia: Initial Results • **Ioannis S. Dimopoulos**, Matthew Tennant, Riz Somani, Ian MacDonald
28. Tele-ophthalmology screening for the detection of diabetic retinopathy and macular edema using monoscopic colour photographs and optical coherence tomography: an analysis of 1,020 eyes • **Tina Felfeli**, Roy Alon, Michael Brent
29.  **HOT TOPIC** Swept-Source OCT-Angiography of the Anomalous Foveal Avascular Zone • **Shangjun (Collier) Jiang**, Netan Choudhry
30. Natural history of untreated epiretinal membranes: progression, prognosis, and predictive factors • **Daniel Q. Li**, David T. Wong
31. The use of intravitreal anti-VEGF and triamcinolone in the treatment of radiation papillopathy: A prospective case series • Kelsey A. Roelofs, Matthew Larocque, **Ezekiel Weis**
32. The Effect of Intravitreal Bevacizumab in Experimental Models of Ocular Inflammation • J. Thomas Toguri, Daniel Lafreniere, Rishi R. Gupta, Alan Cruess, Melanie Kelly, **Mark E. Seamone**.

Abstract 26

Title: Local failure after episcleral brachytherapy for posterior uveal melanoma: Patterns, risk factors and management

Authors: Claudine Bellerive, Hassan A. Aziz, James Bena, Allan Wilkinson, John Suh, Thomas Plesec, Arun Singh

Abstract Body:

Purpose: To evaluate the patterns, the risk factors and the management of recurrence following brachytherapy in patients with posterior uveal melanoma.

Study Design: This is a retrospective study of 374 consecutive patients (375 eyes) treated with episcleral brachytherapy for posterior uveal melanoma from January 2004 to December 2014.

Methods: Exclusion criteria included inadequate follow-up (less than 1 year) and previous radiation therapy. Local control rate and time to recurrence were the primary end points. Kaplan-Meier estimation and Cox proportional hazard models were conducted to identify risk factors associated with recurrence. The patterns of recurrence (chronologic and anatomic) and their management were also assessed.

Results: 21 patients (5.6%) experienced recurrence (follow-up range: 12 to 156 months, median: 47 months). The median time to recurrence was 18 months (range 4 to 156 months). Five-year estimated local recurrence rate was 6.6%. The majority (90.5%) of the recurrences occurred within the first 5 years. The predominant site of recurrence was at the tumor margin (12 patients, 57.1%). Univariate analysis identified 3 statistical significant recurrence risk factors: advanced age, largest basal diameter and the use of adjuvant transpupillary thermotherapy (TTT). Recurrent tumors were managed by repeat brachytherapy, TTT or enucleation.

Conclusions: Local recurrences following brachytherapy are uncommon 5 years following episcleral brachytherapy. Follow-up intervals can be adjusted to reflect time to recurrence. Most of the eyes with recurrent tumor can be salvaged by conservative methods.

Abstract 27



Third Prize, COS Awards for Excellence in Ophthalmic Research

Title: Gene Therapy for Choroideremia: Initial Results

Authors: Ioannis S. Dimopoulos, Matthew Tennant, Riz Somani, Ian MacDonald

Abstract Body:

Purpose: To evaluate safety and preliminary efficacy of gene replacement therapy in 6 subjects affected with choroideremia (CHM)

Study Design: An open-label, Phase 1/2 clinical trial of subretinal gene therapy for CHM using an adeno-associated viral vector (AAV2) encoding Rab-escort protein 1 (REP1). Main inclusion criteria: 1) best-corrected visual acuity (BCVA) equal to or worse than 20/30 but better than or equal to 20/200 in the study eye; and 2) active degeneration of the retina with spectral domain optical coherence tomography (SD-OCT) changes visible within the central macula.

Methods: Six CHM subjects underwent unilateral AAV2.REP1 gene replacement therapy (NCT02077361) in the worse-seeing eye, with the fellow eye used as a comparator. The primary efficacy outcome measure is change in ETDRS BCVA in the treated compared to the untreated eye. As a secondary efficacy measure, fundus autofluorescence (FAF) area measures are used to compare progression of RPE degeneration between the treated and untreated eyes.

Results: Post-intervention, all treated eyes lost central visual acuity. 4/6 subjects regained their baseline acuity, without showing, to date, a measurable gain in the treated eye. One subject demonstrated a 15-ETDRS letter gain in the treated eye, with a similar improvement noted in the untreated eye of an unrelated subject. One subject encountered a serious adverse event of presumed inflammatory reaction within the retina, resulting in permanent distorted vision. For all eyes, loss of FAF signal occurred at the transitional zone between healthy and degenerated retina. At 12-months, the change from baseline in FAF area was similar between the treated (11.86%) and untreated (9.86%) eyes.

Conclusions: In this limited cohort of CHM subjects, AAV2.REP1 gene replacement in CHM patients appears to be generally safe but with no preliminary evidence of arrest in disease progression. Longer follow-up is required to determine whether gene therapy shows any benefit in modifying the natural history of CHM.

Abstract 28

Title: Tele-ophthalmology screening for the detection of diabetic retinopathy and macular edema using monoscopic colour photographs and optical coherence tomography: an analysis of 1,020 eyes

Authors: Tina Felfeli, Roy Alon, Michael Brent

Abstract Body:

Purpose: There are several international tele-ophthalmology diabetic retinopathy (DR) screening programs that currently use only monoscopic colour photographs for grading DR. The purpose of this study is to determine the efficacy of our tele-ophthalmology screening program's unique use of monoscopic colour photographs and optical coherence tomography (OCT) in combination, and to evaluate the implications for detecting DR and diabetic macular edema (DME).

Study Design: Retrospective observational case series.

Methods: A review of all consecutive tele-ophthalmology referrals and examination records of patients from urban areas and native reserves seen at seven Community Health Centres (CHC) in Ontario between September 2013 and November 2016 was conducted. Monoscopic colour photographs, OCT, and clinical data stored on the Ontario Telemedicine Network (OTN) were evaluated by a retinal specialist to determine presence of DR and DME. A comparative analysis was made to determine the added benefit of screening for DR and DME using OCT in combination with monoscopic colour photographs. The study was approved by the University Health Network Research Ethics Board.

Results: A total of 1,020 eyes for 435 new patient visits and 75 follow-ups were reviewed. Patient population consisted of 53% females, with a mean age of 56.3 ± 11.5 years and diabetes duration of 7.9 ± 6.2 years. The prevalence of DR was 25.5% (8.3% monocular; 17.2% binocular), and DME was 3.9% (2.8% monocular; 1.1% binocular) over the three-year screening period. The use of OCT was required for 34.3% of all eyes to make a definitive diagnosis for the presence or absence of DME. A total of 15 additional eyes with DME not previously detected by color photographs alone were diagnosed by adding the OCT as a screening tool. Furthermore, using the OCT enabled the screening retinal specialist to rule out the diagnosis of DME in 178 eyes, in which its presence could not be ruled out when using the colour photographs alone. A total of 87 unwarranted patient referrals to a retina specialist were thus eliminated with use of the OCT. Recommendations for follow-up with tele-ophthalmology (52.1%), or in-person referrals to retina (11.1%), general ophthalmology (14.3%) and optometry (22.5%) were completed for all patients.

Conclusions: The addition of OCT imaging to monoscopic colour photographs in a tele-ophthalmology screening program provides increased efficacy for detecting pathology and reducing unnecessary referrals to tertiary care.

Abstract 29



Title: Swept-Source OCT-Angiography of the Anomalous Foveal Avascular Zone

Authors: Shangjun (Collier) Jiang, Netan Choudhry

Abstract Body:

Purpose: To analyze anomalous appearing (vascularized) foveal avascular zones (FAZ) using swept-source OCT-angiography (SS-OCTA) and compare these findings to the contour of the corresponding foveal pit using swept-source OCT (SS-OCT).

Study Design: Cross-sectional retrospective case series.

Methods: 14 eyes with anomalous (vascularized) FAZs from 10 patients were identified using swept-source OCT-A (Topcon Triton; Tokyo Japan). Patient medical records were reviewed to obtain demographic, visual acuity, and ophthalmological diagnosis information. Swept-source OCT imaging was used to characterize the foveal contour and identify the presence of fovea plana (FP). Each of the vascular layers in the retina (superficial capillary plexus, deep capillary plexus and choriocapillaris) were evaluated for both affected and unaffected eyes using the 3.0mm x 3.0mm strategy. Depth-decoded images were examined to identify anastomosis between the superficial and deep capillary plexus in all eyes.

Results: Six out of ten patients had an anomalous FAZ findings in only one eye, while the remaining four patients had bilaterally anomalous FAZ presentations. The FAZ was absent in all 14 eyes at the level of the superficial capillary plexus (SCP). Five eyes demonstrated complete vascularization of the FAZ at the levels of the deep capillary plexus (DCP) in addition to the SCP. The choriocapillaris was normal in all eyes. 50%(7) of eyes with a vascularized FAZ demonstrated a foveal plana configuration on SS-OCT, while 50% (7) had a normally developed pit. Four of ten patients had anomalous FAZ presentations bilaterally, and two patients with single eye involvement had a partial FAZ in their uninvolved eye. Mean ETDRS BCVA was 0.20 ± 0.14 logMAR units for anomalous FAZ eyes, and 0.20 ± 0.15 logMAR units for uninvolved eyes for patients with single eye involvement.

Conclusions: The foveal avascular zone (FAZ) is a key anatomical landmark which can be imaged successfully using swept-source OCT-angiography. Vascularization of the FAZ is uncommon and can be found in eyes with both a normally developed FAZ as well as eyes with a fovea plana configuration and is not necessarily associated with worse vision. The superficial capillary plexus and deep capillary plexus can both be involved in an anomalous vascularized FAZ configuration.

Abstract 30

Title: Natural history of untreated epiretinal membranes: progression, prognosis, and predictive factors

Authors: Daniel Q. Li, David T. Wong

Abstract Body:

Purpose: To audit the longitudinal visual outcome of epiretinal membrane (ERM) in untreated eyes and identify predictors of ERM progression using spectral-domain optical coherence tomography (SD-OCT).

Study Design: Retrospective electronic medical record database study.

Methods: 469 eyes from 396 patients diagnosed with ERM between 2012 and 2014 at St. Michael's Hospital (Toronto, Canada) with complete follow-up and no surgical treatment were included. Demographic information, medical co-morbidities, ocular history and visual acuities were extracted from electronic medical records. Central subfield macular thickness, linear dimensions of ERM, and inner segment ellipsoide (ISe) band integrity were reviewed on SD-OCT images, and the ERM was further characterized based on foveal contour, surface wrinkling, presence of intra-retinal cysts or subretinal fluid, and associated vitreomacular traction, lamellar macular hole, or full-thickness macular hole. The degree of foveal contour change was additionally measured by the "photoreceptor deformation index" (PDI), defined as the ratio of foveal ONL thickness to the juxtafoveal ONL plus OPL thickness. These parameters were retrospectively analyzed to identify associations with visual acuity at baseline and follow-ups.

Results: In untreated ERM eyes (mean age 67 years, mean visual acuity 0.42 logMAR), 29% had a previous retinal tear or detachment. Visual acuity and central subfield thickness did not change significantly during a mean observation period of 426 days ($p=0.21$). Specifically, visual acuity improved in 38%, stayed the same in 31%, and worsened in 31% of eyes, while subfield thickness decreased in 54% of eyes and increased in 46% of eyes. PDI was associated with poorer VA and CST at baseline ($p < 0.01$), but did not predict change in VA ($p = 0.96$) over the observation period. Similarly, ISe band disruption was associated with poorer VA and CST at baseline, ($p < 0.01$) but did not predict change in visual acuity ($p=0.68$)

Conclusions: The majority of ERM eyes with good visual function at baseline remain stable or spontaneously improve in visual acuity and macular thickness. While PDI and ISe are significant predictors of visual function at baseline, they may not predict visual outcome in eyes with untreated ERM.

Abstract 31

Title: The use of intravitreal anti-VEGF and triamcinolone in the treatment of radiation papillopathy: A prospective case series

Authors: Kelsey A. Roelofs, Matthew Larocque, **Ezekiel Weis**

Abstract Body:

Purpose: To evaluate the efficacy of treatment of radiation papillopathy using an algorithm combining intravitreal bevacizumab and triamcinolone. To the best of our knowledge, this combination treatment strategy has not previously been studied.

Study Design: Prospective, non-comparative, interventional case series.

Methods: Ethics approval from the Health Research Ethics Board for Alberta - Cancer Committee was obtained. Prospectively collected data from 201 patients with choroidal melanoma treated with plaque brachytherapy was reviewed to identify factors associated with the development of radiation papillopathy. Patients who developed papillopathy associated with poor vision (<20/40) were offered treatment with intravitreal bevacizumab (1.25mg in 0.05ml) at the time of diagnosis. Approximately one week later, these patients also received an intravitreal injection of triamcinolone (2mg in 0.05ml). Following this, patients were switched to monotherapy with monthly bevacizumab until the papillopathy resolved.

Results: Ten of the total 201 patients (4.98%) developed radiation papillopathy at a mean time of 563 ± 200 days from the date of plaque implantation. Of the 40 patients in the juxtapapillary sub-group (<1mm from optic nerve head), 3 patients (7.50%) developed radiation papillopathy. On multi-variate analysis, the only statistically significant factor predictive of developing radiation papillopathy was the total radiation dose to the optic nerve ($p = 0.045$). Papillopathy did not develop in any patients who received <30 Gy to the optic nerve head. One patient in our series had excellent vision (20/25) at the time of papillopathy and was not offered treatment. All of the remaining 9 patients had poor vision and were offered treatment. Of these, only 8 chose to proceed with injections. Of those who decided to pursue treatment, visual acuity (VA) 3 months prior to diagnosis, at the time of diagnosis of radiation papillopathy and following treatment and resolution of papillopathy were compared. Three of eight (37.50%) patients presented with a significant decline in vision (≥ 4 lines of Snellen VA) at the time of diagnosis compared to baseline. In this subgroup of patients, a significant improvement was seen following treatment. For these patients, there was no significant difference between their baseline visual acuity (logMAR 0.32 ± 0.15 ; Snellen equivalent = 20/42) and that recorded following resolution of papillopathy (logMAR 0.47 ± 0.21 ; Snellen equivalent = 20/60). Papillopathy for all eight patients who received treatment with bevacizumab and triamcinolone resolved in a mean of 6.75 ± 2.60 months.

Conclusions: In our prospective database of 201 patients who have undergone plaque brachytherapy, radiation dose to the optic nerve was the only significant predictive factor. Below a threshold of 30Gy, no patients developed papillopathy. Of the subset of patients whose loss of visual acuity could be attributed to the development of radiation papillopathy, a combined treatment algorithm employing both intravitreal bevacizumab and triamcinolone resulted in a significant improvement to their pre-papillopathy visual acuity. These prospective non-comparative results need further study with a controlled trial.

Abstract 32

Title: The Effect of Intravitreal Bevacizumab in Experimental Models of Ocular Inflammation

Authors: J. Thomas Toguri, Daniel Lafreniere, Rishi R. Gupta, Alan Cruess, Melanie Kelly, **Mark E. Seamone**

Abstract Body:

Purpose: VEGF-A contributes to ocular inflammation by increasing vascular permeability and by upregulating cellular adhesion molecules. Levels of VEGF-A are increased in Exogenous Endophthalmitis in humans. Experimental Endotoxin-Induced Uveitis (EIU) and Peptidoglycan Induced Uveitis (PIU) mimic gram-negative and gram-positive ocular infection respectively. The purpose of this manuscript is to determine if intravitreal (IVT) Bevacizumab decreases inflammation in EIU and PIU.

Study Design: Basic science/bench research

Methods: Six groups of BALB/c mice (n= 8-10 per group) were studied: wild-type (WT) control (saline, IVT), wild-type vehicle (VEH, α -trehalose dehydrate, polysorbate 20, sodium phosphate) WT EIU (LPS, 250 ng, IVT), WT EIU + Bevacizumab (BEV, 2.5 μ g, 25 μ g and 45 μ g IVT), WT PIU (2 μ g PGN) and WT PIU + BEV (2.5 μ g, 25 μ g and 45 μ g). Intravital microscopy was used to determine, in real-time, the number of leukocytes adhering to the iridial vascular endothelium. Eucleated eyes were analyzed via Luminex assay for the cytokines VEGF-A, TNF- α , IL-6, CXCL1, CXCL2, CXCL5-6, IL-10, IL-12p70, IL-33, IFN- γ , INF- α , IFN- β , CCL3, IL-2, IL-4, IL-5, CXCL10, CCL2, IL-1Ra, CCL5, IL-17, IL-33 and CCL11.

Results: A significant increase in leukocyte adhesion to iris microvasculature was observed 6 hours following induction of EIU and PIU ($p < 0.001$). Intravitreal injection of vehicle did not result in a significant change in leukocyte-endothelial adhesion ($p > 0.05$). In PIU, intravitreal injection of Bevacizumab did not decrease leukocyte-endothelial interactions. However, administration of intravitreal Bevacizumab (2.5 μ g) in EIU resulted in a significant decrease in leukocyte adhesion to microvasculature at 6 hours ($p < 0.05$).


Conclusions: Bevacizumab significantly decreased leukocyte adherence to iris microvasculature in BALB/c mice in EIU but not PIU, i.e. the anti-inflammatory effects of Bevacizumab were observed only in the setting of simulated gram-negative inflammation. These results are of significance as Gram-negative endophthalmitis is associated with severe ocular inflammation and worse visual outcomes than Gram-positive endophthalmitis. These results provide evidence for VEGF-A blockade as adjunct therapy to intravitreal antibiotics (and vitrectomy) in exogenous endophthalmitis.

Session Title: Structure and Function in Glaucoma: Where Are We Now?

Subspecialty: Glaucoma

Location: 517A

Session Time: Friday, June 16, 2017, 3:45 pm - 5:15 pm

33.  **HOT TOPIC** The Effects of Phacoemulsification on Intra-Ocular Pressure and Topical Medication Use in Patients with Glaucoma: A Systematic Review and Meta-Analysis • **James J. Armstrong**, Tom Wasiuta, Efsthia Kiatos, Monali Malvankar, Cindy Hutnik
34. The Future Is Here: How Digitally Integrated Visits via Teleglaucoma can be used by Community Ophthalmologists to care for More Glaucoma Patients in Less Time • **Kenman Gan**, Brian Stagg, Eric Maika, Heather Burnett, Murray Erasmus, Trevor Miranda, Mark Bourdeau, Michael Kim, Darren Behn

Abstract 33



Title: The Effects of Phacoemulsification on Intra-Ocular Pressure and Topical Medication Use in Patients with Glaucoma: A Systematic Review and Meta-Analysis

Authors: James J. Armstrong, Tom Wasiuta, Efstathia Kiatos, Monali Malvankar, Cindy Hutnik

Abstract Body:

Purpose: The optimal surgical management strategy for patients with co-morbid cataract and primary open angle glaucoma (POAG) is still greatly debated. Advocates of a staged surgical management plan prefer to perform the less risky cataract procedure first, followed by a glaucoma surgical intervention. It has been generally accepted that cataract removal lowers intraocular pressure (IOP), however there is conflicting evidence as to the clinical significance of these effects in patients with POAG. If these effects were better characterized and shown to be clinically significant, a staged surgical management plan may be an effective and safe consideration for many patients, allowing for IOP re-assessment after cataract removal and potentially removing the need for further glaucoma surgery. A systematic review and meta-analysis was undertaken in order to synthesize evidence quantifying the effect of phacoemulsification alone on post-operative intraocular pressure (IOP) and number of topical glaucoma medications in patients with co-morbid cataract and medically managed primary open angle glaucoma.

Study Design: Systematic review and meta-analysis.

Methods: Database search was carried out August 15, 2016 to identify potentially relevant studies. Screening for relevance was accomplished using Covidence systematic review software. Post-operative mean and percentage reduction in IOP (IOPR%) as well as mean reduction in topical glaucoma medications were computed. Meta-analysis was performed using Review Manager version 5.3. The standardized mean difference (SMD) was calculated as the effect size. Sub-group analysis was performed by grouping studies by baseline IOP. The outcome measures were changes in IOP and number of glaucoma medications.

Results: The search strategy identified 1613 records. After duplicate removal 957 records remained. After screening, 32 studies with 1826 subjects were included in quantitative synthesis. A 12% reduction in IOP from baseline occurred 6 months after phacoemulsification, 14% at 12 months, 15% at 24 months and 9% at 36 months. A mean reduction of 0.57 bottles per patient of topical glaucoma medication occurred 6 months after phacoemulsification, 0.47 bottles per patient at 12 months, 0.38 bottles per patient at 24 months and 0.16 bottles per patient at 36 months. Meta-analysis results showed a significant reduction in the IOP 6 months (SMD = 0.71, 95% CI: 0.54, 0.89], 12 months (SMD = 0.93, 95% CI: 0.65, 1.20]), 24 months (SMD = 0.97, 95% CI: 0.57, 1.38]) and 36 months (SMD = 0.49, 95% CI: 0.30, 0.68]) after phacoemulsification. Results showed a significant drop in topical glaucoma medications 6 months (SMD = 1.09, 95% CI: [0.55, 1.62]), 12 months (SMD = 0.86, 95% CI: [0.39, 1.33]), 24 months (SMD = 0.62, 95% CI: [0.18, 1.06]) and 36 months (SMD = 0.38, 95% CI: [0.15, 0.61]) after phacoemulsification.

Conclusions: Phacoemulsification lowers IOP in patients with co-morbid primary open angle glaucoma and cataract, and reduces these patient's dependency on topical glaucoma medications. These effects appear to last at least 36 months, although effects appear reduced after 1 to 2 years. These findings may support cataract removal before glaucoma surgery in patients with this co-morbidity.

Abstract 34

Title: The Future Is Here: How Digitally Integrated Visits via Teleglaucoma can be used by Community Ophthalmologists to care for More Glaucoma Patients in Less Time

Authors: Kenman Gan, Brian Stagg, Eric Maika, Heather Burnett, Murray Erasmus, Trevor Miranda, Mark Bourdeau, Michael Kim, Darren Behn

Abstract Body:

Purpose: 1. Describe one of the world's largest teleglaucoma programs. 2. Discuss how Digitally Integrated Visits can be utilized to maximize efficiency in glaucoma care.

Study Design: Prospective case series evaluating Primary Open Angle Glaucoma (POAG) and POAG suspects.

Methods: Data from the Care1 telemedicine program in British Columbia and Alberta.

Results: 2416 consecutive patients in 2 provinces with glaucoma or diagnosed as a glaucoma suspect (1055 males, 1307 females, mean age 57.8 years) were prospectively identified and received standardized testing (history, stereo fundus photos, OCT RNFL, Humphrey VF testing, applanation IOPs, pachymetry, refraction, and vision). In-person evaluation was done by one of 24 participating community optometrists, and telemedical evaluation was done by a participating ophthalmologist. 59 patients (2.4%) were requested to have an in-person assessment with an ophthalmologist for further assessment and treatment. Medical quality assurance via overreads by a second ophthalmologist was performed for 152 (6.3%) patients.

Conclusions: Governments have demonstrated enthusiasm for integrated models where patients do not see the specialist in-person at every visit. POAG is an incurable disease that requires continuous evaluation for progression. As our population ages, the ability for ophthalmologists to care for these patients may become limited. Current coping mechanisms include: 1. Reducing follow-up frequency beyond those recommended by guidelines; 2. Declining to accept new glaucoma referrals; and 3. Discharging the patient to non-ophthalmologists. Each option carries different limitations. We propose "Digitally Integrated Visits" (DIVs), where patients who require regular visits with an ophthalmologist have a proportion of their visits consist of glaucoma testing plus an encounter with non-ophthalmologist personnel. Retina specialists have utilized DIVs for many years. Based on our data, DIVs appear to be an accepted, efficient and beneficial method to help identify and monitor POAG patients/suspects.

Ophthalmologists can set up the equipment and personnel needed for glaucoma DIVs in 3 ways: 1. Traditional Telemedicine - purchasing equipment and training staff for a remote site. 2. Collaborative Telemedicine - making partnerships to utilize equipment and staff at an optometrist's office. 3. In-House Telemedicine - utilizing equipment and staff at their own office.

Session Title: Why you shouldn't have skipped your eyelid and orbital anatomy lectures! - Oculoplastic free papers

Subspecialty: Oculoplastic & reconstructive surgery

Location: 518AB

Session Time: Friday, June 16, 2017, 3:45 pm - 5:15 pm

35. Progressive optic nerve glioma: orbital biopsy technique using a surgical navigation system • **Ahsen Hussain**, Michael Wan, Dan DeAngelis
36. Localizing the Lost Rectus Muscle using the Connective Tissue Framework • **David Jordan**, Bazil Stoica
37. The Toronto Sick Kids experience with bleomycin sclerotherapy of orbital lymphatic malformations • **Stephanie A. W. Low**, Ahsen Hussain, Ralph Gnannt, Joao Amaral, Philip John, Dan DeAngelis
38. Sural nerve graft for neurotrophic keratitis- long term results • **Ezekiel Weis**, Avi Rubinov, Ahmed Alghoul, Farrah Yau
39. Frontal Nerve Branch Anatomy: Neurectomy as a Treatment for First Division Trigeminal Neuralgia • **Patrick Yang**, Jonathan Micieli, Ahsen Hussain, Sue Tucker, Harmeet Gill, Dan DeAngelis, Nancy Tucker
40. Use of Onyx for intraoperative embolization of orbital vascular malformation • **Vivian T. Yin**, Manraj Heran

Abstract 35

Title: Progressive optic nerve glioma: orbital biopsy technique using a surgical navigation system

Authors: Ahsen Hussain, Michael Wan, Dan DeAngelis

Abstract Body:

Purpose: Surgical navigation systems (SNS) are increasingly being used to improve intraoperative safety and patient outcomes in many surgical disciplines. Its application in orbital surgery however remains limited. We describe the case of a paediatric patient with a progressive optic nerve tumour where SNS played a critical role.

Study Design: Case presentation and review of the literature

Methods: An 11 year-old male patient presented with blurred vision in his left eye. His vision was 20/20 in the right eye and 20/50 in the left eye. This presentation demonstrated left eye proptosis, a left afferent pupillary defect and severe edema of the left optic nerve. Imaging revealed a heterogeneously enhancing mass involving the intraorbital portion of the optic nerve with minimal extension to the intracanalicular and pre-chiasmatic segments. In view of the significant risk to visual acuity, a biopsy was deferred and the patient commenced on chemotherapy. Close monitoring initially showed stability, however this was followed by a decline in vision and enlargement of the tumour with more posterior extension. Despite a change in the chemotherapeutic regimen, progression and functional decline continued. An orbital approach biopsy was therefore planned to determine the pathology.

Results: The initial biopsy procedure was performed via the medial orbit through a transconjunctival intraconal route. Unfortunately, the tissue was non-diagnostic and was only found to contain thickened dura with no lesional tissue. After discussion at multidisciplinary rounds, a lateral orbitotomy approach was planned and executed. SNS proved critical in allowing minimal access surgery, which avoided bone removal, as well as intraoperative guidance in avoiding biopsy of cystic parts of the tumour. Intraoperative frozen-section analysis confirmed lesional tissue and appropriate histopathological studies.

Conclusions: SNS are useful tools for the orbital surgeon in specific circumstances. These can include patient factors such as abnormal anatomy or disease factors such as apical location of the lesion or tumour characteristics. Furthermore, they may allow modification of surgical planning to minimize patient morbidity.

Abstract 36

Title: Localizing the Lost Rectus Muscle using the Connective Tissue Framework

Authors: David Jordan, Bazil Stoica

Abstract Body:

Purpose: To describe a technique for localizing a lost rectus muscle during strabismus surgery, retinal detachment surgery or post trauma with disinsertion or laceration of a rectus muscle.

Study Design: Single center, retrospective chart review of 5 patients.

Methods: In this single center, retrospective chart review, 5 patients were identified between January 2012 and June 2016 with a lost rectus muscle; 3 during strabismus surgery and 2 post trauma. The inclusion criteria included a lost rectus muscle during strabismus surgery, or a disinserted/lacerated rectus muscle following orbital trauma. The primary outcome measure was successful reattachment of the rectus muscle. This retrospective chart review was performed with Research Ethics Board approval and in compliance with the Declaration of Helsinki.

Results: The lost rectus muscle was identified in each patient and reattached to the globe by gently applying traction anteriorly at the conjunctiva/tenon edge using double pronged skin hooks. There was no instance of an additional lost or slipped muscle following the identification and reinsertion of the original lost/slipped rectus muscle. There was no instance where orbital fat was obscuring or blocking the view of the lost recti muscles. There were no other complications associated with the procedure.

Conclusions: We describe a simple and effective method to localize a lost rectus muscle based on a thorough knowledge of the orbital connective tissue framework.

Abstract 37

Title: The Toronto Sick Kids experience with bleomycin sclerotherapy of orbital lymphatic malformations

Authors: Stephanie A. W. Low, Ahsen Hussain, Ralph Gnannt, Joao Amaral, Philip John, Dan DeAngelis

Abstract Body:

Purpose: To report our experience with intralesional bleomycin as a primary or adjunctive treatment for orbital lymphatic malformations (OLM).

Study Design: Case series

Methods: Data was extracted from patient records of pediatric cases that underwent percutaneous sclerotherapy treatment of macrocystic OLM with ultrasound guided injection of bleomycin. Data included comprehensive eye examination findings and clinical photography completed before and after treatment sessions. Procedures were repeated depending on clinical response and recorded accordingly. Indications, procedure details, outcomes and complications are presented.

Results: Four female patients (ages 2, 2.5, 6 and 12) are included. All were diagnosed with unilateral OLM. The indication for each patient was an objective increase in proptosis with two having worsened keratopathy. All had significant restriction in ocular motility. One patient had surgical debulking as an emergent procedure before her first session. Patients received an average of 3.0 +/- 1.2 sessions of intralesional bleomycin, with the addition of doxycycline in one case and sodium tetradecyl sulphate 3% in another. Intraoperative aspiration of fluid ranged from 0-16ml with a mean injection volume of 5.1 ml +/- 3.2 ml of bleomycin. All patients demonstrated improvement in the macrocystic component although recurrence occurred in two patients during treatment sessions. Visual acuity and proptosis improved in all patients. There were no complications during the treatment course.

Conclusions: There is growing data in the use of this modality of treatment for OLM. We demonstrate intralesional sclerotherapy with bleomycin as being a safe and effective option, offering advantages over surgical management alone.

Abstract 38

Title: Sural nerve graft for neurotrophic keratitis- long term results

Authors: Ezekiel Weis, Avi Rubinov, Ahmed Alghoul, Farrah Yau

Abstract Body:

Purpose: To describe long term results of sural nerve graft for neurotrophic keratitis.

Study Design: Consecutive case series of patients with neurotrophic keratitis who were failing maximal medical treatment and surgically treated with a sural nerve graft to the neurotrophic cornea.

Methods: Nine eyes have undergone sural nerve graft surgery. Visual acuity and corneal sensation were recorded, as well as complications due to the surgical procedure.

Results: Out of nine eyes, six have a follow up period of at least one year. All six developed corneal sensation. Five of them had healing of their epithelial defects with subsequent improvement in corneal sensation. One patient although having improved corneal sensation, showed a decrease in visual acuity and developed a recurrent non-infectious corneal ulcer. There were no post surgical complications recorded during the follow up period.

Conclusions: These results provide further evidence that sural nerve grafting for neurotrophic keratitis is a new exciting surgical option that can be added to the armamentarium of the treating physician.

Abstract 39

Title: Frontal Nerve Branch Anatomy: Neurectomy as a Treatment for First Division Trigeminal Neuralgia

Authors: Patrick Yang, Jonathan Micieli, Ahsen Hussain, Sue Tucker, Harmeet Gill, Dan DeAngelis, Nancy Tucker

Abstract Body:

Purpose: First division trigeminal neuralgia (TN) is characterized by paroxysms of severe “electric-like” shocks of pain in the distribution of the nerve. Medical treatment is the first-line therapy but many patients become refractory or unable to tolerate side effects of the medications. For first-division TN, neurectomy of the frontal nerve branches through an upper eyelid skin crease incision is an effective surgical treatment. However, the location of these nerves in the anterior orbit must be better understood for such procedures to be a viable option.

Study Design: We dissected 19 fresh cadaver orbits to determine the anatomic location of the branches of the frontal nerve (supraorbital and supratrochlear nerves) in relationship to known anterior orbit landmarks.

Methods: 19 fresh cadaver orbits were obtained. Upper eyelid skin-crease incision was performed on all samples with meticulous dissection of the anterior orbits. Measurements and data included: 1) Trochlea location, 2) Supratrochlear nerve location, 3) Distance between supraorbital and supratrochlear nerve at anterior orbit and 5mm posteriorly, and 4) the blood supply in relation to the supraorbital nerve.

Results: Of the 19 cadaver orbits studied, the trochlea was at the orbital rim in 11 of 19 orbits, and 2.1mm+/-0.6mm posterior to the rim in 8 orbits. The supratrochlear nerve was 2.3mm+/-0.6mm lateral to the trochlea in 11 orbits, directly above the trochlea in 4 orbits, directly under the trochlea in 2 orbits and 1mm medial to the trochlea in 2 orbits. The distance between the supraorbital and supratrochlear nerve was 5.3mm+/-2.3mm when measured at the orbital rim, and 2.2mm+/-1.6mm when measured 5mm posterior to the orbital rim. The supraorbital artery was anterior to the nerve in 12 of 19 orbits, anteromedial in 5 orbits, posteromedial in 1 orbit, and not discernable in 1 orbit.

Conclusions: Based on our studies, making an upper lid skin crease incision and dissecting superiorly to find the trochlea as an anatomical landmark is a viable method of finding the supraorbital and supratrochlear nerve. The majority of supratrochlear nerves will be found approximately 2mm lateral to the trochlea. The supraorbital nerve will be approximately 2-5 mm lateral to the supratrochlear nerve either at the orbital rim or immediately posterior to the orbital rim. Better understanding of supraorbital and supratrochlear nerves in relation to anatomical landmarks of the anterior orbit will be instrumental in performing neurectomy as a treatment for first division trigeminal neuralgia refractory to pharmacological therapy.

Abstract 40

Title: Use of Onyx for intraoperative embolization of orbital vascular malformation

Authors: Vivian T. Yin, Manraj Heran

Abstract Body:

Purpose: To describe the use of intraoperative Onyx embolization in the surgical excision of orbital vascular malformation.

Study Design: Case series

Methods: We describe here 5 consecutive cases of complex orbital vascular malformations (varix, lymphangioma and cavernous hemangioma) managed with intraoperative Onyx embolization and excision.

Results: Five consecutive patients with symptomatic complex orbital vascular malformation was treated with either complete or debulking of malformation with intraoperative Onyx embolization. The mean age was 68.3 years with median follow up of 6 months. None of the patient undergoing debulking experienced any symptoms of inflammatory reaction from the residual Onyx material. None of the cases had enlargement of the residual malformation in the follow-up time.

Conclusions: The use of intraoperative Onyx embolization for the excision of complex orbital vascular malformation provide increase control of hemostasis.

Session Title: The Big Picture: Improving Glaucoma Care
Subspecialty: Glaucoma
Location: 517A
Session Time: Saturday, June 17, 2017, 10:45 am - 12:15 pm

Abstract 41

Title: Gonioscopy post laser Iridotomy: a healthcare quality improvement intervention study

Authors: Milime Keyeutat Tondji, Beatrice Des Marchais, Elianne De Larochellière, Ralph Kyrillos

Abstract Body:

Purpose: A review study made at the Centre Universitaire d'Ophtalmologie (CUO) in 2014, has revealed that the gonioscopy post YAG laser iridotomy treatment was documented only in 27,7% of the patient's record who undergo the treatment.

The aim of this study was to improve the quality of this practice in order to be able to identify patients who, despite the laser treatment, have narrow iridocorneal angle and therefore remain at risk of developing glaucoma.

Study Design: Quality improvement study


Methods: An interventional plan was implanted at the CUO for 17 weeks (from July 7, 2015 to November 3, 2015). This plan consisted of updating all ophthalmologists and the staff on the guidelines concerning the gonioscopy post and pre iridotomy in order for them to apply these recommendations during the patient's follow-ups.

The ophthalmologists performing a YAG Laser Iridotomy at the CUO (n = 20) have compiled data about the gonioscopy pre and post iridotomy in the forms specially designed for this plan.

Results: A total of 75 patients have had a YAG laser iridotomy during the period of this interventional plan. A gonioscopy post iridotomy was done on 49 of these patients (65.33%). The average time between the intervention and the follow up was 34.7 days (4.9 weeks). Of the 92 eyes treated, 13 (14.13%) have maintained a narrow irido-corneal angle thus at risk of developing glaucoma.

Conclusions: The outcome of this study mainly showed an increase of the rate of gonioscopy post iridotomy going from 25% to 65,33%. This new rate approximates the recommendations of the American Academy of Ophthalmology, which requires that any iridotomy must be followed with a gonioscopy in order to have a view of the iridocorneal angle. There by, an interventional plan can be an important and effective tool to improve the safety and the quality of care given to our patients.

Session Title: New Strategies for Old Corneal Issues
Subspecialty: Cornea, external disease & refractive surgery
Location: 518AB
Session Time: Saturday, June 17, 2017, 1:30 pm - 3:00 pm

42.  **HOT TOPIC** Corneal neurotisation reinnervates anaesthetic corneas and improves ocular surface health • **Asim Ali**, Simon Fung, Joseph Catapano, William Halliday, Emily Ho, Ronald Zuker, Gregory Borschel
43. A novel amniotic membrane-conformer assembly for acute Stevens-Johnson syndrome/ toxic epidermal necrolysis • **Simon S. M. Fung**, Michael Webb, Crystal Cheung, Hall F. Chew, Kamiar Mireskandari, Asim Ali
44. Vitritis after Boston keratoprosthesis type 1 implantation • **Davin Johnson**, Marie-Claude Robert, Soumaya Bouhout, Mona Harissi-Dagher
45. The Value of Corneoscleral Rim Cultures in Keratoplasty: A Systematic Review and Cost-Effectiveness Analysis Value of Corneoscleral Rim Cultures in Keratoplasty: A Systematic Review and Cost-Effectiveness Analysis • **Efstathia Kiatos**, William Hodge, James J. Armstrong, Stephen Tsioros, Monali Malvankar, Cindy Hutnik
46. The EyePrintPRO therapeutic scleral contact lens: indications and outcomes • **Michael T. B. Nguyen**, Vishakha Thakrar, Clara C. Chan
47. Feasibility of implementing a National Corneal Transplant Registry: 2016 Update on the Ottawa Pilot Study • **Reginald Robert G. Tan**, Yufeng Chen, Mohammed Taha, Pablo Morales, Harrish Nithianandan, George Mintsioulis, Setareh Ziai, Kashif Baig

Abstract 42



Title: Corneal neurotisation reinnervates anaesthetic corneas and improves ocular surface health

Authors: Asim Ali, Simon Fung, Joseph Catapano, William Halliday, Emily Ho, Ronald Zuker, Gregory Borschel

Abstract Body:

Purpose: Using a nerve graft that connects the eye with axons from the contralateral face, corneal neurotization reinnervates an otherwise anaesthetic cornea, resulting in improved corneal sensation. However, it remains unknown whether corneal neurotisation results in improved ocular surface health. Here we describe our experience with corneal neurotization, including post-operative ocular surface status data along with histological evidence of corneal reinnervation.

Study Design: Prospective interventional cohort study.

Methods: Fifteen patients receiving corneal neurotization were followed prospectively, documenting corneal sensation, ocular surface health, and visual acuity. Corneal sensation was determined using Cochet-Bonnet aesthesiometry and best spectacle corrected visual (BSCVA) was assessed. Histological and immunohistochemical analyses were performed on corneal specimens from three patients who underwent corneal transplantation subsequent to neurotization. In these specimens, presence of neuronal tissue was assessed with neurofilament antibody clone 2F11 (Dako, Canada) using the DAKO Omnis platform. These specimens were compared with corneal tissue obtained from six normal controls. In one of our cases, comparison was also made with corneal tissue obtained prior to neurotisation procedure.

Results: Median central corneal sensation improved from 0 mm pre-operatively (range, 0 to 10) to 60 mm (range, 0 to 60) post-operatively ($p < .001$). After neurotization, all patients experienced fewer episodes of persistent epithelial defects, and there was no further vision loss in any patient over a median follow-up of 16.4 months (range, 1.5 - 43 months). In 3 of our patients who subsequently underwent corneal transplantation to remove pre-existing corneal scarring, all had uncomplicated post-operative recovery and improved BSCVA after a median of 30 months (range, 24 - 33). Histological examination of explanted corneal tissue confirmed the presence of neurofilament+ axon profiles in the cornea after neurotization.

Conclusions: Corneal neurotization reinnervates the cornea, re-establishes corneal sensation and improves ocular surface health. Furthermore, the neuronal tissue after neurotization was able to regenerate after iatrogenic trauma, so that patients could recover from corneal transplantation in a manner similar to that in whom with normal corneal sensation. Thus, corneal neurotization permits successful visual rehabilitation, giving patients with neurotrophic keratopathy a new opportunity to regain their sight.

Abstract 43

Title: A novel amniotic membrane-conformer assembly for acute Stevens-Johnson syndrome/ toxic epidermal necrolysis

Authors: Simon S. M. Fung, Michael Webb, Crystal Cheung, Hall F. Chew, Kamiar Mireskandari, Asim Ali

Abstract Body:

Purpose: Utility of amniotic membrane (AM) for severe acute Stevens-Johnson syndrome (SJS)/ toxic epidermal necrolysis (TEN) is rapidly becoming accepted as standard of care. However, its insertion involves suturing to the ocular surface - a procedure that could be time-consuming and requires general anesthesia in patients who are often systemically unstable. We describe the design, technique and outcomes of a novel device that delivers amniotic membrane to the ocular surface at the bedside with topical anaesthesia in patients with SJS/TEN.

Study Design: Description of interventional technique and retrospective case series.

Methods: A set of different sized polymethyl methacrylate (PMMA) ocular conformers, with a central aperture for the cornea, was custom-designed to fit a range of forniceal contours. Anatomic fit for the right and left eyes were available in the trial set. A specially designed platform allows layers of AM to be wrapped and suture-fixated onto the conformer, forming a bilayered AM-conformer assembly. The platform design is openly available to all ophthalmologists to download for three-dimensional printing. The completed AM-conformer assembly can then be taken to the bedside and directly inserted to totally cover the ocular surface and conjunctival fornices. As a result, the need for general anaesthesia is alleviated and additional inflammation and trauma to the patient's ocular surface induced by suturing are avoided.

Results: Five patients (10 eyes) were treated with bilateral insertion of the AM-conformer assembly for SJS/TEN associated ocular surface inflammation. The procedure was successfully completed under topical anaesthesia in all eyes and the AM coverage lasted from 3-8 days. One patient (2 eyes) with severe disease had a second AM-conformer inserted after dissolution of the first AM within 4 days. No complications, such as infection, device extrusion, limbal stem cell deficiency, ocular surface failure or scleral melts were observed. All eyes maintained visual acuity $\geq 20/40$ at final follow-up.

Conclusions: This novel assembly allows rapid and efficient placement of amniotic membrane onto the ocular surface without the need for general anesthesia and direct suturing to the ocular surface. Therefore surgery on an otherwise inflamed conjunctiva and risks of anesthesia in critically ill patients with acute SJS/ TEN are negated. Patient with other acute ocular surface diseases, such as acute ocular chemical injury, may also benefit from this novel assembly.

Abstract 44

Title: Vitritis after Boston keratoprosthesis type 1 implantation

Authors: Davin Johnson, Marie-Claude Robert, Soumaya Bouhout, Mona Harissi-Dagher

Abstract Body:

Purpose: To describe the incidence, presentation, and clinical course of vitritis occurring after Boston keratoprosthesis (KPro) type 1 implantation.

Study Design: Retrospective chart review.

Methods: The medical records of all patients undergoing Boston KPro implantation by a single surgeon over a 4-year period between October 2008 and June 2012 were reviewed. Cases of vitreous inflammation were identified and classified as either postoperative (within 1 month of surgery without obvious endophthalmitis), reactive (secondary to ocular surface inflammation), idiopathic, or infectious endophthalmitis. The presenting features and postoperative course of all patients were reviewed.

Results: A total of 110 eyes (97 patients) underwent Boston KPro type 1 implantation with a median follow-up of 5.6 years (range 6 months - 8 years). Overall there were 21 episodes of vitritis occurring in 17 patients (3.7 episodes per 100 patient-years); 6 cases were postoperative, while 5 were reactive, 7 idiopathic, and 3 infectious endophthalmitis. Vitritis cases presented a median of 10 months after surgery (range 1 week - 7 years). Compared to patients not developing vitritis, those with vitritis were younger (50.8 vs. 62.2 years, $p=0.012$) but with a similar prevalence of autoimmune disease ($p=1.00$). Eyes with postoperative vitritis had a benign and short course, and were all managed with topical medications. Reactive vitritis occurred in association with infectious keratitis (4 cases) or corneal melting (1 case). Patients with idiopathic vitritis and endophthalmitis presented with similar symptoms of pain (6/7 cases of idiopathic vitritis, 3/3 endophthalmitis) and severe vision loss (mean 11.3 lines lost with idiopathic vitritis vs. 18.4 lines lost with endophthalmitis, $p=0.12$). The mean duration of inflammation in cases of idiopathic vitritis was 3.3 months; all patients later developed retroprosthetic membrane and 2 (29%) retinal detachment. Three of 7 patients with idiopathic vitritis had a vitreous tap, which was negative in all cases. The 3 cases of infectious endophthalmitis had a prolonged and severe course, with only 1 eye retaining functional vision.

Conclusions: Patients undergoing Boston KPro type 1 are at risk of postoperative vitreous inflammation which may present in the immediate post-operative period or years later. Cases of idiopathic inflammation may present similar to infectious endophthalmitis, and a low threshold should be taken for performing vitreous tap and injection of antimicrobials.

Abstract 45

Title: The Value of Corneoscleral Rim Cultures in Keratoplasty: A Systematic Review and Cost-Effectiveness Analysis Value of Corneoscleral Rim Cultures in Keratoplasty: A Systematic Review and Cost-Effectiveness Analysis

Authors: Efstathia Kiatos, William Hodge, James J. Armstrong, Stephen Tsioros, Monali Malvankar, Cindy Hutnik

Abstract Body:

Purpose: The purpose of this study was to examine the performance of donor corneoscleral rim cultures for predicting endophthalmitis or keratitis after corneal transplantation, and to determine whether there remains a significant advantage in continuing their practice.

Study Design: Systematic Review and Cost-Effectiveness Analysis

Methods: Comprehensive literature search was performed in MEDLINE-OVID, EMBASE-OVID, CINAHL, Web of Science, and Cochrane Library, along with a grey literature search. Keyword searches include: *keratoplasty*, *eye infections*, and *tissue culture techniques*. Articles were from any country, written in English, and published after the year 2000. We included all studies examining corneal button contamination and its association with endophthalmitis and keratitis post-transplantation. Last search was on October 20th, 2015 with weekly alerts set up until April 15, 2016. The primary outcome was incidence of postkeratoplasty endophthalmitis or keratitis. Extracted data from the studies were used to calculate sensitivity, specificity, positive predictive value and negative predictive value. Cost data from the London Laboratory Services Group (LLSG) Microbiology Lab in London, Ontario was used to calculate the cost-effectiveness of culturing donor rim cultures.

Results: A total of 1006 studies were identified and imported into Covidence. Ten studies were included in the systematic review and cost analysis. The cumulative sample size of all grafts performed was 7324. Of 7324 grafts, 679 had a positive rim culture, and 8 patients went on to develop post-keratoplasty infection. The positive predictive value of this test is 0.8%. The estimated cost of a positive test result is \$38.33 and the estimated cost of a negative test result is \$10.82. The cost to run all 7324 tests is estimated to be \$98,775.03, with an ICER of 48,008.82.

Conclusions: Preoperative donor corneoscleral rim cultures are unreliable predictors of post-operative infections, and are not useful in the clinical management of patients undergoing keratoplasty.

Abstract 46

Title: The EyePrintPRO therapeutic scleral contact lens: indications and outcomes

Authors: Michael T. B. Nguyen, Vishakha Thakrar, Clara C. Chan

Abstract Body:

Purpose: To describe indications and outcomes of patients fitted with the EyePrintPRO therapeutic scleral lens.

Study Design: Retrospective case series.

Methods: All eyes fitted with the EyePrintPRO therapeutic scleral lens at the Vaughan Family Vision Care, Vaughan, Ontario, Canada between 2014 and 2016 were included in the study. Ethics approval was obtained from the University of Toronto Ethics Board. Patient demographics, past medical and ocular history, indications for fitting, duration of wear, symptoms, and best corrected visual acuity (BCVA) were analyzed.

Results: Preliminary results included 14 eyes in total (10 patients) with a mean age at lens fitting was 49 years (range, 21-67). The average duration of wear was 12 months (range, 7-17). Indications for fitting included: limbal stem cell deficiency, post-PRK decentered ablation, pellucid marginal degeneration, Stevens Johnson Syndrome, keratoconus, dry eye, neurotrophic keratitis, exposure keratitis from facial nerve paralysis, ocular trauma, post RK symptoms, decentered corneal ablation visual symptoms, and corneal scarring. The majority of patients (7/10) had failed either corneal contact lens or conventional scleral lens wear due to inadequate comfort, vision, or a compromise to the cornea and ocular surface. Mean BCVA was 20/54 (range, 20/20-20/200). After the fitting, mean BCVA improved to 20/21 (range 20/10-20/60, $P=0.006$). Nine patients reported resolution of their blurry vision and all reported improvement of dry eye, eye redness, and pain symptoms. Six of the seven patients who wore other lenses prior to the EyePrintPRO reported greater comfort with EyePrintPRO wear and the ability to wear the lens throughout the day while only two experienced fogging and needed to clean the lens after 4-6 hours of wear.

Conclusions: This study is the first series in the literature to report on the variety of indications for the EyePrintPRO, a scleral lens which uses a mold technology with 3-D scanning to create a customized fit for patients with scleral and corneal irregularities. Patient outcomes in our series were positive. The comprehensive ophthalmologist should be aware that this new therapeutic scleral lens exists as an addition to the armamentarium of options for patients who have failed other lenses, have severe ocular surface disease, or have conditions where surgical intervention is best to be delayed or obviated.

Abstract 47

Title: Feasibility of implementing a National Corneal Transplant Registry: 2016 Update on the Ottawa Pilot Study

Authors: Reginald Robert G. Tan, Yufeng Chen, Mohammed Taha, Pablo Morales, Harrish Nithianandan, George Mintsioulis, Setareh Ziai, Kashif Baig

Abstract Body:

Purpose: There are currently only three countries in the world with corneal transplant registries: Australia, Sweden, and India. The purpose of this study is to implement a Canadian Corneal Transplant Registry by conducting an initial pilot study on a smaller scale in the Ottawa region. The objective of the study was to collate information that will help Canadian corneal surgeons improve graft survival and increase transplant success. The 2016 update will review issues and challenges in setting up the registry.

Study Design: Retrospective medical chart review and prospective case series.

Methods: All patients who underwent a corneal transplant procedure between 2008 and 2016 at the University of Ottawa Eye Institute were included in this study. Details of the donor graft, the procedure itself, indications for the transplantation, visual and surgical outcomes as well as post-operative complications were uploaded onto a de-identified online registry accessible to each participating corneal surgeon.

Results: 1208 patients were included in the study. Using the database, data can be extracted from the database easily: The type and number of surgeries (descemet membrane endothelial keratoplasty, descemet stripping automated endothelial keratoplasty, penetrating keratoplasty, deep anterior lamellar keratoplasty), the indications (fuchs endothelial dystrophy, pseudophakic bullous keratopathy), intraoperative and postoperative complications (graft failure, rejection, glaucoma, retinal detachment, broken suture), etc.

Conclusions: We believe that this registry captured the most valuable information for corneal transplant surgeons. This registry will help serve as the framework for a potential large-scale corneal transplant registry in Canada. Future directions for the study include recruiting corneal surgeons across Ontario and ultimately Canada to contribute to the registry.

Session Title: Retinopathy of Prematurity, Strabismus and Albinism

Subspecialty: Pediatric ophthalmology and strabismus

Location: 522ABC

Session Time: Saturday, June 17, 2017, 1:30 pm - 3:00 pm

48. Retrobulbar Anesthesia for Adjustable Strabismus Surgery in Adults • **Razek Georges Coussa**,
Milad Modabber, Andrei Dan, Michael Flanders
49. Outcomes of laser treatment for retinopathy of prematurity: a 10-year perspective • **Seema Emami**,
Maram Isaac, Kamiar Mireskandari, Nasrin N. Tehrani
50. Macular Appearance on Optical Coherence Tomography following Unilateral Bevacizumab Injection for Retinopathy of Prematurity • **Maram Isaac**, *Antony Clark, Tom Wright, Carol Westall, kamiar Mireskandari, Nasrin Tehrani*
51.  The Effect of anti-Vascular Endothelial Growth factor injection on growth and organ development of the neonate: In-vivo study • **Sina Khalili**, *Yulia Shifrin, Jingyi Pan, Jaques Belik, Kamiar Mireskandari*
52. Effect of Overcorrection on Ocular Alignment after Bilateral Lateral Rectus Recession for Intermittent Exotropia • **Sarit Khimdas**, *Monali Malvankar, Sapna Sharan*
53. Stage 3 Retinopathy of Prematurity Persisting Beyond 40 Weeks of Post Menstrual Age: Outcomes and Risk Factors for Treatment • **Robert Kouchehi**, *Maram Isaac, Nasrin Tehrani, Kamiar Mireskandari*
54. Foveal avascular zone parameters and perifoveal capillary density of retinopathy of prematurity versus normal eyes imaged with optical coherence tomography angiography • **Salina Teja**, *Zaid Mammo, Morgan Heisler, Andrew Merkur, Mirza F. Beg, Myeong J. Ju, Yifan Jian, Eduardo Navajas, Marinko Sarunic*

Abstract 48

Title: Retrobulbar Anesthesia for Adjustable Strabismus Surgery in Adults

Authors: Razek Georges Coussa, Milad Modabber, Andrei Dan, Michael Flanders

Abstract Body:

Purpose: Strabismus surgery in adults is traditionally done under general anaesthesia. Retrobulbar anaesthesia is a good alternative for patients with serious comorbidities such as sleep apnea, emphysema, obesity and cardiovascular problems. A busy, surgical, strabismus practice can be facilitated if it is not subject to the limited availability of general anaesthesia. To our knowledge, there are no published reports describing the efficacy and logistics of using retrobulbar anaesthesia for adjustable strabismus surgery. This study is designed to describe the response sequence of the eye following retrobulbar injection of xylocaine and to determine the earliest postoperative moment in time when a reliable assessment of ocular alignment and motility can be made for the purpose of initiating the adjustment procedure.

Study Design: Observational prospective study.

Methods: Thirty adult patients were selected to undergo strabismus surgery with retrobulbar anaesthesia. To date, data has been collected for 5 patients. They all received a retrobulbar injection of xylocaine 2% with epinephrine (3.0-5.0 mls) and a retroauricular lid block (3.0 mls). The following observations were made: onset of pupillary dilatation, ptosis, visual impairment and akinesia. Intraoperative level of analgesia and akinesia was documented. Postoperatively, the recovery times for normalization of the vision, ptosis, motility and pupil were recorded. The incidence of retrobulbar hemorrhage, vasovagal reaction and oculocardiac reflex was noted.

Results: The average onset times for pupil dilation, akinesia and ptosis were 27 ± 3 sec, 86 ± 22 sec and 45 ± 9 sec, respectively. Eighty percent of patients had a visual acuity of counting fingers (CF) at 90 sec after the retrobulbar injection. None of the patients demonstrated a oculocardiac reflex during surgery. The average times for the onset of postoperative pain, resolution of ptosis, recovery of ocular motility and normalization of pupil size were 4 ± 0.7 hr, 6 ± 1.4 hr, 6 ± 1.6 hr, 6 ± 1.5 hr, 6.5 ± 1.5 hr, respectively. All patients reported a visual acuity better than CF 6hr postoperatively.

Conclusions: Retrobulbar anaesthesia in the context of adult, adjustable strabismus surgery is a safe and effective technique. Excellent analgesia and akinesia is easily achieved. Suture adjustment can be done reliably six hours after retrobulbar injection. Normalization of pupil size coincides with complete recovery of ocular motility.

Abstract 49

Title: Outcomes of laser treatment for retinopathy of prematurity: a 10-year perspective

Authors: Seema Emami, Maram Isaac, Kamiar Mireskandari, Nasrin N. Tehrani

Abstract Body:

Purpose: To report the structural, visual, and refractive outcomes of a 10-year cohort of infants treated with laser photocoagulation therapy for retinopathy of prematurity (ROP).

Study Design: Retrospective chart review.

Methods: We reviewed charts for all infants who received laser treatment for ROP at our institution between January 2004 and March 2014. Patients who had a follow-up eye examination at 8-15 months corrected age (CA) and/or 3 years \pm 6 months of age were included in the study. All eyes treated for type 1 ROP were included in this analysis. Primary outcome was structural outcome as defined by ETROP criteria. Secondary outcomes were refractive error and monocular visual acuity (VA) reported in spherical equivalent (SE) and logMAR respectively. Data on demographics and ROP parameters were collected.

Results: A total of 114 infants (202 eyes) were treated for type 1 ROP in zone I (n=37; 18.32%) or zone II (n=165; 81.68%). Seventy-three were males (64.04%). Mean gestational age was 24.4 ± 1.6 weeks and mean birth weight was 759.49 ± 273.47 grams. Infants received treatment for ROP at a mean post-menstrual age of 37.71 ± 4.32 weeks.

Twenty-six infants (22.81%) were treated for unilateral type 1 ROP. Five infants (n=7/202 eyes, 3.47%) received retreatment for failure of regression. Five infants (n=6/202 eyes, 2.97%) had unfavourable structural outcome and had surgery for retinal detachment; 3 of these eyes were in zone I.

One hundred and seven infants (n=189 eyes) had an examination between 8-15 months CA. Mean refractive error was -3.24 ± 4.38 diopters (range -18.50 to +6.50, n=179/189 eyes). Mean monocular VA was 0.904 ± 0.35 logMAR (range 0.00 to 2.00; n=125/189 eyes). Eighty-six infants (n=151 eyes) had an examination at 3 years of age. Mean refractive error was -5.27 ± 7.89 diopters (range -21.00 to +2.25, n=141/151 eyes). Mean monocular VA was 0.405 ± 0.38 logMAR (range 0.00 to 1.90, n=113/151 eyes).

Conclusions: In this cohort, we report lower rates of unfavourable structural outcomes following treatment with laser photocoagulation for type 1 ROP when compared to ETROP. Our results highlight the value of measuring and reporting upon institutional treatment-related outcomes when obtaining informed consent for the management of ROP. This is particularly important when parents are offered the opportunity to choose between laser and anti-vascular endothelial growth factor injection as possible treatment modalities.

Abstract 50

Title: Macular Appearance on Optical Coherence Tomography following Unilateral Bevacizumab Injection for Retinopathy of Prematurity

Authors: Maram Isaac, Antony Clark, Tom Wright, Carol Westall, kamiar Mireskandari, Nasrin Tehrani

Abstract Body:

Purpose: Vascular endothelial growth factor inhibitors have become an alternative treatment for retinopathy of prematurity (ROP), particularly for disease in zone I. The purpose of this study is to assess the effect of intravitreal bevacizumab (IVB) on foveal development and macular thickness in infants treated for type 1 retinopathy of prematurity for unilateral disease and compare treated and untreated eyes of the same infant.

Study Design: Retrospective case-series.

Methods: All infants treated with IVB 0.625mg/0.025ml for unilateral type 1 ROP were reviewed. Infants in whom spectral domain optical coherence tomography (SD-OCT) imaging of the macula was successfully performed were included. Data on baseline characteristics including sex, gestational age, birth weight, and postmenstrual age (PMA) at the time of treatment were recorded. We compared macular thickness between treated and untreated eyes across a standard early treatment of diabetic retinopathy grid. Foveal structural development in treated and untreated eyes was also compared according to a standard grading system. Univariate analysis of foveal grade was performed using non-parametric tests. The difference in retinal thickness between treated and untreated eyes was examined using a linear mixed effects model. P values < 0.05 were considered significant.

Results: Seven infants were treated in one eye. All treated eyes had type 1 ROP; stage 3 in zone II with plus disease. All untreated eyes had type 2 ROP that regressed spontaneously. The mean \pm SD gestational age of infants was 25.3 ± 0.3 weeks with a birth weight of 776 ± 17.6 grams. Treatment was performed at a mean PMA of 37.2 ± 0.4 weeks. Foveal development was normal in three (43%) treated versus five (71%) untreated eyes ($P=0.59$). Three patients (43%) demonstrated asymmetric foveal development. In all three, the treated eye's fovea was more hypoplastic by one grade compared to the untreated eye. Mean central foveal thickness for treated and untreated eyes was $270.1 \mu\text{m} \pm 19.6$ and $253.0 \mu\text{m} \pm 27.2$ respectively ($P=0.15$).

Conclusions: In this small case series, there was increased foveal hypoplasia and a thicker fovea with intravitreal bevacizumab treatment compared to no treatment. Further study is needed to determine whether this reflects differences in ROP disease severity or a potential influence of IVB on foveal development.

Abstract 51



First Prize, COS Awards for Excellence in Ophthalmic Research

Title: The Effect of anti-Vascular Endothelial Growth factor injection on growth and organ development of the neonate: In-vivo study

Authors: Sina Khalili, Yulia Shifrin, Jingyi Pan, Jaques Belik, Kamiar Mireskandari

Abstract Body:

Purpose: Retinopathy of prematurity (ROP) is one of the leading causes of blindness in preterm infants. Conventional laser treatment results in permanent loss of peripheral retina and visual field, and does not always stop disease progression. Anti-vascular endothelial growth factor (VEGF) treatment is emerging as a promising treatment modality, but there is insufficient evidence on their safety for preterm neonates. We investigate the effect of high dose systemic anti-VEGF in rat pups with equivalent maturity to a 32 week neonate to assess body and organ development.

Study Design: In-vivo interventional study

Methods: Ethical approval by the Animal Care Committee of the Hospital for Sick Children was obtained. A single dose of either anti-VEGF antibody, AF-564 (30 µg/kg; R&D systems: n=7), or saline (control group; n=6) was administered to newborn rats intra-peritoneally on the first day of life and the pups' body weight and overall health was monitored daily. 14 days' post treatment, the serum concentration of anti-VEGF antibody was measured and the brain, lung, heart, kidney and liver of the animals were harvested and weighed. The heart was processed to measure the Fulton index (right ventricular assessment as a surrogate for pulmonary hypertension). All other organs were processed for mRNA expression of VEGF and VEGF receptors (R1&R2) using real-time quantitative qPCR with SYBR Select Master Mix (Thermo Fisher, Waltham, MA, US).

Results: All pups survived for 14 days' post injection and no group differences in body, brain, lung, kidney and liver weights were noted. The VEGF antibody was still detected in serum 14 days after the injection. The AF-564-treated pups exhibited increased total heart weight ($p<0.01$) and Fulton index ($p<0.05$). AF-564 exposure resulted in increase in lung ($p<0.002$) and kidney ($p<0.01$) VEGF mRNA expressions and the lung ($p<0.02$) VEGF-R1 and kidney ($p<0.001$) VEGF-R2 mRNA expression. No changes were seen in the liver and brain ($p=0.95$ and $p=0.83$ respectively for VEGF mRNA expression).

Conclusions: Anti-VEGF antibody exposure in newborn rats did not affect mortality, total body and organ weights, but was associated with pulmonary hypertension. Expression of lung and kidney VEGF and its receptors was increased, whilst the brain and liver did not show changes. Dosing experiments can now be targeted to assess safety threshold and at anti-VEGF dose used in human ROP treatment.

Abstract 52

Title: Effect of Overcorrection on Ocular Alignment after Bilateral Lateral Rectus Recession for Intermittent Exotropia

Authors: Sarit Khimdas, Monali Malvankar, Sapna Sharan

Abstract Body:

Purpose: Exotropic drift is common after bilateral lateral rectus recession for intermittent exotropia. Exotropic drift may result in deficits of binocular single vision including fusion and stereopsis. Our goal is to evaluate changes in the angle of deviation over time after bilateral lateral rectus recession for intermittent exotropia and compare the motor success rate with different initial postoperative deviations. We hypothesize that initial over-correction (ie. Making the patient slightly esotropic initially) may result in longer term motor success.

Study Design: Retrospective cohort

Methods: A chart review was performed and all patients who were strictly diagnosed as intermittent exotropia without any other ocular co-morbidity were selected. Ethics approval was obtained through Research Ethics Board. Preoperative ocular assessment and post-op ocular deviations were obtained at two months and one year. Post-operatively, patients were grouped into corrected, under-corrected (still exotropic) or over-corrected (now esotropic). Patients were followed for a minimum of one year and up to five years. Comparisons were made between the patient's initial state (corrected, under-corrected, over-corrected) and their long term motor success. Motor success was defined as ocular deviation within 10 prism diopters of orthophoria at the last follow-up visit.

Results: Twenty-six patients met our inclusion criteria. The average age at presentation was 5.5 years. Before surgery, 88% of patients had fusion for near, but only 23% had fusion for distance. Average stereoacuity was 200 seconds of arc. There was no indication of amblyopia in any patient. Preoperatively, all patients had a comitant intermittent exotropia ranging from 20-40 prism diopters at near and distance. 12 patients were corrected, 9 were over-corrected and 5 were under-corrected. There was no difference in the rate of motor success between the group that was corrected vs. over-corrected at near ($P=0.9$) or distance ($P=0.8$). Predictably, patients who were under-corrected had a better motor success rate than those under-corrected at their last follow up visit at near ($P=0.01$) and distance ($P=0.005$). Only two patients (8%) failed to demonstrate fusion at near (those that were under-corrected). At their last follow up, 80% of patients had fusion for distance and the average stereoacuity was 80 seconds of arc.

Conclusions: Bilateral lateral rectus recession is an effective procedure of choice for intermittent exotropia. Although exotropic drift does occur, long term motor success does not seem to be influenced if the patient is over-corrected initially. Our study indicates that strabismus surgeons can expect good motor control and improvements in binocular single vision by aiming to correct the patient for orthophoria.

Abstract 53

Title: Stage 3 Retinopathy of Prematurity Persisting Beyond 40 Weeks of Post Menstrual Age: Outcomes and Risk Factors for Treatment

Authors: Robert Koucheiki, Maram Isaac, Nasrin Tehrani, Kamiar Mireskandari

Abstract Body:

Purpose: To evaluate structural outcomes of infants with stage 3 (S3) retinopathy of prematurity (ROP) persisting beyond 40 weeks of post menstrual age (PMA) and identify morphological risk factors in infants who required treatment.

Study Design: Retrospective chart review.

Methods: We reviewed charts of all premature infants screened from January 2004 to July 2015. All infants with S3 ROP persisting beyond 40 weeks of PMA were included. Infants treated before 40 weeks PMA were excluded. We collected data on patients' demographics and ROP parameters at first, most severe and at last diagnosis of S3 ROP. We also collected data on structural outcome at last follow up as defined by ETROP criteria. In addition, the presence or absence of macular drag was noted. We performed univariate and multivariate analyses on risk factors associated with treatment.

Results: Out of 2356 screened infants, 115 infants (172 eyes) met inclusion criteria. Thirty three eyes (19.2%) required laser photocoagulation treatment and 139 eyes (80.8%) were observed. Sixteen eyes (9.3%) were treated for type 1 ROP. The 17 eyes (9.9%) which did not meet type 1 criteria were nevertheless treated for persistent temporal band of S3 (PTB-S3 group). When the observed group was compared to the PTB-S3 treatment group; multiple births (OR 3.86, 95% CI (1.05, 14.2), $p=0.04$), two or more clock hours of S3 (OR 26.74, 95% CI (1.52, 469.29), $p=0.025$), having vascular tortuosity and/or preplus at most severe diagnosis of ROP (OR 19.08, 95% CI (1.09, 334.81), $p=0.044$) were the risk factors for receiving treatment. No eye in both treated and observed groups had unfavorable structural outcome. 10/17 eyes that were treated for PTB-S3 and 1/139 eyes of the observed group had a macular drag. Temporal band of S3 crossing the horizontal midline (OR 19.74, 95% CI (1.12, 348.7), $p<0.04$) was statistically significant risk factor for having a macular drag.

Conclusions: In this cohort, stage 3 ROP persisting beyond 40 weeks of PMA was uncommon and associated with favorable structural outcome. Less than a tenth reached type 1 ROP. A similar number were treated for a persistent temporal band with high risk for macular drag. Persistence of a temporal band of S3 that extends more than two clock hours and crosses the horizontal midline were important factors for considering treatment.

Abstract 54

Title: Foveal avascular zone parameters and perifoveal capillary density of retinopathy of prematurity versus normal eyes imaged with optical coherence tomography angiography

Authors: Salina Teja, Zaid Mammo, Morgan Heisler, Andrew Merkur, Mirza F. Beg, Myeong J. Ju, Yifan Jian, Eduardo Navajas, Marinko Sarunic

Abstract Body:

Purpose: To evaluate foveal avascular zone (FAZ) parameters and perifoveal capillary density of optical coherence tomography angiography (OCT-A) images in eyes with retinopathy of prematurity (ROP) and normal control eyes.

Study Design: Prospective observational imaging study.

Methods: 12 normal patients without past or family ocular history were identified, as well as 2 patients with a history of ROP. 14 OCT-A images of the foveal region in each eye were acquired using a 1060nm Swept-Source (SS)-OCT prototype. Automated vessel segmentation was performed by classifying each pixel into vessel or non-vessel class using deep neural networks (DNNs). FAZ morphometric parameters (area, and minimum/largest diameter) and perifoveal capillary density were derived from the automated segmentations.

Results: 21 eyes of 12 normal patients had a mean age of 32.75 ± 9.45 . 2 eyes of 2 ROP patients had a mean age of 13.25 ± 2.50 . The minimum diameter of the FAZ in normal eyes was 0.470 ± 0.130 mm in contrast to the minimum diameter in ROP eyes of 0.128 ± 0.049 mm. The maximum diameter in normal eyes was 0.707 ± 0.159 mm whereas in ROP eyes was 0.275 ± 0.069 mm. The FAZ area in normal eyes was 0.740 ± 0.092 mm² in contrast to ROP eyes was 0.042 ± 0.016 mm². Perifoveal capillary density in normal eyes was 0.408 ± 0.080 while in ROP eyes it was 0.223 ± 0.039 .

Conclusions: Eyes with ROP had lower perifoveal capillary density, smaller area and smaller diameters compared to healthy normal controls. A larger number of ROP patients will be imaged before June 2018.

Session Title: Glaucoma Surgery: Free Papers

Subspecialty: Glaucoma

Location: 517A

Session Time: Saturday, June 17, 2017, 3:45 pm - 5:15 pm

55.  **HOT TOPIC** Episcleral venous outflow: a potential outcome marker for iStent surgery • *Cristina Bostan, Paul Harasymowycz*
56. Comparison of Two Transscleral Cyclophotocoagulation Treatment Settings in Glaucoma • *Mathieu Carrière, Andrew Toren*
57. Gonioscopy-Assisted Transluminal Trabeculotomy (GATT): The Western Canadian Experience • *Stephanie L. Cote, Bryce Ford, Patrick Gooi*
58. When is Evidence Enough Evidence? • *Cindy Hutnik, Jeffrey Chow, Monali Malvankar*
59. Efficacy and Safety of Standalone Ab Interno Gelatin Microstent Implantation with MMC Versus Standalone Trabeculectomy with MMC: Multi-Center Retrospective Cohort Design • *Matthew Schlenker, Husayn Gulamhusein, Alix Somers, Ina Conrad-Hengerer, Ingeborg Stalmans, Fritz Hengerer, Iqbal K. Ahmed*
60. Surgeon Perspectives and Learning Curve with an Ab Interno Gelatin Microstent • *Andrei-Alexandru Szigiato, Simrenjeet Sandhu, Gokulan Ratnarajan, Michael Dorey, Iqbal Ike Ahmed*

Abstract 55



Title: Episcleral venous outflow: a potential outcome marker for iStent surgery

Authors: Cristina Bostan, Paul Harasymowycz

Abstract Body:

Purpose: To determine whether the episcleral venous outflow (**EVO**) in locations of iStent placement, a potential iStent surgery outcome marker, is associated with postoperative intraocular pressure (**IOP**) and medication burden, and to identify EVO determinants.

Study Design: Retrospective cohort study.

Methods: Were included 151 glaucomatous eyes of 106 subjects operated for combined phacoemulsification and iStent placement. Demographic (age, sex, race) and clinical data (IOP, number of anti-glaucoma medications, glaucoma type and stage, maximal IOP, central corneal thickness) were collected preoperatively. Postoperatively, were recorded IOP, number of anti-glaucoma medications, and EVO scores (0: slow red blood cell (**RBC**) egress, no laminar flow; 1+: rapid RBC egress, no laminar flow; 2+: visible laminar flow) at one year, as well as occurrence of stent malpositioning and obstruction by peripheral anterior synechiae (**PAS**) at any time during follow-up. A Kruskal-Wallis test determined the association between EVO and postoperative IOP and medication burden. A multivariate ordinal logistic regression identified determinants of EVO.

Results: Patients with visible laminar flow (2+) were more likely to have a lower IOP and fewer medications at one year postoperatively than those with slow RBC egress and no laminar flow (0). No difference was found in postoperative IOP and number of medications when comparing patients having fast RBC egress and no laminar flow (1+) with patients from the other two EVO categories (0 and 2+). Identified determinants of EVO included iStent obstruction status (OR 5.95, 95% CI 2.04-17.4), early as opposed to advanced or worse glaucoma stage (OR 3.80, 95% CI 1.13-12.7), and preoperative and maximal IOP (OR 0.85, 95% CI 0.77-0.95 and OR 0.94, 95% CI 0.89-0.99, respectively). Demographic characteristics, glaucoma type, central corneal thickness and preoperative number of medications did not associate significantly with EVO.

Conclusions: Higher EVO scores were associated with better postoperative IOP and medication burden. The EVO evaluated using the grading scale proposed herein could thus be used as an outcome marker for iStent surgery. Patients with better preoperative IOP control, early rather than advanced glaucoma, and lesser tendency for PAS are more likely to have a higher EVO and might be better candidates for iStent placement.

Abstract 56

Title: Comparison of Two Transscleral Cyclophotocoagulation Treatment Settings in Glaucoma

Authors: Mathieu Carrière, Andrew Toren

Abstract Body:

Purpose: Transscleral cyclophotocoagulation (TSCPC) is effective in reducing intraocular pressure (IOP) but its use is limited by concern over complications from thermal damage and inflammation. Traditionally, the laser parameters are titrated to the sound of "pops" with a typical power of 2 watts for 2 seconds. The main objective of this study is to compare the efficacy of two different settings of TSCPC for elevated intraocular pressure: 2 watts for 2 seconds, short and fast (S&F) and 1.25 watts for 4 seconds, long and slow (L&S).

Study Design: Single center retrospective case-control study.

Methods: Patients with refractory glaucoma on maximum tolerated medical therapy who were treated with TSCPC were identified using billing records from 3 ophthalmologists. Intraocular pressure, and medication data were collected for a period of 12 months following treatment. Patients without any follow-up data available were excluded.

Results: Forty-five patients were included in the L&S group and fifty in the S&F group. The two groups (L&S, S&F) were comparable at baseline with respect to mean age (71.9 vs 70.7, $p=0.75$), mean IOP (29.2 vs 28.4 mmHg, $p=0.72$) and mean number of topical glaucoma agents (3.04 vs 2.96, $p=0.76$) respectively. At one month, IOP decreased in both groups (16.1mmHg and 19.37 mmHg, $p=0.16$). After 6 months, IOP was lower in both groups (L&S-13.9 mmHg ; S&F-18.8 mmHg) but differed significantly between groups ($p<0.009$). At 1 year follow-up, IOP was reduced from baseline by a comparable amount between the two groups (L&S-15.2 mmHg ; S&F-16.8 mmHg, $p=0.48$). At 1, 6 and 12 months, topical medications decreased significantly in the L&S group (2.4, 2.0, 1.8 agents). In the S&F groups, topical medications increased at 1 month (3.0 agents) and decreased non-significantly at 6 and 12 months (2.5, 2.5 agents) respectively. In patients receiving 13 laser shots or less, IOP decreased at 12 months follow-up from 28.5 mmHg with 3.2 agents at baseline to 14.7 mmHg ($p=0.06$) with 1.7 agents ($p=0.3$) in the L&S group and from 27.7 mmHg with 3.0 agents at baseline to 17.2 mmHg ($p<0.09$) with 2.1 agents ($p=0.4$) in the S&F group. In patients receiving 14 shots or more, IOP also decreased at 12 months follow-up from 29.3 mmHg with 3.0 agents at baseline to 15.3 mmHg ($p<0.004$) with 1.8 agents ($p=0.1$) in the L&S group and from 28.8 mmHg with 2.9 agents at baseline to 16.6 mmHg ($p<0.001$) with 2.8 agents in the S&F group.

Conclusions: Transscleral cyclophotocoagulation shows efficacy using both methods at a short and medium term. The L&S method appears to show a slightly greater efficacy as the numbers of glaucoma medications was considerably lower compared to the S&F group. Further research is needed to elucidate the optimal paradigm for TSCPC treatment parameters.

Abstract 57

Title: Gonioscopy-Assisted Transluminal Trabeculotomy (GATT): The Western Canadian Experience

Authors: Stephanie L. Cote, Bryce Ford, Patrick Gooi

Abstract Body:

Purpose: Minimally Invasive Glaucoma Surgery (MIGS) is a rapidly evolving field as it provides a safer, less invasive means of reducing intraocular pressure (IOP) than traditional surgery. However, most forms of MIGS involve surgical devices that add considerable cost per case. Gonioscopy Assisted Transluminal Trabeculotomy (GATT) is a conjunctival sparing, minimally invasive, ab interno approach to a circumferential trabeculotomy. GATT can be performed using 5-0 polypropylene sutures, which substantially reduces the cost per case.

Study Design: A retrospective case series.

Methods: This is a retrospective chart review of all open-angle glaucoma patients who underwent a GATT procedure by Dr. Bryce Ford and Dr. Patrick Gooi from two Western Canadian glaucoma centers between December 2014 and November 2016. Ethics has been obtained by the Conjoint Health Research Ethics Board (CHREB). The study parameters we looked at were age, gender, past ocular history, best corrected visual acuity (BCVA), IOP, number of glaucoma medications, and complications. With direct gonioscopic visualization, the procedure was performed by passing a 5-0 polypropylene suture circumferentially through Schlemm's Canal and then externalizing the suture, creating a 360 degree trabeculotomy.

Results: There were 107 cases of the GATT procedure included in the analysis. Average age was 54.5 ± 18.6 years, age range was 15 - 85 years, and 68.% were males. The mean pre-operative IOP of the patients in our study was 29.89 mmHg. The IOP was significantly lower at 1 month post-operatively and remained so up until 18 months post-operatively. The mean baseline number of glaucoma drops was 3.66 and drop usage significantly decreased at 1 month through to 18 months post-operatively. Of the 107 cases, five required additional light cyclophotocoagulation, two required trabeculectomy, and one required a Xen gel stent. One patient had hypotony due to a cyclodialysis cleft which required treatment with argon laser. The most common complication was hyphema, which occurred in almost all cases but cleared in all cases by 3 weeks postoperatively. There were no cases of endophthalmitis or suprachoroidal hemorrhage.

Conclusions: Our clinical experience with the GATT procedure shows this to be a safe and effective procedure for lowering IOP and decreasing glaucoma medications in patients with open angle glaucoma. GATT using a 5-0 polypropylene suture is a promising MIGS technique that is potentially more cost effective compared with other Schlemm's canal devices.

Abstract 58

Title: When is Evidence Enough Evidence?

Authors: Cindy Hutnik, Jeffrey Chow, Monali Malvankar

Abstract Body:

Purpose: To examine the availability of evidence for one of the earliest available minimally-invasive glaucoma surgical (MIGS) procedures.

Study Design: Systematic review and meta-analysis

Methods: A systematic review and meta-analysis was conducted for the use of the Trabectome as a solo procedure in the treatment of primary open angle glaucoma. The Trabectome, which was introduced in 2005, was chosen because it was one of the first MIGS procedures to be introduced.

Results: After an extensive screening of various databases published up to January 29, 2016, only 3 full text studies and one abstract remained eligible for inclusion. After the initial search, significant heterogeneity was noted in the types of studies, types of patients, stage of glaucoma, medications, co-morbidities, outcome measures, complication rates and overall study quality. A synthesis of the available data did show a potential benefit in terms of standard glaucoma treatment outcomes for patients with primary open angle glaucoma.

Conclusions: The Trabectome is an example of a MIGS procedure which has been available for over a decade but yet whose position in the glaucoma treatment paradigm remains unclear. The difficulty of obtaining evidence may be one of the many obstacles that limit a full understanding of the potential safety and/or efficacy benefits compared to standard treatments. The time has come for a thoughtful and integrated approach with stakeholders to determine optimal access to care strategies for our patients.

Abstract 59

Title: Efficacy and Safety of Standalone Ab Interno Gelatin Microstent Implantation with MMC Versus Standalone Trabeculectomy with MMC: Multi-Center Retrospective Cohort Design

Authors: Matthew Schlenker, Husayn Gulamhusein, Alix Somers, Ina Conrad-Hengerer, Ingeborg Stalmans, Fritz Hengerer, Iqbal K. Ahmed

Abstract Body:

Purpose: To compare retrospectively the efficacy and safety of standalone ab interno gelatin microstent implantation with MMC versus standalone trabeculectomy with MMC in consecutive eyes from January 2011 to July 2015 at 3 centers: Mississauga, Canada, Frankfurt, Germany, and Leuven, Belgium.

Study Design: Multi-center retrospective interventional cohort study.

Methods: 373 eyes in 311 patients were identified, 80 eyes excluded due to previous incisional surgery, atypical forms of glaucoma, age extremes, or follow-up less than 1 month. Primary outcome was time to failure (IOP outside of 6-17 on no medications) on two consecutive visits despite in-clinic maneuvers (including needling). Secondary outcomes included upper limit IOP cutoffs of 14 and 21 (with and without medications), complications, and reoperations. Baseline characteristics were compared using Fisher Exact tests and Wilcoxon rank sum tests. A Cox proportional hazards model accounting for correlation between eyes stratified by site and adjusted for baseline characteristics was used to compare the hazard rate of the two interventions.

Results: Baseline characteristics were similar, except more males, eyes ≤ 0.4 logMAR vision, and prior trabeculoplasty in microstent eyes. Median follow-up/survival was 20.2 months (IQR 16.5-28.6) for microstent eyes and 23.6 months (IQR 16.2, 33.2) for trabeculectomy eyes. The crude 12-month survival was 72.1% and 70.3% for IOP of 6-17 on no medications. The adjusted hazard rate (HR) for the microstent relative to trabeculectomy was 0.8 (0.5-1.4), and similar for the other outcomes with and without medications. On a univariate basis covariates associated with increased risk of failure were diabetes (HR 4.8 [2.6-8.8]) and non-Caucasian ethnicity (HR 2.4 [95% CI 1.5-3.9]), and on multivariate diabetes (HR 3.7 [1.9-7.3]). 17% and 10% had complications ($p=0.1$), though most were transient. 9% and 7% received reoperation ($p=0.7$).

Conclusions: In a large multi-center cohort we were unable to detect a difference in the risk of failure or safety profile between standalone ab interno gelatin microstent implantation with MMC and standalone trabeculectomy with MMC. The most important risk factor for failure was history of diabetes. Both procedures appear to be reasonable alternatives for uncontrolled glaucoma in eyes with no prior incisional surgery.

Abstract 60

Title: Surgeon Perspectives and Learning Curve with an Ab Interno Gelatin Microstent

Authors: Andrei-Alexandru Szigiato, Simrenjeet Sandhu, Gokulan Ratnarajan, Michael Dorey, Iqbal Ike Ahmed

Abstract Body:

Purpose: To evaluate and compare an ab interno gelatin microstent (XEN-45, Allergan) to other glaucoma surgeries from the surgeon's perspective.

Study Design: Cross-sectional survey study.

Methods: A survey instrument was developed to measure factors associated with learning and clinical use of the gelatin microstent. The survey was validated using input from 3 experienced glaucoma surgeons. Evaluation criteria included prior surgical experience, patient selection criteria, stepwise analysis of device implantation, post-operative care and incorporating the device into practice. 30 surgeons in Canada who used the gelatin microstent were identified and emailed the anonymous survey instrument (FluidSurveys, Survey Monkey).

Results: Surgeons were in early-mid career (11.8 ± 7.2 operating years) and experienced with filtration surgery (94.1% very comfortable). Most surgeons selected patients for implantation on the following criteria: moderate to advanced disease (88.2% and 76.5% of surgeons, respectively), diagnosis of POAG or PXG (70.6%), on 2, 3, or 4 glaucoma medications (70.6%, 75.5%, 70.6%, respectively), and had prior minimally invasive glaucoma surgery (70.6%). Creation of the scleral tunnel into the subconjunctival space and stent deployment were rated the most difficult steps of the surgery. Most surgeons (52.9%) required 6-10 cases to be comfortable with the procedure and felt it was easier to gain proficiency with gelatin microstent implantation than filtration surgery (94.1% agree or strongly agree).

Conclusions: A group of experienced glaucoma surgeons used an ab interno gelatin microstent to manage patients with moderate to advanced glaucoma and thought the procedure was easier to learn than traditional filtration surgery. We hope that this data, as well as key learning points shared by surgeons who participated, will be helpful to guide surgeons who are beginning to use this device.

Session Title: Pediatrics: Pot-Pourri

Subspecialty: Pediatric ophthalmology and strabismus

Location: 522ABC

Session Time: Saturday, June 17, 2017, 3:45 pm - 5:15 pm

61. Pediatric ocular injuries: a 3-year review of patients presenting to an emergency department in Canada • **Cyril Archambault**, *Assia Mekliche, Nicole Fallaha, Caroline Bélanger, Rosanne Superstein*
62. Systemic immunosuppression in juvenile idiopathic arthritis (JIA)-related and idiopathic uveitis: Impact on ophthalmic surgeries • **Crystal SY Cheung**, *Kamiar Mireskandari, Asim Ali, Earl Silverman, Nasrin N. Tehrani*
63. Community wide Photoscreening in Children using the Plusoptix S12C Automated Photoscreener • **Inas Makar**, *Afua Oteng-Amoako, Melanie Brimson-Theberge*
64. Surgery in paediatric traumatic cataracts: Visual and refractive outcomes in Traumatic Paediatric Cataracts: Visual and Refractive Outcomes • **Kamiar Mireskandari**, *Anne-Marie Yardley, Asim Ali, Nasrin N. Tehrani*
65. Ophthalmic needs of families living in family shelters in Toronto • **Fady Sedarous**, *Helen Dimaras, Maram Isaac, Myrna Lichter, Nasrin Tehrani*
66. Ophthalmic associations and diagnostic criteria of PHACE syndrome • **David W. Wei**, *Lauren Y. Chan, Alexandra Pennal, Elena Pope, Kamiar Mireskandari*

Abstract 61

Title: Pediatric ocular injuries: a 3-year review of patients presenting to an emergency department in Canada

Authors: Cyril Archambault, Assia Mekliche, Nicole Fallaha, Caroline Bélanger, Rosanne Superstein

Abstract Body:

Purpose: Ocular traumas represent the most common cause of non-congenital blindness in children. Of all the causes of ocular trauma, sports are the second most important in children less than 14 years old in Canada. The American Academy of Pediatrics and the American Association of Ophthalmology both recommend that all children enrolled in organized sport activities wear adjusted ocular protective equipment. However, 84% of children don't use any ocular protection in high-risk situations. Studies show that 46 to 90% of ocular traumas could be preventable with better education, supervision and ocular protection. To our knowledge, no data on ocular trauma in children exists in the Quebec population. The goal of our study is to gather data of the Quebec pediatric population to determine high-risk age groups, sports or other activities.

Study Design: This is a retrospective study evaluating all patients younger than 18 who were entered in the CHIRPP (Canadian Hospital Injury Reporting and Prevention Program) database with ocular or periocular trauma at Ste-Justine hospital between 2007 and 2010.

Methods: Basic demographic data was obtained, in addition to visual acuity on presentation and discharge from the ophthalmology service, delay before presentation to the hospital, use or not of ocular protection, mechanism and type of injury, type of sport (if applicable), geographical location of injury, and necessity or not for any ocular surgery. Statistical analysis was performed to determine the relationship between the aforementioned data.

Results: In total, 289 patients were included in this study. The mean age was 7.22 years old and 65.0% of patients presenting to the hospital were boys. More than half of all patients (50.0%) presented to the hospital within 6 hours of the injury. As for the nature of the injury, 43 patients' (14.9%) injuries arose in a sport-related activity. Among the patients injured during sports, hockey was most often associated with ocular traumas (19 patients, 44.2%). Extensive surgery to preserve vision was required in 8 patients (2.7%). 4 of these 8 patients had perforating ocular injuries. These four patients also had worse visual acuity outcome (20/40 or worse). Importantly, in 88.9% of traumas seen in the emergency room, ocular protection was not documented, addressed or discussed with the family.

Conclusions: Our study shows that ocular traumas occur frequently in the pediatric population and could be prevented with proper education and prevention strategies.

Abstract 62

Title: Systemic immunosuppression in juvenile idiopathic arthritis (JIA)-related and idiopathic uveitis: Impact on ophthalmic surgeries

Authors: Crystal SY Cheung, Kamiar Mireskandari, Asim Ali, Earl Silverman, Nasrin N. Tehrani

Abstract Body:

Purpose: There has been increasing use of systemic immunosuppressants to manage refractory uveitis in recent years. We investigate whether these reduced ophthalmic complications requiring surgery.

Study Design: Retrospective chart review

Methods: Retrospective chart review at single centre from 1988 to 2016. Patients were divided into 3 groups: 1) methotrexate only (Group 1; n=17), 2) methotrexate and systemic biologic, in which uveitis was diagnosed before 2007 (Group 2; n=16) and after 2007 (Group 3; n=20). Ophthalmic surgeries were stratified into cataract and glaucoma surgeries. One-way ANOVA was used to compare the means for continuous variables.

Results: The mean age of uveitis diagnosis was 7.9 ± 4.3 . JIA uveitis comprised of 52.8% (28/53) of the cohort. The duration between uveitis onset and methotrexate use was 19.5 ± 6.8 months for Group 1, 15.8 ± 7.5 months for Group 2, and 7.3 ± 3.5 months for Group 3 ($p=0.52$). The duration between uveitis onset and systemic biologic use is 64.5 ± 11.1 months for Group 2 and 17.9 ± 5.3 months for Group 3 ($p=0.0014$). The mean of total ophthalmic surgeries was 1.3 ± 0.32 for Group 1, 1.3 ± 1.0 for Group 2, and 0.3 ± 0.1 for Group 3 ($p=0.006$). The mean number of cataract surgeries is 0.6 ± 0.7 for Group 1, 0.8 ± 0.7 for Group 2, and 0.5 ± 0.7 for Group 3 ($p=0.9$). For glaucoma surgeries, mean number is 0.7 ± 1.3 for Group 1, 1.7 ± 1.6 for Group 2 and 0.1 ± 0.3 for Group 3 ($p=0.0009$). Mean total duration of using topical prednisone >3 times daily was 37.3 ± 12.8 months for Group 1, 63.9 ± 8.2 months for Group 2 and 9.5 ± 1.6 for Group 3 ($p<0.001$). Mean number of intravitreal corticosteroid injections is 1.13 ± 1.72 for Group 1, 0.71 ± 1.5 for Group 2 and 0.14 ± 0.47 for Group 3 ($p=0.05$). Uveitis grading at last follow-up was 0.6 ± 0.4 for Group 1, 0.3 ± 0.6 for Group 2 and 0.1 ± 0.3 for Group 3 ($p=0.38$).

Conclusions: Earlier introduction of systemic biologics is associated with: 1) fewer total ocular surgeries ($p=0.006$), particularly glaucoma surgeries ($p=0.0009$) 2) reduce duration of cataract-inducing dosage of topical corticosteroids ($p<0.001$) 3) possibly fewer number of intravitreal corticosteroid injections ($p=0.05$). The greater rate of glaucoma surgeries among Group 2 may be attributable to prolonged corticosteroid use. The earlier initiation of biologics after 2007 may reflect a greater acceptance of these agents and change in practice pattern over time.

Since 2007, earlier introduction of systemic immunosuppression in a step-wise manner was associated with better uveitis control and fewer ophthalmic surgeries, particularly glaucoma surgeries, in patients with JIA-related and idiopathic uveitis.

Abstract 63

Title: Community wide Photoscreening in Children using the Plusoptix S12C Automated Photoscreener

Authors: Inas Makar, Afua Oteng-Amoako, Melanie Brimson-Theberge

Abstract Body:

Purpose: The purpose of this study is to report the initial results of a community-wide photoscreening program offered in London Ontario for children age 18 months to five years using the Plusoptix S12C Photoscreener.

Study Design: Two thousand fourty six (2,046) children aged 18 to 59 months were recruited and 1985 children were screened in various community settings in London, Ontario.

Methods: Participants were screened with the Plusoptix S12C device from September 2015 to November 2016. Data will be presented for percentage of children referred for amblyogenic risk factors using the Arnold 2012 referral criteria. Screening locations, results, follow-up rate; as well as positive predictive value was determined.

Results: Data from 1985 children was analyzed. Mean age of children meeting the inclusion criteria was 34.5 ± 11.06 (18 - 58) months. 1807 (91.1 %) of all screened children had a pass result. 126 children (6.3%) were referred to an optometrist for further testing and 52 (2.6%) were inconclusive screens. 45% of all referrals identified by photoscreening were found to have anisometropia, 30% astigmatism and 9% strabismus, 9% myopia and 7 % amblyogenic hypermetropia. Follow up information was available from 54 children (43%) out of 126 children that the camera flagged as positive screens and cycloplegic refraction information was available only from 28 children. 45% of parents (children with positive screens) booked follow up with optometrist at 3 months follow up call and 48% of parents did not reply to follow up call at 3 months after screening.

Conclusions: Photoscreening identified in a timely manner, 126 children with amblyogenic risk factors previously unknown to be present. Multiple barriers exist for this positive finding to be beneficial to the child including: parent's compliance with booking optometrist visit, child's cooperation with optometrist and delivering optimal care from the optometrist by performing cycloplegic refraction. Photoscreening has already been proven to be a useful screening modality in this age group in multiple previous studies. The real benefit of photoscreening in reducing the incidence of amblyopia and or strabismus secondary to anisometropia and refractive errors will occur when universal coverage for all target age children is provided through public health as well as with parent's commitment to follow up and optometrist's commitment to cycloplegic refractions.

Abstract 64

Title: Surgery in paediatric traumatic cataracts: Visual and refractive outcomes in Traumatic Paediatric Cataracts: Visual and Refractive Outcomes

Authors: Kamiar Mireskandari, Anne-Marie Yardley, Asim Ali, Nasrin N. Tehrani

Abstract Body:

Purpose: To describe the visual outcome and refractive accuracy for paediatric traumatic cataract requiring surgical intervention and evaluate the factors that influence success of surgery.

Study Design: Retrospective cohort study

Methods: All children who underwent lensectomy for traumatic cataract between January 2000 and June 2015 were recruited into the study. Patients with less than 3 month follow up data were excluded. Data collected were demographic information, injury and surgical details, complications, visual and refractive outcomes. Univariate and multiple logistic regression were used to assess factors significant for poor visual and refractive outcomes.

Results: One hundred and six eligible patients were identified with mean age at lensectomy of 7.6 ± 3.9 years. Patients were followed for a median of 41 months (range 3-155). Seventy-nine suffered open globe injuries (OGI) and 27 closed globe injuries (CGI). The OGI group were significantly younger than the CGI group (mean age 6.9 vs 10.4 years; $p < 0.05$). Intraocular lens placement was performed in 94 children (69 OGI and 25 CGI). Final best-corrected visual acuity was 20/40 or better in 47 children (38% OGI vs. 63% CGIs). All OGIs had primary repair followed by lensectomy with intraocular lens (IOL) placement as a second (single or staged) procedure, whereas CGIs mostly had cataract surgery with IOL as a single procedure. Refractive outcome within one diopter of their target refraction was achieved in 30% of OGIs compared with 60% of CGI group. Open globe injuries and posterior segment injury were associated with worse final visual acuity (OR 2.8, $p = 0.03$; OR 9.1, $p = 0.03$) and refractive outcomes (OR 3.1, $p = 0.02$; OR 9.1, $p = 0.03$) respectively. Age less than 5 years was associated with worse final refractive outcome (OR 2.88; $p = 0.02$).

Conclusions: Children requiring surgical intervention for traumatic cataract can have good visual and refractive outcomes. Closed globe injuries and older age are factors associated with better visual outcomes and refractive accuracy.

Abstract 65

Title: Ophthalmic needs of families living in family shelters in Toronto

Authors: Fady Sedarous, Helen Dimaras, Maram Isaac, Myrna Lichter, Nasrin Tehrani

Abstract Body:

Purpose: To assess the prevalence of visual impairment and to identify unmet eye care needs in children and their parents/legal guardians (P/LGs) residing in Toronto family shelters.

Study Design: Cross-sectional study.

Methods: From each participating shelter, 10 English-speaking families with at least one child age 16 or younger were randomly recruited. Information regarding each family member's socio-demographics, medical history, visual complaints, and access to eye care was collected through a structured interview. Comprehensive visual screening and funduscopy were performed for P/LGs. All children underwent refraction, slit-lamp, ocular motility and dilated funduscopic examinations.

Results: The study was conducted in five shelters. 49 families participated in this study: 55 adults and 86 children. Mean age for adults was 34.9 ± 9.3 years (range, 17 - 60 years) and mean age for children was 6.1 ± 4.3 years (range, 1 month - 16 years). 90.9% of adults and 54.6% of children were females. Despite 49.1% of adults having previously owned corrective lenses, only 25.5% of adults owned them at the time of study. Amongst P/LGs, 38.5% reported dissatisfaction with their own vision and 6.5% had concerns that their children had eye problems. P/LGs reported less likelihood to access care for an eye problem in the last year than to access care for their children (adults 36.4%, children 81.8%). When analyzing the worse seeing eye, best corrected visual acuity (BCVA) was 20/50 or worse in 12.7% of adults. VA was measurable in 60.5% of children using LEA symbols or ETDRS charts. BCVA was 20/50 or worse in 7.8% of children. Upon examination, 43.6% of adults and 26.7% of children had pertinent ocular findings. In the adults that needed referral for further treatment, the commonest finding was refractive error (66.6%). Amongst the children, refractive errors (60.9%) and strabismus (17.4%) were the commonest reasons for further treatment. Other conditions that were identified included glaucoma, penetrating trauma, optic neuropathy, corneal opacity and epiretinal membranes in the adults and in children, nasolacrimal duct obstruction, optic nerve asymmetry, cataract, and phthisis bulbi.

Conclusions: There is lack of data on vision problems in homeless children living in shelters. This is the first study to assess ocular health in children residing in Canadian shelters. This study highlights a gap between P/LGs' perception of vision problems and actual percentage of children found to have ocular abnormalities. Identifying children with ocular needs and directing them to appropriate eye services in a timely fashion is an integral part of addressing health care needs of this vulnerable population.

Abstract 66

Title: Ophthalmic associations and diagnostic criteria of PHACE syndrome

Authors: David W. Wei, Lauren Y. Chan, Alexandra Pennal, Elena Pope, Kamiar Mireskandari

Abstract Body:

Purpose: To investigate the prevalence of ophthalmic complications in patients with PHACE (posterior fossa anomalies, hemangioma, arterial lesions, cardiac abnormalities/coarctation of the aorta, eye anomalies) syndrome.

Study Design: Retrospective chart review.

Methods: All patients diagnosed with definite PHACE syndrome who presented at the Hospital of Sick Children, Toronto, Canada between January 2000 to March 2016 were identified. Demographic data and ocular abnormalities that meet the major and minor diagnostic criteria of PHACE syndrome (persistent fetal vasculature, retinal vascular anomalies, "Morning Glory" disc anomaly, optic nerve hypoplasia, peripapillary staphyloma, sclerocornea, cataract, coloboma and microphthalmia) were collected. Other ophthalmic features and complications (ptosis, visual occlusion, proptosis, amblyopia, strabismus, refractive error) were also noted.

Results: A total of 24 patients were identified with a diagnosis of definite PHACE syndrome. The mean age at presentation was 3.66 (SD=7.44) months. The female to male ratio was 3:1. All patients had a segmental or large facial hemangioma more than 5cm in diameter. Orbital or ocular involvement of the hemangioma was found in 19 (79%) of the patients, involving the eyelids (n=19), orbit (n=8), and conjunctiva (n=5). Due to eyelid involvement, 15 patients had ptosis, with six resulting in visual obstruction. Only 2 (8%) of patients had ocular abnormalities that fit the major or minor diagnostic criteria for PHACE syndrome. The first patient had peripapillary staphyloma, a major criterion. The second patient had two minor criteria, cataract and Peters anomaly of the cornea, in the spectrum of sclerocornea. Amblyopia was found in 10 (42%) of patients. Treatments included optical iridectomy for Peters anomaly, refractive correction and patching for amblyopia. Strabismus developed in 5 (21%) patients, 4 of whom required subsequent corrective surgery.

Conclusions: Our findings suggest that ocular abnormalities that fit the PHACE syndrome diagnostic criteria are uncommon. We report the largest cohort for which ophthalmic findings are investigated, of which only 2 patients had findings that met the diagnostic criteria. Furthermore, these 2 patients would have been diagnosed with definite PHACE syndrome even without the ocular diagnostic criteria. Most eye abnormalities were complications secondary to the location of the hemangioma, including ptosis, proptosis, strabismus, and amblyopia. Therefore, regardless of diagnostic criteria, ophthalmologists should be consulted in all cases of suspected PHACE syndrome for ophthalmic complications to be promptly recognized and treated.

Session Title: Things That Make You Go Hmm: Latest Options in Refractive Corneal Surgery

Subspecialty: Cornea, external disease & refractive surgery

Location: 518AB

Session Time: Saturday, June 17, 2017, 3:45 pm - 5:15 pm

67. Outcomes of small-incision lenticule extraction (SMILE) in myopia • **Mohammad Hamid**, Michel Podteteney
68.  Corneal collagen cross-linking in the management of keratoconus in Canada: a cost-effectiveness analysis • **Victoria C. Leung**, Petros Pechlivanoglou, Hall F. Chew, Wendy Hatch
69. Phototherapeutic keratectomy: a review of indications and outcomes using a novel refractively neutral technique • **Michael T. B. Nguyen**, Armand Borovik, Nir Sorkin, David Rootman, Clara Chan
70. Higher Order Aberration (HOA) Guided Phototherapeutic keratectomy (PTK) and collagen crosslinking (CXL) in the treatment of keratoconus • **Victor Penner**, Kylee Lewis, Guillermo Rocha
71. Visual, Refractive, and Tomographic Outcomes of Adolescents Following Corneal Collagen Cross-Linking for Keratoconus • Esteban Santiago, **Vinay Kansal**, Yelin Yang, Kashif Baig
72.  **HOT TOPIC** A Head to Head Comparison of Corneal Collagen Cross Linking (CXL) alone versus CXL and Simultaneous Intracorneal RingSegments (CXL+ICR) versus CXL and Simultaneous Topography-Guided Photorefractive Keratectomy (CXL+TG-PRK) in Patients with Progressive Keratoconus, Pellucid Marginal Degeneration (PMD) and Laser In Situ Keratomileusis (LASIK)-induced Corneal Ectasia: A Prospective Single Center Trial • Neera Singal, **Stephan Ong Tone**, Raymond Stein, Matthew Bujak, Clara Chan, Hall Chew, Sherif El-Defrawy, Yaping Jin, Theodore Rabinovitch, David Rootman, Allan Slomovic, Wendy Hatch

Abstract 67

Title: Outcomes of small-incision lenticule extraction (SMILE) in myopia

Authors: Mohammad Hamid, Michel Podteteney

Abstract Body:

Purpose: To report the outcomes of small-incision lenticule extraction for myopia using the Visumax femtosecond laser at the first established Relex Smile center in Montreal.

Study Design: Retrospective noncomparative case series.

Methods: Consecutive myopic small-incision lenticule extraction procedures performed by two certified Relex Smile surgeons were evaluated with at least 3 months of follow up. Inclusions criteria were a preoperative spherical equivalent (SE) refraction up to -10.00 diopters (D) and corrected distance visual acuity (CDVA) of 20/40 or better. Postoperative refraction, uncorrected distance visual acuity and change in distance corrected visual acuity were analyzed.

Results: Three months data was available for 183 eyes. Preoperatively, the mean corrected SE was -5.02 D +/- 2.05 D (SD) (range -0.88 to -10.00) and the mean cylinder +0.58 +/- 0.68 D (range 0.00 to 3.75 D). Postoperatively, the mean SE was +0.10 +/- 0.33 D (range -1 to +1) and was within +/-0.75 D in 96% of eyes. The uncorrected distance visual acuity was 20/20 or better in 90% of eyes and 20/25 or better in 98% of eyes. One line of CDVA was lost in 1 eye (0.5%) and no eye lost more than one line.

Conclusions: The outcomes of myopic SMILE treatments up to -10.00 D performed in Montreal proved to be as safe and effective as previous studies.

Abstract 68



Title: Corneal collagen cross-linking in the management of keratoconus in Canada: a cost-effectiveness analysis

Authors: Victoria C. Leung, Petros Pechlivanoglou, Hall F. Chew, Wendy Hatch

Abstract Body:

Purpose: Recently approved for use in early progressive keratoconus (KC) in the United States, corneal cross-linking (CXL) is the first available treatment designed to halt progression of disease. Conventional management has relied on spectacles and contact lenses, and corneal transplant in the late stages of progressive disease. We compared the cost-effectiveness of early CXL to conventional therapy for KC, including penetrating keratoplasty when indicated (conventional management/PKP).

Study Design: Cost-effectiveness analysis using patient-level microsimulation state-transition models.

Methods: We modelled health states to reflect the natural history of KC, the impact of conventional management/PKP on expected costs and health outcomes, and the impact of early CXL. We included the following health states: 1.KC managed with spectacles and contact lenses; 2.Surgical intervention (CXL or PKP); 3.Post-operative success; 4.Post-operative vision loss/minor complication; 5.Post-operative irreversible vision loss/major complication; and 6.Death. We derived probabilities of moving between health states from studies with over 20 years of follow-up. Each health state had assigned expected costs and health outcomes (quality-adjusted life years gained, QALYs), based on published literature and expert consensus. 100,000 simulated individuals moved through the CXL and conventional management/PKP models in monthly cycles from time of diagnosis until death. We calculated the average individual costs incurred and QALYs gained from each model and compared their cost-effectiveness using an incremental cost-effectiveness ratio (ICER), where $ICER = (Cost\ of\ CXL - Cost\ of\ PKP) / (QALYs\ gained\ from\ CXL - QALYs\ gained\ from\ PKP)$. We applied a discount rate of 5% to calculate the present value of future costs and QALYs gained. We conducted one-way sensitivity analyses to test the validity of our model assumptions.

Results: Discounted costs and utilities associated with CXL vs. conventional management/PKP were: \$1784 and 16.32 QALYs vs. \$1174 and 15.73 QALYs, respectively. We calculated a comparative ICER of \$1034 per QALY gained from CXL. Our results remained robust to one-way sensitivity analyses.

Conclusions: CXL is a cost-effective alternative to conventional management/PKP in keratoconus. Our ICER of \$1034 per QALY falls well below the commonly accepted threshold range of \$50,000 USD per QALY that is considered cost-effective for new health interventions. This study is the first to provide economic evidence to support the adoption of CXL in Canada.

Abstract 69

Title: Phototherapeutic keratectomy: a review of indications and outcomes using a novel refractively neutral technique

Authors: Michael T. B. Nguyen, Armand Borovik, Nir Sorkin, David Rootman, Clara Chan

Abstract Body:

Purpose: To describe a novel excimer laser technique used to maintain refractive neutrality post phototherapeutic keratectomy (PTK) and to assess indications and outcomes of patients who underwent this treatment.

Study Design: Retrospective chart review

Methods: After preparation of the corneal surface, PTK with the refractively neutral technique was performed using 2 treatments - a -1D myopic treatment in conjunction with a +1D hyperopic treatment. Eyes undergoing PTK either with or without this refractively neutral technique at the TLC Yonge Eglinton Laser Centre between 2013 and 2016 were included in the study. Ethics approval was obtained from the University of Toronto Research Ethics Board. Patient demographics, indication for the PTK, laser settings and symptom resolution were assessed. Refraction and best corrected visual acuity (BCVA) were compared between the pre-operative and 6 month post-operative periods using paired-sample-t-tests. Refractive changes were compared between the group that underwent PTK with the refractively neutral technique and the group that underwent PTK without the refractively neutral technique using independent-sample-t-tests.

Results: Preliminary results included 78 eyes in total (52 patients) with a mean age at time of PTK of 52 years (range: 25 to 75). The most common indications for PTK included: recurrent erosion syndrome (30%), granular dystrophy (23%), and epithelial basement membrane dystrophy (16%). Pre-operatively, mean BCVA was 20/53 (range: 20/20 to CF). At six months follow-up after PTK, mean BCVA was 20/36 (range: 20/15 to 20/400, $p=0.07$). Symptom resolution occurred in 79.5% of eyes. Only 30 eyes (22 patients) had complete follow-up and were eligible for the part of the study comparing refractive outcomes. Using the refractively neutral technique, there was an absolute refractive change of 1.27 spherical equivalents (range: 0.5 to 2.13). In patients who underwent PTK without the refractively neutral technique, there was an absolute refractive change of 2.43 spherical equivalents (range: 0 to 6.38, $p=0.04$).

Conclusions: This novel technique provides an effective method for performing PTK in a variety of indications while maintaining refractive neutrality.

Abstract 70

Title: Higher Order Aberration (HOA) Guided Phototherapeutic keratectomy (PTK) and collagen crosslinking (CXL) in the treatment of keratoconus

Authors: Victor Penner, Kylee Lewis, Guillermo Rocha

Abstract Body:

Purpose: To demonstrate the clinical outcomes of phototherapeutic keratectomy (PTK) targeting higher order aberrations (HOA) when combined with collagen crosslinking (CXL) in the treatment of keratoconus.

Study Design: Case series of keratoconic eyes having undergone wavefront guided PTK/CXL at a single centre.

Methods: 28 keratoconic eyes of 21 patients were included. The Ocular Wavefront Analyzer from Schwind Eye-Tech-Solutions was used to evaluate the HOA. The coupled Schwind Amaris excimer laser then performed a PTK of no more than 40 microns using the measured HOA. CXL was then carried out respecting the standard of 400 microns of corneal thickness.

Results: The average age was 32 (range: 15-48) years. Uncorrected distance visual acuity improved from 0.58 to 0.31 logMAR ($p < 0.001$), with best corrected distance visual acuity improving from 0.03 to 0.02 logMAR ($p=0.7$). On manifest refraction, the average spherical component decreased from -1.87 to -1.40D (0.47 ± 2.12 $p=0.4$). Cylinder decreased from 2.18 to 0.87D (1.31 ± 1.14 D $p < 0.001$). All HOA decreased: Total HO 0.94 to 0.58 (0.36 ± 0.42 $p=0.05$); Spherical Aberration: 0.142 to -0.018 (0.160 ± 0.160 $p<0.001$); 2nd Astigmatism: 0.21 to 0.11 (0.10 ± 0.11 $p=0.02$); Coma: 0.80 to 0.42 (0.38 ± 0.47 $p=0.03$); Trefoil: 0.33 to 0.29 (0.04 ± 0.17 $p=0.7$).

Conclusions: A previous case series evaluating a bitoric ablation patterned PTK and CXL for keratoconic eyes demonstrated that there was a significant improvement in visual acuity. Using a bitoric pattern there was however no significant decrease in HOA. By utilizing HOA to guide the treatment all the HOA decreased post procedure. At the 6 month follow up the majority of HOA have decreased significantly. This is a small case series, but demonstrates a promising trend of improved HOA. Considering keratoconic eyes have very irregular surfaces with significant HOA, reducing these aberrations should improve best corrected quality of vision. Having longer follow up and greater numbers may demonstrate a clearer improvement.

Abstract 71

Title: Visual, Refractive, and Tomographic Outcomes of Adolescents Following Corneal Collagen Cross-Linking for Keratoconus

Authors: Esteban Santiago, **Vinay Kansal**, Yelin Yang, Kashif Baig

Abstract Body:

Purpose: To evaluate the visual, refractive and tomographic outcomes of corneal collagen cross-linking (CXL) in adolescent patients with keratoconus.

Study Design: Retrospective chart review.

Methods: The medical records of adolescent patients (aged from 12 to 18 inclusive) with keratoconus who underwent CXL between April 2009 and November 2015 were retrospectively reviewed. 86 eyes (57 patients) aged ≤ 18 years who underwent CXL for keratoconus were identified. Uncorrected visual acuity (UCVA), best corrected visual acuity (BCVA), manifest refraction, corneal topography, pachymetry and slit lamp biomicroscopy findings were evaluated pre-operatively and at 3, 6, and 12 months follow-up.

Results: 48 patients were male, with mean age of 16.2 ± 1.7 years. The mean follow-up was 10.6 ± 2.8 months. Compared to preoperatively, UCVA improved significantly at 12 months follow up (0.66 ± 0.66 to 0.10 ± 0.13 logMAR, $p=0.024$) BCVA improved at 12 months, although not statistically significant (0.14 ± 0.19 to 0.10 ± 0.15 logMAR, $p=0.15$). Mean sphere refraction also improved significantly at 12 months. Keratometry improved significantly at 6 months ($p<0.05$), and this was stable at 12 months. Progression of keratoconus occurred in 2 eyes at latest follow up. One patient was retreated with CXL at 45 months follow up. Multiple logistic regression model did not identify any significant risk factors for progression of keratoconus.

Conclusions: Corneal collagen cross-linking is both safe and effective in stabilizing the progression of keratoconus in adolescent patients, providing improvements in visual, refractive, and corneal tomographic measurements.

Abstract 72



Title: A Head to Head Comparison of Corneal Collagen Cross Linking (CXL) alone versus CXL and Simultaneous Intracorneal RingSegments (CXL+ICR) versus CXL and Simultaneous Topography-Guided Photorefractive Keratectomy (CXL+TG-PRK) in Patients with Progressive Keratoconus, Pellucid Marginal Degeneration (PMD) and Laser In Situ Keratomileusis (LASIK)-induced Corneal Ectasia: A Prospective Single Center Trial

Authors: Neera Singal, **Stephan Ong Tone**, Raymond Stein, Matthew Bujak, Clara Chan, Hall Chew, Sherif El-Defrawy, Yaping Jin, Theodore Rabinovitch, David Rootman, Allan Slomovic, Wendy Hatch

Abstract Body:

Purpose: To compare the preoperative to one year postoperative changes in best-corrected spectacle visual acuity (BCSVA) and maximum keratometry (K_{\max}) in patients with progressive keratoconus, PMD or LASIK-induced ectasia treated with CXL alone, CXL+ICR or CXL+TG-PRK.

Study Design: Prospective single center cohort study

Methods: We recruited subjects with mild to moderate keratoconus, PMD and LASIK-induced ectasia from June 2013 to March 2015. Two hundred and five eyes underwent CXL alone, 129 eyes underwent CXL+ICR and 119 eyes underwent CXL+TG-PRK. All subjects underwent preoperative and postoperative assessments at 1, 3, 6, and 12 months that included BCSVA, corneal topography and tomography. A statistical model was constructed to analyze change, including a random effect to account for the correlation between eyes for subjects who had procedures performed on both eyes.

Results: Preoperative mean BCSVA and K_{\max} for CXL alone, CXL+ICR and CXL+TG-PRK were as follows: 0.359 ± 0.146 logMAR (20/46) and $58.25D \pm 6.69D$, 0.401 ± 0.153 logMAR (20/50) and $60.29D \pm 5.72D$, and 0.373 ± 0.143 logMAR (20/47) and $56.19D \pm 4.98D$, respectively. At one year postoperatively, mean BCSVA had improved in the CXL alone, CXL+ICR and CXL-TG-PRK groups as follows: 1.3 lines (-0.126 logMAR; 95% confidence interval (CI), -0.154 to -0.098), 2.3 lines (-0.228 logMAR; 95% CI, -0.262 to -0.193), and 1.7 lines (-0.173 logMAR; 95% CI, -0.210 to -0.136), respectively. Comparisons of the differences in the magnitude of improvement in visual acuity were all statistically significant: CXL+ICR > CXL by 0.102 logMAR ($p < 0.0001$), CXL+TG-PRK > CXL by 0.047 logMAR ($p = 0.041$), CXL+ICR > CXL+TG-PRK by 0.055 logMAR ($p = 0.027$), which is a difference of approximately 1 line, 2 letters and 3 letters respectively. K_{\max} showed no change in the CXL alone group ($-0.08D$; 95% CI -0.68 to $0.53D$). The mean flattening of K_{\max} was $3.21D$ (95% CI -3.97 to $-2.45D$) for CXL-Intacs and $3.69D$ (95% CI -4.49 to $-2.90D$) for CXL+TG-PRK. The magnitude of change in K_{\max} was statistically significantly different between CXL+ICR and CXL alone ($p < 0.0001$) and between CXL+TG-PRK and CXL alone ($p < 0.0001$). There was no significant difference in K_{\max} between CXL+ICR and CXL+TG-PRK ($p = 0.5453$).

Conclusions: One year after surgery, mean BCSVA had improved in all three groups. The greatest improvement was in the CXL+ICR group (1 line more than CXL alone). CXL+TG-PRK improved more than CXL alone by about 2 letters and CXL+ICR improved more than CXL+TG-PRK by almost 3 letters.

K_{\max} flattened by over 3D in both the CXL-Intacs and CXL+TG-PRK groups. CXL alone showed stabilization in K_{\max} as reflected in no change in K_{\max} at 1 year.

Session Title: Eliminating Avoidable Blindness in Canada and Around the Globe

Subspecialty: International and public health ophthalmology

Location: 518AB

Session Time: Sunday, June 18, 2017, 1:30 pm - 3:00 pm

- 73.** Can the preoperative history and physical be omitted in low risk cataract patients without increasing risk of postoperative medical complications • **Lorne Bellan**, *Archie Benoit, Thomas Mutter, Rose Djukic, Marc Wallace, Gillian Toth, Caroline Dekeyster, Barbara Ginter-Boyce*
- 74.** Development of a tele-ophthalmology screening program for marginalized communities in Ontario • **Michael Brent**, *Tina Felfeli, Roy Alon*
- 75.** Economic Review of Teleophthalmology as a Screening Strategy for Chronic Eye Disease • **Aishwarya Sundaram**, *Noha Sharafeldin, Atsushi Kawaguchi, Sandra Campbell, Christopher Rudnisky, Ezekiel Weis, Matthew Tennant, Karim F. Damji*
- 76.** Cataract barriers and outcome in Narayani zone, Nepal: A Rapid Assessment of Avoidable Blindness (RAAB) Study • **Vivian T. Yin**, *Ram Prasad Kandel, Ken Bassett*

Abstract 73

Title: Can the preoperative history and physical be omitted in low risk cataract patients without increasing risk of postoperative medical complications

Authors: Lorne Bellan, Archie Benoit, Thomas Mutter, Rose Djukic, Marc Wallace, Gillian Toth, Caroline Dekeyster, Barbara Ginter-Boyce

Abstract Body:

Purpose: All cataract surgery patients have historically required a preoperative history and physical (H&P) from their family doctor. On January 1 2015, Misericordia Health Centre in Winnipeg implemented a validated, 12 item questionnaire to stratify patients into low and high-risk groups based on comorbidities and symptoms. High-risk patients were required to obtain an H&P and at the anesthesiologist's discretion, attend a pre-anesthetic clinic, while low-risk patients, representing approximately 60% of cases, did neither. The goal of this study was to ensure that the benefits of reduced resource use and expedited preoperative care in low risk patients did not result in an increase in postoperative complications.

Study Design: Retrospective, before/ after chart review study with composite primary outcome of emergency room visit, hospital admission or death within thirty days of cataract surgery.

Methods: Relevant ethics approvals were obtained to access registry data and charts. The study population included all cataract surgery patients from July through December 2014 (Before group) and from October through March 2015 (After group). An anesthesiologist and ophthalmologist reviewed charts for those patients who experienced an outcome. Both the chart associated with the outcome and the perioperative chart were reviewed.

Results: There were 2254 patients in the Before group versus 2392 in the After group. Primary outcomes occurred in 152 and 155 patients respectively. In the Before group 2 patients had strokes or TIAs, 4 had an acute coronary syndrome(ACS) , 2 had cardiac arrest and none died. In the After group these numbers were 5,5,1,and 3 respectively. There were no significant differences ($p > 0.25$, Fisher's exact test) in outcomes between the before and after groups. All but one (an ACS) serious adverse events in the After group were in high-risk patients. The vast majority of outcomes were minor ailments, pre-existing conditions, or ocular complaints.

Conclusions: Foregoing a preoperative H&P and pre-anesthetic clinic visit in low risk patients as identified by a simple questionnaire did not significantly increase complication rates in cataract surgery patients . Serious adverse events remained rare. These findings support the continued use of this strategy.

Abstract 74

Title: Development of a tele-ophthalmology screening program for marginalized communities in Ontario

Authors: Michael Brent, Tina Felfeli, Roy Alon

Abstract Body:

Purpose: Diabetes currently affects approximately 2.4 million Canadians, and its management along with associated complications has a burden of \$9 billion annually on the healthcare system. The prevalence of diabetes is highest in areas that have lower income levels, higher unemployment rates, higher proportion of racialized groups and higher immigration rates. It is estimated that 36.8% of individuals living with diabetes in large cities are not screened for diabetic retinopathy (DR). Development of a tele-ophthalmology program for marginalized communities in Ontario will serve as an effective outreach and engagement strategy to target under screened groups.

Study Design: Program development and evaluation.

Methods: In partnership with seven primary care organizations within First Nation territories and Toronto Central Local Health Integration Network (LHIN), mobile screening clinics were developed. Training was provided to technicians for history taking, visual acuity testing, intraocular pressure measurement, and use of imaging modalities such as fundus camera and OCT. All health information and images were securely stored on the Ontario Telemedicine Network (OTN) and interpreted by a retina specialist remotely. Recommendations for follow-up with tele-ophthalmology or in person referrals to appropriate eye care providers was made accordingly. The study was approved by the University Health Network Research Ethics Board.

Results: A total of 435 patients (and 75 follow-ups) with a mean age of 56.3 ± 11.5 years and visual acuity of $0.21 \log\text{MAR} (20/30) \pm 0.21$ were screened between September 2013, and November 2016. Patients from First Nation territories made up 12.6% of the individuals screened. The mean diabetes duration was 7.9 ± 6.2 years with a mean HbA1c $7.9 \pm 1.9\%$. Among the patients screened, 78.6% were under the age of 64 years, and 32.9% reported no previous eye examination. Visual acuity of 20/70 or worse was documented in 18.6% in at least one eye, while 4.4% and 0.9% of patients were legally blind in one or both eyes, respectively. The tele-ophthalmology program identified 111 patients with DR and 17 patients with diabetic macular edema. Overall, diabetic and non-diabetic ocular pathologies including cataract, age-related macular degeneration, and glaucoma were identified in 58.6% of the patients who had previously reported no known ocular disease. Despite best efforts to contact patients, the no show rate following the initial screening was 15.3% for all referrals received from primary healthcare providers. The program satisfaction rate was 96.2%.

Conclusions: This tele-ophthalmology screening program has effectively identified significant ocular pathologies in individuals with diabetes living in low income, marginalized communities. There is an ongoing need for tele-ophthalmology screening programs for under screened groups in both urban and remote regions of Ontario.

Abstract 75

Title: Economic Review of Teleophthalmology as a Screening Strategy for Chronic Eye Disease

Authors: Aishwarya Sundaram, Noha Sharafeldin, Atsushi Kawaguchi, Sandra Campbell, Christopher Rudnisky, Ezekiel Weis, Matthew Tennant, Karim F. Damji

Abstract Body:

Purpose: Over the last decade, interest in telemedicine applications has been on the rise with tele-ophthalmology well positioned to be one of the top candidates. Identification of associated costs of tele-ophthalmology over traditional forms of screening is a cornerstone to its implementation. Economic evaluation of cost effectiveness of the technology, however, is lacking. To address this gap, we conducted an up-to-date systematic review to evaluate the cost effectiveness of tele-ophthalmology compared with other methods of patient screening and management for chronic eye diseases in adults.

Study Design: Systematic Review

Methods: A structured search was executed by an expert librarian of the following databases: MEDLINE, EMBASE, EBM Reviews including Cochrane Databases using controlled vocabulary and key words representing the concepts "telehealth" and "ophthalmology". Full article review of the selected articles yielded 20 cost-related articles, which were systematically reviewed by two reviewers. Two reviewers independently assessed trial quality and extracted data. We used the 10-item Drummond *et al.*'s checklist to assess the methodological quality and risk of bias.

Results: A total of 16 articles fulfilled the inclusion criteria and were retained for the narrative review: 12 on diabetic retinopathy (DR), 2 on glaucoma, and 2 on all chronic eye diseases. Tele-retinal screening for DR yielded higher cost savings when compared with traditional clinic examination. The study settings for DR included: urban, rural and remote settings, community, hospital, and health mobile units. The most important determinant of cost-effectiveness of tele-ophthalmology was the prevalence of patients with disease screened, indicating an increase of cost savings with the increase of screening rates. The required patient pool size to be screened varied from 110 to 3,500 patients. Other factors found to potentially influence cost-effectiveness of tele-retinal screening were patient age, screening frequency, and full utilization of the equipment. Tele-glaucoma screening and tele-medical home monitoring were more cost-effective compared to in person examination or hospital admission of glaucoma patients, respectively. Similarly, increasing number of patients targeted for screening would yield more cost savings.

Conclusions: This systematic review provides evidence in support of cost-effectiveness of tele-ophthalmology for screening of DR and glaucoma and demonstrates its potential in increasing accessible screening especially in rural and remote populations. Special selection of the targeted screening population could potentially better optimize the cost-effectiveness of tele-ophthalmology.

Abstract 76

Title: Cataract barriers and outcome in Narayani zone, Nepal: A Rapid Assessment of Avoidable Blindness (RAAB) Study

Authors: Vivian T. Yin, Ram Prasad Kandel, Ken Bassett

Abstract Body:

Purpose: The Nepal Blindness Survey in 1981 showed the highest prevalence of blindness in the Narayani zone. A 2006 survey in Lumbini and Chitwan confirmed the prevalence of blindness to be as high as 2.3%, compared to the nationwide prevalence of 0.84% reported in 1981. We aim to evaluate the cataract surgical coverage, barriers and outcome among adult population in Narayani zone, Nepal, utilizing the Rapid Assessment of Avoidable Blindness (RAAB) methodology after 10 years of effort on improving eye care service.

Study Design: Cross-sectional observational study

Methods: Five thousand study participants age 50 years and older were randomly selected by population-weighted cluster design. Participants underwent visual acuity (VA) measurement and ocular examination by three teams, each with an ophthalmologist in door-to-door household lists following standard RAAB protocol. Field data were collected using smart phones and data analysis was carried out with RAAB5 software. Comparison in cataract surgical coverage, barriers to cataract surgery and surgical outcome were made between the inland districts (ID), Chitwan and Makawanpur, and the bordering districts (BD), Bara, Parsa and Rautahat.

Results: The cataract surgical coverage for VA<3/60 was equal in men and women in ID but showed a gender differential in the BD, with 96.8% in male and 90.6% in female. The primary barrier to cataract surgery were fear (35.7%) and cost (32.1%) in ID compared to need not felt (63.8%) and cost (26.3%) in BD. VA >6/18 after cataract surgery were similar in ID and BD at 83.7% and 86.5%, respectively. Surgeries were done in charity/voluntary hospital (>87%) with IOL (97%).


Conclusions: Although there was surprisingly overall higher cataract surgical coverage in the BD, the gender inequality was seen in the boarder districts and no in the inland districts. The cultural difference between the two was also seen in the barriers to cataract surgery. Both showed similar outcome, location in surgery and type of surgery.

Session Title: Exploring the Frontiers of Component Surgery of the Cornea

Subspecialty: Cornea, external disease & refractive surgery

Location: 519AB

Session Time: Sunday, June 18, 2017, 1:30 pm - 3:00 pm

77. Outcomes at one-year follow up of hemi-descemet membrane endothelial keratoplasty • **Javiera Compan**, Yelin Yang, Pablo Morales, Esteban Santiago, Kashif Baig
78.  **HOT TOPIC** Descemetorhexis alone or with Ripasudil salvage for Fuchs' Endothelial Dystrophy • **Greg Moloney**, C Petsoglou, M Ball, Y Kerdraon, R Hollhumer, N Spiteri, Simon Paul Holland
79. Aberrations Induced By Descemet Membrane Endothelial Keratoplasty (DMEK) • **Mohammed Taha**, Reginald Tan, Pablo Morales, Kashif Baig
80. DMEK surgery: A simple way to forego peripheral iridotomy • **Julia Talajic**, Mathieu Mercier, Michele Mabon, Isabelle Brunette, Johanna Choremis
81. Comparison of punching techniques for preparation of endothelial grafts for descemet membrane endothelial keratoplasty • **Reginald Robert G. Tan**, Mohammed Taha, Pablo Morales, Esteban Santiago, Nima Noordeh, Yelin Yang, Kashif Baig
82. Preliminary outcome of Hemi-Descemet membrane endothelial keratoplasty (DMEK) and Quarter-DMEK for Fuchs endothelial dystrophy • **C Maya Tong**, Nadine Gerber-Hollbach, Lamis Baydoun, Thomas M. Muller, Jessica T. Lie, Isabel Dapena, Gerrit R. J. Melles

Abstract 77

Title: Outcomes at one-year follow up of hemi-descemet membrane endothelial keratoplasty

Authors: Javiera Compan, Yelin Yang, Pablo Morales, Esteban Santiago, Kashif Baig

Abstract Body:

Purpose: To evaluate the one-year outcome after hemi-descemet membrane endothelial keratoplasty (hemi-DMEK) at a single tertiary center

Study Design: Retrospective interventional case series

Methods: Six eyes of six patients [Fuchs endothelial dystrophy (n=4), pseudophakic bullous keratopathy (n=1) and descemet membrane detachment during cataract surgery (n=1)] who underwent hemi-DMEK at the Ottawa Eye Institute. With 12 to 16 months follow-up. Main outcome measures are best-corrected visual acuity (BCVA), endothelial cell density (ECD), and intraoperative and postoperative complications.

Results: Hemi-DMEK was successful in 5 out of 6 eyes; one eye had persistent graft detachment despite rebubbling and underwent repeat DMEK. All 5 successful grafts reached a BVCA \geq 20/30 and BVCA \geq 20/25 at 6 months and one-year postoperative follow-up, respectively. Mean cumulative decrease in ECD postoperatively is 34% at six months and 53% at one year. No postoperative complications were encountered.

Conclusions: Hemi-DMEK may be a feasible method to increase availability of donor cornea with stable visual outcomes over long term.

Abstract 78



Title: Descemetorhexis alone or with Ripasudil salvage for Fuchs' Endothelial Dystrophy

Authors: Greg Moloney, C Petsoglou, M Ball, Y Kerdraon, R Hollhumer, N Spiteri, Simon Paul Holland

Abstract Body:

Purpose: To report the safety and efficacy of Descemetorhexis without grafting as a primary intervention in Fuchs' Dystrophy, and the use of Ripasudil as a salvage agent in non clearing cases

Study Design: Retrospective Study

Methods: 12 eyes of 11 patients underwent a central Descemetorhexis not exceeding 4mm. Corneal clearance and visual parameters were recorded at 1, 2, 3, 6 and 12 months. Cases failing to clear by month 2 were considered for salvage treatment. This consisted of a trial of two formulations of topical ROCK inhibitor. Endothelial keratoplasty was planned as the final salvage procedure in unsuccessful cases.

Results: 9 of 12 eyes cleared spontaneously between 2 and 6 months. 1 eye failed to clear by month 5 and topical Y-27632 was administered, without success. Endothelial keratoplasty was performed. In 2 eyes healing stalled at 3 months and 5 months. In both cases topical Ripasudil administered 6 times/day for 2 weeks resulted in complete corneal clearance. In cases achieving corneal clearance, BSCVA improved from a mean of 0.26 to 0.125 (logMAR) with subjective improvement in quality of vision.

Conclusions: In Fuchs' dystrophy with visual degradation due to central guttata, Descemetorhexis without grafting is a viable procedure for visual rehabilitation. Careful patient selection is required, but the advent of topical Ripasudil as a salvage agent suggests a broader application of the surgery may be possible.

Abstract 79

Title: Aberrations Induced By Descemet Membrane Endothelial Keratoplasty (DMEK)

Authors: Mohammed Taha, Reginald Tan, Pablo Morales, Kashif Baig

Abstract Body:

Purpose: To evaluate the changes in spherical aberration and refraction in eyes after Descemet's Membrane Endothelial Keratoplasty (DMEK). Knowledge of the spherical aberration induced during DMEK surgery will help in selecting the most appropriate IOL when planning cataract surgery before DMEK.

Study Design: Prospective chart review.

Methods: This prospective study includes pseudophakic patients undergoing DMEK for indications of Fuchs Endothelial Dystrophy (FED) or Pseudophakic Bullous Keratopathy (PBK). Patients with any other ocular pathologies were excluded from the study. Preoperative, operative and postoperative data are collected at 1 week, 3 month and 6 month follow-ups. Outcomes assessed include best-corrected visual acuity (BCVA), uncorrected visual acuity (UCVA), intraocular pressure, refraction and spherical aberration. Aberrometry was performed using two different aberrometers: iTrace™ and Pentacam™. Spherical aberration and refraction compared preoperatively and at various follow-ups.

Results: 17 eyes underwent DMEK were included, with indications including FED (n=15) and PBK (n=2). 7 patients were male, and the age ranged from 58 to 81 years. Compared to preoperatively, BCVA improved significantly at three month follow up (0.32 ± 0.24 vs. 0.08 ± 0.10 logMAR, $p < 0.05$). Spherical aberration decreased at 3-month follow up compared to preoperative measurements (0.11 ± 0.07 preoperatively vs. 0.09 ± 0.05 μm using Pentacam™ 0.007 ± 0.004 vs. 0.004 ± 0.004 μm using iTrace™. Post-DMEK refractive shift data will be analyzed at the last follow up point.

Conclusions: This study shows that BCVA improved significantly post-DMEK. It also shows there is only a minimal decrease in spherical aberration after DMEK. Hence, spherical aberration should not affect the IOL choice for cataract surgery prior to DMEK.

Abstract 80

Title: DMEK surgery: A simple way to forego peripheral iridotomy

Authors: Julia Talajic, Mathieu Mercier, Michele Mabon, Isabelle Brunette, Johanna Choremis

Abstract Body:

Purpose: The aim of the study was to report a novel technique to forego performing peripheral iridotomy in DMEK surgery. PI has been theorized to increase risk of graft rejection, in addition to potentially leading to dysphotopsias.

Study Design: Retrospective case series

Methods: Records of all cases of DMEK from January 2015 to October 2016 at Hôpital Maisonneuve-Rosemont (Montreal) were reviewed. Cases of pupillary block were identified, in addition to cases where excess gas was burped out of the anterior chamber postoperatively. The operating protocol was reviewed, including the use of a dilating pledget implemented at the end of surgery.

Results: 63 DMEKs were performed by 3 surgeons. Our standardized technique for creating a dilating pledget in DMEK surgery is as follows. A piece of an ophthalmic sponge is soaked in drops of 1% atropine, 10% phenylephrine, 1% tropicamide, and 1% cyclopentolate. After intracameral 20% SF6 injection, each of the aforementioned dilating drops is applied to the eye. The pledget is then introduced in the lower lid fornix and left in place while the patient lies supine. Patients are examined after several hours and the pledget is removed. With this technique, 2 cases of pupillary block were described (3% overall). These occurred shortly after surgery while the patient was still in hospital and were managed by removing excess gas at the slit lamp and dilating the patient further. No other cases required postoperative air removal.

Conclusions: We had a low rate of pupillary block following DMEK surgery without PI, owing to the use of a dilating pledget. The few cases of pupillary block we did observe could likely have been prevented by avoiding hyperinflation of the anterior chamber by SF6 gas. Use of a pledget can negate the need for preoperative inferior laser PI or intraoperative iridotomy using a Sinsky hook as has been described in the literature.

Abstract 81

Title: Comparison of punching techniques for preparation of endothelial grafts for descemet membrane endothelial keratoplasty

Authors: Reginald Robert G. Tan, Mohammed Taha, Pablo Morales, Esteban Santiago, Nima Noordeh, Yelin Yang, Kashif Baig

Abstract Body:

Purpose: To compare the use of a widely available dermatologic punch for preparing endothelial grafts for descemet membrane endothelial keratoplasty (DMEK), with the current standard trephine punch

Study Design: Prospective, randomized, masked, ex-vivo paired-eye investigation

Methods: Ten pairs of contralateral donor corneas were harvested using the SCUBA technique (Price et al., 2009). For each corneal pair, one cornea was prepared using a standard Barron trephine punch and the other with a widely available dermatologic (derm) punch. The number of graft tears was counted for each punching technique. Also, the circularity of the grafts were evaluated through Adobe® analysis and the ease of peeling graft tissue was assessment using a 2-item Likert scale

Results: Five paired corneas revealed that the number of graft tears were not statistically different when using the 10mm derm punch (1.25) vs trephine (2.83; $P>0.05$) or when using the 8mm derm punch (1.8) or trephine (1; $P>0.05$). Also, circularity of the graft after using the punch (0.75) and the trephine (0.72) were also statistically not different ($P>0.05$)

Conclusions: The widely available dermatologic punch is comparable to the standard trephine in terms of number of graft tears, circularity, and ease of peeling when harvesting endothelial donor grafts for DMEK

Abstract 82

Title: Preliminary outcome of Hemi-Descemet membrane endothelial keratoplasty (DMEK) and Quarter-DMEK for Fuchs endothelial dystrophy

Authors: C Maya Tong, Nadine Gerber-Hollbach, Lamis Baydoun, Thomas M. Muller, Jessica T. Lie, Isabel Dapena, Gerrit R. J. Melles

Abstract Body:

Purpose: To evaluate the clinical outcome of Hemi-DMEK and Quarter-DMEK.

Study Design: Interventional case series.

Methods: Ten eyes of ten patients with Fuchs endothelial dystrophy (FED) received a Hemi-DMEK graft and one patient underwent Quarter-DMEK for FED in his right eye. Best corrected visual acuity (BCVA) and endothelial cell density (ECD) were evaluated and complications were recorded.

Results: Hemi-DMEK was successful in 9 out of 10 eyes; one eye showed persistent graft detachment despite rebubbling and underwent a secondary DMEK. BCVA improved in all successful hemi-DMEK eyes. Preoperative donor ECD declined from 2744 (± 181) cells/mm² to 940 (± 380) cells/mm² at 6 months postoperatively (n=9). Four eyes required rebubbling for visually significant graft detachment. No other complications occurred. After Quarter-DMEK, BCVA improved from 20/50 (0.4) before to 20/20 (1.0) at 3 months after surgery. ECD decreased from 2700 cells/mm² before to 846 cells/mm² at 3 months after surgery. No complications were observed.


Conclusions: Hemi-DMEK and Quarter-DMEK may give fast visual rehabilitation within the first months similar to visual outcomes after DMEK. If long-term endothelial cell density would prove acceptable in a larger number of cases, Hemi- and Quarter-DMEK may have the potential to double or to quadruple the availability of donor endothelial tissue for endothelial keratoplasty.

Session Title: What's up, doc? New research in cataract

Subspecialty: Cataract surgery

Location: 517A

Session Time: Sunday, June 18, 2017, 1:30 pm - 3:00 pm

83. Comparative effectiveness and safety of two dosing regimens of Loteprednol Gel 0.5% and Bromfenac 0.07% solution to control inflammation and pain after cataract surgery • **Ahmad Al-Awadi**, Clara C. Chan, Sohel Soman
84. Immediately Sequential Bilateral Cataract Surgery - 10,000 eyes later • **Steve A. Arshinoff**
85. Wang-Koch Equation for Optimization of Intraocular Lens Power Calculation: An Evaluation at a Canadian Centre • **Xavier Campos-Möller**, Marko Popovic, Mathew B. Schlenker, Iqbal Ike K. Ahmed
86. Trends in prevalence of self-reported cataracts in Canada • **Yaping Jin**, Ge Yang, Yvonne Buys, Graham Trope
87. Interocular axial length and corneal power differences as predictors for post-operative refractive outcomes following cataract surgery • **Vinay Kansal**, Matthew B. Schlenker, Iqbal K. Ahmed
88. Metformin inhibits epithelial-to-mesenchymal transition in an *in vitro* model of posterior capsule opacification • **Jade M. Lasiste**, Denise Miyamoto, Pablo Zoroquiain, Patrick Logan, Miguel N. Burnier, Jr.
89.  **HOT TOPIC** Intraoperative complication rates in cataract surgery performed by Ophthalmology resident trainees compared to staff surgeons in a Canadian academic center • **Stephanie A. W. Low**, Rosa Braga-mele, David B. Yan, Sherif El-Defrawy
90. Refractive Stabilization and Corneal Curvature Post Cataract Surgery • **Micah Luong**, Ammar Khan, Emi Sanders, Andrew Crichton, Bryce Ford
91. The Dose and Administration of Intracameral Moxifloxacin for Prophylaxis of Postoperative Endophthalmitis in Cataract Surgery • **Milad Modabber**, Steve A. Arshinoff
92. Assessing the Effect of Wait Time on Threshold Change in Functional Vision after Cataract Surgery Using CATQUEST 9-SF • **Prima Moinul**, Joshua Barbosa, Bryon McKay, Anne Beattie, Nina Ahuja, Mark Fava, Enitan Sogbesan, Khalid Hasanee, Varun Chaudhary
93. Secondary intraocular lens implantation by a single surgeon at a tertiary hospital: Indications, techniques, outcomes and complications • **Pablo Morales**, Harrish Nithianandan, Reginald Tan, Mohammed Taha, Kashif Baig
94. Influence of Age on Clinical Outcomes in Congenital Cataract Surgery: A Meta-Analysis • **Marko Popovic**, Xavier Campos-Möller, Matthew B. Schlenker, Iqbal Ike K. Ahmed

95. Practice Patterns of Canadian Ophthalmological Society members in Cataract Surgery. Survey 2017 • **Lindsay Ong-Tone**
96. Does iris color play a role in Femtosecond Laser (FSL)-Induced Miosis in patients undergoing cataract surgery? • **Guillermo Rocha**, Tarek Ibrahim, Phillip Goernert
97. Evaluation of a novel artificial iris • **Saama Sabeti**, Yelin Yang, Mohammed Taha, Reginald Tan, Pablo Morales, Kashif Baig
98. Evaluation of a retropupillary iris-claw Artisan IOL in patients with inadequate capsular support • **Mohammed Taha**, Reginald Tan, Pablo Morales, Kashif Baig
99. The rate of retinal tear and detachment post Nd:YAG capsulotomy • **Jason D. Wesolosky**, Christopher J. Rudnisky, Matthew Tennant

Abstract 83

Title: Comparative effectiveness and safety of two dosing regimens of Loteprednol Gel 0.5% and Bromfenac 0.07% solution to control inflammation and pain after cataract surgery

Authors: Ahmad Al-Awadi, Clara C. Chan, Sohel Somani

Abstract Body:

Purpose: We aim to evaluate the safety and effectiveness comparing two dosing regimens of Loteprednol etabonate (LE) ophthalmic gel 0.5% and Bromfenac ophthalmic solution 0.07% in patients undergoing routine cataract surgery. We hypothesize administering LE BID is as effective and safe as administering QID as originally outlined in standard protocols.

Study Design: A prospective, masked, randomized controlled non-inferiority study was conducted on cataract surgery patients.

Methods: Patients were randomized to one of two groups: LE QID + once-daily Bromfenac (group 1), versus, LE BID + once-daily Bromfenac (group 2). Outcome metrics included: Summed Ocular Inflammation Score (SOIS), Intraocular Pressure (IOP), Visual Acuity (VA), Central Retinal Thickness (CRT), and, subjective symptomology scores. These metrics were measured at four study visits: baseline, same day post-operative, one week post-operative, and one month post-operative. The final visit also included a questionnaire addressing compliance, satisfaction, and comfort with the medications.

Results: Data from 90 patients demonstrated similar effectiveness and safety between both dosing regimens. There was no statistical difference between groups for reported SOIS ($p = .81$), visual acuity improvement ($p = .62$), IOP ($p = .42$), CRT ($p = .82$), and other ocular features such as, ocular pain ($p = .58$), photophobia ($p = .08$), discharge (100% of patients reported zero discharge), dryness ($p = .37$), tearing ($p = .86$), itching ($p = .30$), and discomfort ($p = .42$). Patients in Group 1 (QID LE, QD Bromfenac) significantly reported a more difficult time remembering their Bromfenac dose ($p < .05$) and tended to forget their LE dose more often than Group 2, although statistically insignificant ($p = .16$). Neither group reported a single adverse event.

Conclusions: This study suggests both groups have had similar outcomes with respect to control of ocular inflammation with no differences in adverse outcomes. The compliance questionnaire also suggests a patient preference for the dosing regimen with lower frequency of drop application.

Abstract 84

Title: Immediately Sequential Bilateral Cataract Surgery - 10,000 eyes later

Authors: Steve A. Arshinoff

Abstract Body:

Purpose: To review my experience of Immediately Sequential Bilateral Cataract Surgery (ISBCS) of over 10,000 eyes.

Study Design: Review of cases, and global ISBCS issues.

Methods: Chart review of over 10,000 eyes undergoing ISBCS. Review of issues coming to me as President of the International Society of Bilateral Cataract Surgeons from its inception (2008) to present.

Results: ISBCS is associated with an extremely low rate of complications. It has been adopted for MSICS (manual small incision cataract surgery) in third world countries, and the performance of FFPP (femto-femto-phaco-phaco) femtosecond laser assisted bilateral cataract surgery is being proposed instead of FPFP (femto-phaco-femto-phaco) because of the ever falling complication rates.

Conclusions: I have performed ISBCS on over 10,000 eyes since 1996, with ever increasing facility and declining complication rates. Globally, ISBCS is growing rapidly, particularly in the USA, and the inclusion of femtosecond lasers in ISBCS will likely be another large step in facilitating the procedure for patients, as very low complication rates will likely simplify surgery.

Abstract 85

Title: Wang-Koch Equation for Optimization of Intraocular Lens Power Calculation: An Evaluation at a Canadian Centre

Authors: Xavier Campos-Möller, Marko Popovic, Mathew B. Schlenker, Iqbal Ike K. Ahmed

Abstract Body:

Purpose: Hyperopic surprise is a frequent concern in IOL power calculation for long eyes. To correct for these systematic inaccuracies, the Wang-Koch (WK) method for optimization of IOL formulas has been used. We aim to externally validate the WK formula in a Canadian sample.

Study Design: retrospective case series

Methods: cataract surgery patients with $AL \geq 25.0\text{mm}$ and postoperative best corrected visual acuity better than 20/40 were recruited. IOL choice was guided by the predicted spherical equivalent (PSE), which was based on the Holladay 1 formula using a WK adjusted AL. The PSE of the unadjusted AL was also calculated. These adjusted and unadjusted PSEs were compared to the postoperative manifest refraction spherical equivalent, thus yielding a prediction error. Accounting for within-patient correlation, the proportion of eyes achieving a prediction error of $\leq \pm 0.5\text{D}$ and $\leq \pm 1.0\text{D}$ were compared between unadjusted and adjusted AL eyes using McNemar's test.

Results: From the 2073 eyes that underwent cataract surgery, a total of 372 eyes in 238 patients were included. There was a balanced gender distribution, a mean age of 63.28 ± 9.19 years and a preoperative AL of $26.36 \pm 1.07\text{mm}$. For 171 eyes with ALs between $26.0 < x \leq 25.0\text{mm}$, unadjusted eyes had significantly lower prediction errors for endpoint 1 ($p < 0.001$) but not endpoint 2 ($p = 1.00$). In 109 eyes with ALs between $27.0 > x \geq 26.0\text{mm}$, no significant differences were observed between comparators for both endpoints ($p = 0.46$, $p = 0.11$). Generally, WK adjusted eyes had significantly lower prediction errors than unadjusted eyes for the 92 eyes with ALs greater than 27.0mm .

Conclusions: The WK adjustment produced consistently lower prediction errors in eyes with $AL \geq 27.0\text{mm}$. This cutoff should be considered in the evaluation of patients undergoing IOL power calculation with the Holladay 1 formula. Future studies should design optimization methods in long eyes that are sensitive to the needs of patients in different AL categories

Abstract 86

Title: Trends in prevalence of self-reported cataracts in Canada

Authors: Yaping Jin, Ge Yang, Yvonne Buys, Graham Trope

Abstract Body:

Purpose: In 2004, all Canadian provincial governments launched a wait time strategy to shorten wait times for cataract surgery. It is unknown if this strategy was associated with reduced number of Canadians with cataracts post-2004. We provided population estimates 5 years after the wait time strategy was introduced and a 9-year trend in self-reported prevalence of cataracts in Canada from 2001 to 2009.

Study Design: Cross-sectional survey.

Methods: Analyses were based on self-reported data for individuals aged 45+ from 4 nationwide surveys: the Canadian Community Health Survey (CCHS) in 2000/2001 (n=60,569), 2003 (n=68,036), 2005 (n=66,475) and the CCHS Health Aging in 2008/2009 (n=30,849). Age- and sex-standardized prevalence was calculated for comparisons.

Results: An estimated 1,341,600 Canadians had cataracts in 2008/2009. This represents an increase of 411,500 (or 44.2%) cataract patients compared to 2000/2001. The age- and sex-standardized prevalence increased from 8.9% in 2000/2001 to 10.2% in 2008/2009 ($p<0.05$).

The increase was greater in individuals without secondary school education (34.7%, $p<0.05$) than those with secondary school education or higher (19.1%, $p<0.05$), in non-whites aged 65+ (33.1%, $p<0.05$) than whites aged 65+ (10.3%, $p<0.05$). Across provinces, the lowest age-standardized prevalence was seen in Newfoundland and Labrador (5.6%-8.0%), and the highest in Saskatchewan (9.7%-13.4%). Saskatchewan also had the longest median wait times for cataract surgery (118 days in 2008) and the lowest number of ophthalmologists per 100,000 population (1.96 vs. 3.35 national average in 2012). The prevalence in Ontario was most stable, ranging from 9.9% in 2000/2001 to 10.2% in 2008/2009.

Conclusions: Despite efforts to reduce wait times for cataract surgery post 2004, the prevalence of cataracts increased between 2001 and 2009. Estimated 1.3 million Canadians had cataracts in 2008/2009. Studies are needed to understand reasons behind this increase.

Abstract 87

Title: Interocular axial length and corneal power differences as predictors for post-operative refractive outcomes following cataract surgery

Authors: Vinay Kansal, Matthew B. Schlenker, Iqbal K. Ahmed

Abstract Body:

Purpose: To determine whether differences between eyes in axial length (AL) and corneal power (K) on optical biometry is associated with poorer refractive outcomes.

Study Design: Retrospective cohort study

Methods: This retrospective cohort study identified 883 patients (1766 eyes) who underwent bilateral phacoemulsification at TLC (Mississauga, Ontario, Canada) from September 2013 to August 2015. 154 patients were excluded for extremes in age, refractive measurements, or biometry measurements. We compared the odds of having > 0.5 Diopters of refractive error from target for multiple cutoffs of interocular axial length differences (IALD) and interocular K differences (IKD) between eyes as measured by optical biometry (IOL-Master, Zeiss). Analysis was repeated for 0.25D or 1.0D targets. Proportions and odds ratios were computed using generalized estimating equations to account for within patient correlation.

Results: 86.1% of eyes were $\leq 0.5D$ of refractive target, 58.5% $\leq 0.25D$, and 97.5% $\leq 1.0D$. The odds ratio of having a refractive outcome >0.5D from target for IALD cutoff of 0.2mm was 1.4 (1.1-2.0), 0.3mm 1.6 (1.2-2.3) and 0.4mm 1.9 (1.3-2.7). This translates to 78.8% (72.7-83.9) within target for IALD of $\geq 0.4mm$ versus 87.4% (85.4-89.2) for <0.4mm. Half of >0.5D eyes were myopic and half were hyperopic. The odds ratio of >0.5D refractive error from target for IKD-steep cutoff of 0.6D was 1.4 (1.0-2.0), 0.8D 1.7 (1.1-2.7), and 1.0D 1.9 (1.1-3.4). 79.2% (71.4-85.4) eyes were within target for $\geq 0.8D$ of IKD-Steep and 86.9% (84.9-88.6) for <0.8D. There were minimal differences in refractive outcomes for all cutoffs of IKD-flat.

Conclusions: Interocular axial length difference of $\geq 0.3mm$ or steep intraocular K difference of 0.8D are associated with higher chance of >0.5D of refractive error from target. These cutoffs should be considered in preoperative planning and discussion with patients. Future studies should address whether repeating measurements reduces residual refractive error.

Title: Intraoperative complication rates in cataract surgery performed by Ophthalmology resident trainees compared to staff surgeons in a Canadian academic center

Abstract 88

Title: Metformin inhibits epithelial-to-mesenchymal transition in an *in vitro* model of posterior capsule opacification

Authors: Jade M. Lasiste, Denise Miyamoto, Pablo Zoroquiain, Patrick Logan, Miguel N. Burnier, Jr.

Abstract Body:

Purpose: Posterior capsule opacification (PCO) is the most common complication after cataract surgery, resulting in blurry vision and affecting up to 50% of patients 2-5 years post-operatively. Epithelial-to-mesenchymal transition (EMT) is the main pathophysiologic mechanism underlying PCO. Metformin, a drug with an excellent safety profile and primarily used for diabetes, has been shown to inhibit EMT in cancers and fibrotic disease.

The objective of this study was to test the effectiveness of metformin in inhibiting EMT in an *in vitro* model of PCO.

Study Design: This study employs an *in vitro* model of PCO and uses multiple assays to evaluate the efficiency of metformin against EMT.

Methods: The human lens epithelial cell (LEC) line HLE-B3 was exposed to transforming growth factor-beta (TGF- β) and fibroblast growth factor (FGF) to induce EMT.

Subsequently, the effect of metformin on the following cellular parameters were determined: (1) survival, using the CCK-8 viability assay and drug concentrations ranging from 0-100 mM; (2) expression of the epithelial markers pax6 and E-cadherin and the mesenchymal markers α -smooth muscle actin (α -SMA) and fibronectin, via Western blot; (3) morphology, evaluated via microscopy and image analysis; (4) and migration, using the wound assay. Analysis of variance (ANOVA) with Tukey post-hoc test was used for statistical analysis of cytotoxicity, morphology and migration data.

To investigate mechanisms of action, the presence of SLC22A1/OCT1, the receptor for metformin cellular uptake, and the ratio of active to inactive protein kinase B (pAkt/Akt), were assessed via Western blots. Immunohistochemistry was done on deparaffinized sections of the anterior segment to confirm the presence of SLC22A1/OCT1 in lens epithelial tissue.

Results: Metformin is lethal to half (LC₅₀) and all (LC₁₀₀) cells at 30 and 80 mM, respectively. A notable decrease in viability ($P<0.05$) was noted at 5 mM. Compared to controls, EMT-induced LECs treated with 0.1-1 mM metformin showed increased pax6 and E-cadherin and decreased α -SMA and fibronectin expression. LECs treated with metformin also maintained their shape and symmetry, consistent with their epithelial phenotype. In addition, migration was significantly inhibited with 0.5 mM metformin ($P<0.05$). HLE-B3 was demonstrated to express SLC22A1/OCT1, and cells treated with metformin showed a decreased pAkt/Akt ratio.

Conclusions: Metformin inhibits EMT in LECs, decreasing survival and migration and maintaining the epithelial phenotype. Findings suggest that metformin entry into the cell is through the SLC22A1/OCT1 receptor and that its action is mediated via decreased activation of the Akt substrate. Given the presence of the SLC22A1/OCT1 uptake receptor in lens epithelial tissue, metformin has potential as an adjunct to treatment. Toxicity to proximal eye tissues and effectiveness *in vivo* must be tested to determine dose, route and timing of administration.

Abstract 89



Title: Intraoperative complication rates in cataract surgery performed by Ophthalmology resident trainees compared to staff surgeons in a Canadian academic center

Authors: Stephanie A. W. Low, Rosa Braga-mele, David B. Yan, Sherif El-Defrawy

Abstract Body:

Purpose: To compare the intraoperative complication rates in phacoemulsification cataract surgery performed by resident trainees and staff Ophthalmologists in a Canadian residency training center.

Study Design: Prospective cross-sectional study

Methods: Data was collected prospectively from resident case and intraoperative complication tracking forms completed by resident trainees following each case. Data collected included: level of resident training, case complexity (simple phacoemulsification, hypermature cataract, small pupil/intraoperative floppy iris syndrome, zonular/pseudoexfoliation syndrome, other complex), resident participation level (100%, >50%, < 50%, 0% of the case), and intraoperative complications (wound leak, wound burn, anterior capsule rent, posterior capsule rent (PCR), vitreous loss, dropped lens, iris prolapse, other iris complications). The primary outcome was intraoperative complication rates, and the secondary outcome was the level of case complexity for residents and staff cases. Chi-square analysis was used to compare intraoperative complication rates between staff and resident cases with further subgroup analyses performed to compare rates between levels of resident training, level of resident participation. For variables with rare incidences of occurrence the Fisher's exact test was used.

Results: A total of 3961 eligible consecutive cases of primary phacoemulsification cataract extraction and intraocular lens implantation surgery performed at the Kensington Eye Institute (Toronto, Canada) between January 1 and June 30, 2016 were included in the study. Sixty-four percent of all cases were classified as simple cases. The overall rate of intraoperative complications recorded was 2.7%, with an overall PCR rate of 1.2%. Sixty-one percent of all cases were completed by the staff surgeon alone, whereas 31% were completed in their entirety by a resident, and 8% were performed in part by resident. For cases completed exclusively by a single surgeon, there was no difference in overall complication rates for staff surgeons and residents for both simple cases (1.6% and 1.6%, $p = 0.97$) and complex cases (3.3% and 3.2%, $p = 0.93$). For cases with any degree resident involvement, there was no difference in overall intraoperative complication rates (3.1% and 2.4%, $p = 0.175$) or PCR rates (1.2% vs. 1.3%, $p = 0.32$) compared to surgeries with no resident involvement.

Conclusions: Based on the experience of this Canadian residency training center, there is no difference in intraoperative complication rates for primary phacoemulsification cataract surgery performed by resident trainees compared to staff surgeons. This finding is likely related to the choice of appropriate cases for resident involvement and the intense supervision provided by academic teachers.

Abstract 90

Title: Refractive Stabilization and Corneal Curvature Post Cataract Surgery

Authors: Micah Luong, **Ammar Khan**, Emi Sanders, Andrew Crichton, Bryce Ford

Abstract Body:

Purpose: To determine the time required for the corneal curvature, corneal thickness, effective lens position, anterior chamber depth and refraction to stabilize after small incision uncomplicated cataract surgery.

Study Design: Prospective study.

Methods: This is a prospective study of patients undergoing routine 2.2 mm clear corneal incision cataract surgery by two surgeons. Primary outcome measures are corneal thickness, corneal curvature, effective lens position, anterior chamber depth and refraction at 1, 2, 3, 4, 5 and 6 weeks post cataract surgery. Measurements were taken using the IOLmaster 700 and the Tomey RT-7000 autorefractor. Refractive stabilization will be defined as ± 0.50 D for sphere and cylinder, with axis of ± 10 degrees if the cylinder is greater than 1D. Measurements at the 6 week mark are considered the final stable refractive outcome. The time required to achieve the same measurements as at 6 weeks was assessed.

Results: This study is ongoing and actively enrolling patients. At the time of submission, 14 patients have been enrolled. In all but one of the patients, the corneal curvature was ± 0.50 D from the final corneal curvature by week one post-cataract surgery. The effective lens position and anterior chamber depth was on average 0.08 mm at week one from its final position. The refraction was ± 0.50 D by week one post-cataract surgery from the final refraction in all but one of the patients. The central corneal thickness at week one was on average 15 μ m different than the final central corneal thickness.

Conclusions: At the time of submission, the data suggests that refractive stability was achieved between the first and second week post cataract surgery. Therefore, patients undergoing 2.2mm clear corneal incision cataract surgery who want their spectacle correction earlier may be able to be accurately refracted at two weeks postoperatively. This would enable patients to return to work, drive or perform regular daily activities at a much earlier time.

Abstract 91

Title: The Dose and Administration of Intracameral Moxifloxacin for Prophylaxis of Postoperative Endophthalmitis in Cataract Surgery

Authors: Milad Modabber, Steve A. Arshinoff

Abstract Body:

Purpose: To review current and past practices of intracameral antibiotic administration for infection prophylaxis, and to evaluate the safety, efficacy, optimal dose and administration protocol of intracameral moxifloxacin in cataract surgery.

Study Design: Retrospective review of clinical experience.

Methods: Review of clinical experience of 7,951 consecutive cataract surgeries using intracameral moxifloxacin, that had followed 4,797 consecutive cases with intracameral vancomycin was performed. Standard microbiological techniques were used to calculate the appropriate dose of intracameral moxifloxacin prophylaxis, its optimal method of administration and its duration of expected efficacy. The rationale underlying the revised administration protocol for intracameral moxifloaxacin are detailed followed by our clinical experience.

Results: A single case of culture proven post-operative endophthalmitis occurred within the first 3,430 cases of intracameral moxifloxacin (100mcg/0.1 ml). The isolated pathogen was identified as moxifloxacin-resistant strain of *Staphylococcus epidermidis*. Subsequently, the dose and administration protocol of intracameral moxifloxacin was modified. Following this revised protocol, no cases of post-operative endophthalmitis in 4,521 consecutive cases have been observed, and no detrimental side effects or complications have occurred.

Conclusions: Intracameral moxifloxacin offers potent, dose dependent bactericidal activity against a broader spectrum of key pathogens causing postoperative endophthalmitis than other currently available intracameral antibiotics. The preparation of intracameral moxifloxacin by dilution of 3 cc Vigamox with 7 cc bss, and the administration of 0.3-0.4 cc (450-600 mcg) of this mixture as the final step in cataract surgery, following hydration of the main incision via the side port, offers many advantages over alternative intracameral antibiotic prophylactic methods, with minimal risk.

Abstract 92

Title: Assessing the Effect of Wait Time on Threshold Change in Functional Vision after Cataract Surgery Using CATQUEST 9-SF

Authors: Prima Moinul, Joshua Barbosa, Bryon McKay, Anne Beattie, Nina Ahuja, Mark Fava, Enitan Sogbesan, Khalid Hasanee, Varun Chaudhary

Abstract Body:

Purpose: To determine the threshold change in functional vision, as measured by minimally important difference (MID), that patients are willing to experience in exchange for cataract surgery.

Study Design: Single-Centred Prospective Cohort Study

Methods: This single-centered prospective cohort study includes 66 patients (≥ 18 years of age) undergoing cataract surgery at the Hamilton Regional Eye Institute. Each patient completed the CATQUEST-9SF and VF-14 visual disability questionnaires one month prior to and three months following their cataract surgeries. Patient demographics, pre-operative and post-operative best-corrected visual acuities (using the Snellen eye chart), contrast sensitivity (using the Pelli-Robson chart), and wait times to surgery were also assessed. MID scores were statistically analyzed using regression analysis, anchor-based longitudinal approach and distribution-based methods with a 95% confidence interval on SPSS software V22.

Results: Sixty-six patients (average age: 72.2 years) were enrolled in the study (56.5% females and 43.5% male). The average pre-operative visual acuity was 70-75 letters (approximate Snellen equivalent of 20/32). The mean wait time to ophthalmology referral and time to surgery were 21.6 (SD: 27.7) weeks and 14.4 (SD: 16.2) weeks respectively. A significant mean improvement in visual acuity ($p=0.0001$; 95% CI: 5.1-16.4) and contrast sensitivity ($p=0.0009$; 95% CI: 0.16-0.47) were observed following cataract surgery. The mean change in CATQUEST ($p=0.001$; 95% CI: -3.248 to -2.092) and VF-14 questionnaire scores ($p=0.001$; 95% CI: 13.942 to 23.284) were significantly improved post-operatively. MID scores were -2.47 ($p=0.047$) and -0.94 ($p=0.014$) using anchor-based and distributive methods respectively, both indicating a significant improvement in functional vision post-operatively. However, wait time to surgery did not significantly impact the ability to achieve a minimally important difference ($p=0.07$).

Conclusions: Determining a need for cataract surgery is dependent on multiple variables. This study shows that a change in patients' self-reported functional vision (identified as MID), best-corrected visual acuity and contrast sensitivity were all significantly improved after cataract surgery. However, wait time to surgery did not achieve MID or influence patients' post-operative functional vision.

Abstract 93

Title: Secondary intraocular lens implantation by a single surgeon at a tertiary hospital: Indications, techniques, outcomes and complications

Authors: Pablo Morales, Harrish Nithianandan, Reginald Tan, Mohammed Taha, Kashif Baig

Abstract Body:

Purpose: The aim of our study is to describe the indications, techniques, intraocular lenses (IOL) used, intra- and post-operative complications, and outcomes of secondary IOL implantation by a single surgeon in a tertiary anterior segment practice.

Study Design: Consecutive, retrospective case series.

Methods: The primary and secondary outcomes were analyzed using descriptive and inferential statistics. BCVA was converted into logMAR for purpose of analysis. Demographics were analyzed using descriptive statistics. The statistical analysis were performed using SPSS software v20.0 (SPSS, Chicago Illinois, USA).

Results: All patients that underwent secondary IOL implantation (alone or combined with IOL removal) between 2009 and 2016 were included in the study (n=107). Techniques included angle-fixated, iris-sutured, iris-clipped (antero- and retropupillary), sulcus-placed, scleral-sutured, intrascleral-fixated, transconjunctival-fixated, and artificial iris IOLs. Outcome measures included: indication for secondary IOL implantation, BCVA, UCVA, surgical time, type of secondary IOL implanted, intraoperative and postoperative complications.

Conclusions: In patients with aphakia or needing a lens exchange, certain techniques fare better given a particular surgical scenario. This research contributes to the literature by being the first study showing the outcomes of a full spectrum of IOL fixation techniques in a single practice.

Abstract 94

Title: Influence of Age on Clinical Outcomes in Congenital Cataract Surgery: A Meta-Analysis

Authors: Marko Popovic, Xavier Campos-Möller, Matthew B. Schlenker, Iqbal Ike K. Ahmed

Abstract Body:

Purpose: Age of operation is a critical determinant of prognosis following congenital cataract surgery. In this meta-analysis, we aim to explore what differences in clinical outcomes exist based on the patient's age of operation following congenital cataract surgery.

Study Design: Meta-analysis.

Methods: A systematic literature search of Ovid MEDLINE and Ovid EMBASE was conducted to identify original articles that included patients undergoing cataract surgery for congenital cataracts with a mean cohort age of operation of less than 2 years. Throughout, categorical variables were recorded as percentages of the total, while continuous variables were recorded as means \pm standard deviations. A weighted Pearson correlation coefficient was computed to analyze the impact of mean age of operation on postoperative outcomes at last follow-up.

Results: A total of 38 studies were included. There was a negative relationship between the mean age of operation and the incidence of endophthalmitis ($n = 242$; $r = -0.51$), glaucoma ($n = 988$; $r = -0.27$), intraocular lens dislocation or decentration ($n = 372$; $r = -0.42$), strabismus ($n = 461$; $r = -0.38$) and visual axis opacity or posterior capsular opacification ($n = 737$; $r = -0.19$). A positive correlation existed between the mean age of operation and axial length growth ($n = 113$; $r = 0.68$), central corneal thickness ($n = 279$; $r = 0.19$), intraocular pressure ($n = 424$; $r = 0.24$), logMAR best corrected visual acuity ($n = 539$; $r = 0.17$) and incidence of nystagmus ($n = 483$; $r = 0.44$).

Conclusions: Performing cataract surgery on younger eyes is moderately correlated with a lower incidence of nystagmus and a higher incidence of endophthalmitis, intraocular lens complications and strabismus.

Abstract 95

Title: Practice Patterns of Canadian Ophthalmological Society members in Cataract Surgery. Survey 2017

Authors: Lindsay Ong-Tone

Abstract Body:

Purpose: This will be the ninth 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 2017 when an e-mail with a link to Fluid Surveys will be sent to all the COS members who have indicated that their practice focus is on Cataract and IOL. A reminder e-mail will be sent about 3 weeks later.

Results: In the last survey there was a moderate increase in the number of respondents who were using femtosecond laser assisted cataract surgery (FLACS). However the majority (68.4 percent) were doing so only up to 25 percent of the time. The cataract wound size was getting smaller, with 2.2 mm (33.6 percent) being the most popular followed by 2.4 mm (25.5 percent) and 2.75 mm (15.5 percent). Nearly 63 percent of the respondents were correcting astigmatism at the time of cataract surgery. The majority (79.4 percent) were using a toric intraocular lens to do so. The number of respondents using intracameral antibiotics has increased from 23.1 percent in 2009 to 48.1 percent in 2016. In the latest survey, the most popular intracameral antibiotic was moxifloxacin (66.7 percent) followed by vancomycin (16.7 percent) and cefuroxime (9.3 percent).

Conclusions: Certain trends in the practice patterns of the COS members in cataract surgery have been observed and maintained over the years. It is also interesting to see how new techniques and technologies are being adopted by the membership.

Abstract 96

Title: Does iris color play a role in Femtosecond Laser (FSL)-Induced Miosis in patients undergoing cataract surgery?

Authors: Guillermo Rocha, Tarek Ibrahim, Phillip Goernert

Abstract Body:

Purpose: To measure FSL- induced miosis and correlate it with iris color in Femtosecond Laser-Assisted Cataract Surgery (FLACS).

Study Design: Retrospective.

Methods: Iris color was divided into Blue (Group 1), Hazel (Group 2) and Brown (Group 3).

Intraoperative miosis was graded into 4 categories, (0 to +3) following FSL use. Quantitative analysis and correlation with iris color was performed.

Results: Eighty-four percent showed miosis in group one; 45% in group 2 and 19% in group 3. A Kruskal-Wallis test showed that there was a significant effect of eye color on FSL induced miosis ($H(2) = 30.19$, $p < .01$). Follow-up Dunn Q tests of the group mean rankings showed that the degree of FSL induced miosis was significantly higher in the blue eye color group than both the hazel eye color and the brown eye color group (both p 's $< .05$). The difference in the degree of FSL induced miosis between the hazel and brown eye color groups was not significant ($p > .05$).

Conclusions: This is the first report that suggests that light color irises may be more susceptible to FSL energy, possibly resulting in more activation and release of prostaglandins from the ciliary body. The latter has been reported as a potential factor in FSL induced miosis. This finding could have clinical implications in preoperative management, or patient flow decisions.

Abstract 97

Title: Evaluation of a novel artificial iris

Authors: Saama Sabeti, Yelin Yang, Mohammed Taha, Reginald Tan, Pablo Morales, Kashif Baig

Abstract Body:

Purpose: The Reper artificial iris/intraocular lens (IOL) complex is a novel, foldable acrylic-based device used to reduce symptoms and restore function in patients with absent or defective irises. As the first North American centre to use this device, we will contribute to the limited literature by reviewing our patient outcomes as well as the efficacy and safety associated with its use.

Study Design: This is a retrospective and prospective chart review of patients undergoing implantation with the Reper artificial iris/IOL as standard of care by a single surgeon.

Methods: Data on patient demographics, ocular and medical history, pre- and post-operative visual function and symptoms, as well as complications will be collected. The primary outcome measure is the degree of subjective reduction in photophobia. Secondary outcomes will include post-operative visual acuity and intraocular pressure (IOP), intra- and post-operative complications, and patient satisfaction with cosmetic outcome.

Results: Data has been collected on three patients to date and is ongoing. Indications for surgery included congenital aniridia and cataracts, traumatic iridodialysis, and intractable pain in a patient with remote open globe trauma and anterior chamber IOL dislocation. Post-operatively, all three patients reported significant improvements in photophobia and cosmesis. Best-corrected visual acuity (BCVA) was either unchanged or improved compared to pre-operative BCVA; and IOP was stable, ranging from 13 to 16. No intra-operative complications were encountered. Post-operative complications included transient corneal edema and choroidal thickening which resolved by one month.

Conclusions: These first North American implantations of the foldable Reper artificial iris/IOL suggest that it is a safe and effective technique for improving photophobia, visual acuity, and cosmesis in patients requiring an IOL with significant iris defects.

Abstract 98

Title: Evaluation of a retropupillary iris-claw Artisan IOL in patients with inadequate capsular support

Authors: Mohammed Taha, Reginald Tan, Pablo Morales, Kashif Baig

Abstract Body:

Purpose: To evaluate the technique, efficacy, and safety of Artisan retropupillary iris-claw secondary IOLs in patients with insufficient capsular support.

Study Design: Retrospective chart review.

Methods: All patients that underwent Artisan retropupillary iris-claw implantation surgery (alone or combined with IOL removal) between 2012 and 2016 will be included. Outcome measures will include, BCVA, UCVA, surgical time, intraoperative and postoperative complications. BCVA will be converted into logMAR for purpose of analysis. Demographics will be analyzed using descriptive statistics. The primary and secondary outcomes will be analyzed using descriptive and inferential statistics. The statistical analysis will be performed using SPSS software v20.0 (SPSS, Chicago Illinois, USA).

Results: 59 eyes of 56 patients were included. 26% eyes underwent iris-claw IOL combined with IOL exchange. The median follow-up was 8 months (range 2 to 26 months). UCVA improved or remained stable in 95% of eyes. BCVA was 20/40 or better in 54% of eyes at latest follow up. The median number of glaucoma medications at latest follow up was 1 (range 0 to 3). Complications included retinal detachment (n=2), corneal decompensation (n=13), transitory iritis (n=4), IOP rise (n=3) and lens decentration (n=1). One eye had persistent iritis from uveitis-glaucoma-hyphema and underwent IOL exchange with scleral-sutured IOL at 20 months follow up.

Conclusions: This is the largest case series of retropupillary implantation of iris-claw Artisan IOL. This technique is an effective and safe option for secondary IOL implantation, with stable visual outcomes over the long term. This technique should be considered in patients with insufficient capsular support requiring secondary IOL implantation.

Abstract 99

Title: The rate of retinal tear and detachment post Nd:YAG capsulotomy

Authors: Jason D. Wesolosky, Christopher J. Rudnisky, Matthew Tennant

Abstract Body:

Purpose: The literature-reported rate of retinal tear (RT) and retinal detachment (RD) after YAG capsulotomy varies considerably and is generally taught in residency programs to be between 1-2%. We sought to determine the actual population rate of RT/RD post YAG capsulotomy.


Study Design: Retrospective study of practitioners' billing database in Alberta during a 13-year period.

Methods: All patients who underwent a YAG capsulotomy between April 1st 2000 and March 31st 2013 were included. Risk was calculated as a rate (%) of RT or RD post Nd:YAG laser capsulotomy. Rates were calculated in intervals up to 10 years post YAG.

Results: 92654 discrete records were analyzed. 720 RT's and 2219 RD's occurred in our study population during the study period. The 90-day rate of RT was 0.21%, and the 90-day rate of RD was 0.60%. Cumulative risk of RT for 3, 6, 9 and 12 months was 0.21%, 0.30%, 0.36% and 0.43%. For RD, in the same time intervals, the rates were 0.60%, 0.96%, 1.19% and 1.39%. After graphing 30-day interval rates of RD, it was noted to plateau approximately 5 months' post YAG capsulotomy.

Conclusions: There is an increased risk of RD in the first 5 months post Nd:YAG, with a return to a baseline rates thereafter. Using this time interval as a reference, the rate of RT after YAG capsulotomy is 0.29%, whereas the rate of RD is 0.87%.

Session Title: Making the Ocular Surface Great Again
Subspecialty: Cornea, external disease & refractive surgery
Location: 519AB
Session Time: Sunday, June 18, 2017, 3:45 pm - 5:15 pm

- 100.**  **HOT TOPIC** Overview of clinical efficacy and safety of lifitegrast ophthalmic solution 5.0% for treatment of dry eye disease • **Mahshad Darvish-Zargar**, Edward J. Holland, Clara C. Chan, Kelly K. Nichols, Joseph Tauber, Christophe Baudouin, Aparna Raychaudhuri, Monica Roy, Amir Shojaei
- 101.** HER2 as a possible therapeutic target in squamous cell carcinoma of the conjunctiva • **Evangelina Esposito**, Pablo Zoroquiain, Ana B. Toledo Dias, Miguel Burnier
- 102.** Agreement and Reliability of Aberrometry Measurements in Normal Eyes Using iDesign, iTrace and Pentacam • **Pablo Morales**, Antoine Goulet, Reginald Tan, Mohammed Taha, Kashif Baig
- 103.** The corneal endothelium in pediatric posterior polymorphous corneal dystrophy: a specular microscopic study • **Hamza Sami**, Ali El Hamouly, Simon Fung, Dishay Jiandani, Kamiar Mireskandari, Asim Ali
- 104.** Nitric oxide, administered using copper-chitosan derivatives, accelerates corneal epithelial wound healing • **Vasiliki Tellios**, Hong Liu, Nikoleta Tellios, Kathleen Fontana, Bulent Mutus, Cindy Hutnik

Abstract 100



Title: Overview of clinical efficacy and safety of lifitegrast ophthalmic solution 5.0% for treatment of dry eye disease

Authors: Mahshad Darvish-Zargar, Edward J. Holland, Clara C. Chan, Kelly K. Nichols, Joseph Tauber, Christophe Baudouin, Aparna Raychaudhuri, Monica Roy, Amir Shojaei.

Abstract Body:

Purpose: To evaluate the combined evidence from five clinical trials of the efficacy and safety of lifitegrast ophthalmic solution 5.0% versus placebo in subjects with dry eye disease (DED). Lifitegrast is a lymphocyte function-associated antigen-1 (LFA-1) antagonist recently approved in the US for the treatment of signs and symptoms of DED.

Study Design: Adults with DED were randomized to lifitegrast or placebo in five randomized, double-masked, placebo-controlled trials: four 12-week efficacy/safety studies (phase 2, lifitegrast n=58, placebo n=58; phase 3 trials: OPUS-1, lifitegrast n=293, placebo n=295; OPUS-2, lifitegrast n=358, placebo n=360; OPUS-3, lifitegrast n=355, placebo n=356), and a 1-year safety study (SONATA, lifitegrast n=220, placebo n=111).

Methods: Change from baseline to day 84 in DED signs and symptoms was evaluated across the four 12-week studies. Key measures were the sign endpoint of inferior corneal staining score (ICSS; 0-4 point scale), and symptom endpoints of eye dryness score (EDS; visual analogue scale [VAS], 0-100 point scale), and visual-related function subscale of a symptom scale (0-4 point scale). Pooled safety data (lifitegrast n=1287, placebo n=1177) from all five trials were also analyzed.

Results: Lifitegrast improved ICSS versus placebo in the phase 2 study (secondary endpoint; treatment effect 0.35, nominal $P=0.0209$), OPUS-1 (co-primary; 0.24, $P=0.0007$), and OPUS-3 (ad hoc; 0.17, nominal $P=0.0144$). Lifitegrast reduced EDS (VAS) versus placebo in OPUS-2 (co-primary; 12.61, $P<0.0001$) and OPUS-3 (primary; 7.16, $P=0.0007$). The OPUS-1 co-primary symptom endpoint of visual-related function subscale, and the OPUS-2 co-primary sign endpoint of ICSS, did not achieve statistical significance. In the pooled safety analysis, total exposure was 415.65 person-years for lifitegrast, and 332.15 person-years for placebo. Adverse events were mostly mild to moderate in severity. There were no serious ocular treatment-emergent adverse events (TEAEs) and withdrawals due to TEAEs were infrequent (lifitegrast=7.0%, placebo=2.6%).

Conclusions: Lifitegrast improved signs and symptoms of DED in adults with DED across the four 12-week clinical studies. Lifitegrast appeared to be well tolerated in all studies with no serious ocular TEAEs. The combined clinical evidence from these trials support the recent US FDA approval of lifitegrast as a first-in-class medication for the treatment of signs and symptoms of DED.

Abstract 101

Title: HER2 as a possible therapeutic target in squamous cell carcinoma of the conjunctiva

Authors: Evangelina Esposito, Pablo Zoroquiain, Ana B. Toledo Dias, Miguel Burnier

Abstract Body:

Purpose: Invasive squamous carcinoma (SCC) is the most frequent malignant neoplasia of the conjunctiva, 33% of which will metastasize. C-erbB-2/neu (HER2) is an oncogene associated with poor prognosis, metastatic potential and aggressive behavior in several tumors, including breast, stomach, among others. HER2 amplification is also associated with the response to anti-HER2 treatment. The aim of this study is to evaluate HER2 expression in the progression of ocular surface squamous neoplasia (OSSN) and as a potential therapeutical target.

Study Design: Retrospective study

Methods: Ninety-eight OSSN lesions including 17 papillomas (P), 27 conjunctival intraepithelial neoplasia (CIN) I, 19 CIN II, 13 CIN III, and 11 SCC were evaluated. Eleven conjunctivas from normal human eyes (NHE) were also included in the analysis. Immunohistochemistry was performed to analyze HER2 (clone 29D8) expression, which was graded as follows: complete membrane staining in more than 10% of malignant cells (3+); weak to moderate complete staining in more than 10% of malignant cells (2+); none or fewer than 10% cells staining (0 to 1+, respectively). Positive HER2 was considered when a score 2+ or 3+ was determined. Breast carcinoma with HER2 amplification was used as a positive control. FISH technique was performed in the positive cases to confirm results. Statistical analysis was performed using Fisher's exact test.

Results: HER2 positive expression was detected in 6% of P (100% score 2+), 11% of CIN I (100% score 2+), 32% of CIN II (100% score 2+), 30% of CIN III (100% score 2+), 29% of SCC (50% score 2+ and 50% score 3+). Benign lesions showed lower HER2 expression than *in situ* ($P=0.03$) and invasive tumors ($P=0.02$). No correlation between HER2 and age or tumor thickness in SCC was found ($P>0.05$).

Conclusions: HER2 is expressed in conjunctival SCC. Moreover, one third of SCC were graded as 2+ or 3+. These results support the evaluation of anti-HER2 therapy in conjunctival SCC. Pre-clinical trials should be performed to determine the importance of this marker in conjunctival SCC for predicting response to treatments targeting this pathway.

Abstract 102

Title: Agreement and Reliability of Aberrometry Measurements in Normal Eyes Using iDesign, iTrace and Pentacam

Authors: Pablo Morales, Antoine Goulet, Reginald Tan, Mohammed Taha, Kashif Baig

Abstract Body:

Purpose: Given the increasing importance of aberration analysis in cataract and refractive surgery, the purpose of this study is to compare the agreement and reliability of aberrometry measurements in normal corneas using three commonly used aberrometers: Pentacam (Scheimpflug), iTrace (Ray Tracing) and iDesign (Hartmann-Shack).

Study Design: Prospective, cross-sectional study.

Methods: Participants with healthy normal eyes from University of Ottawa Eye Institute or Faculty of Medicine, University of Ottawa. The patient came for a single visit, undergoing a slit lamp examination by an ophthalmologist ruling out any ocular abnormalities except refractive error. Both eyes were tested using the three aberrometers: iDesign, iTrace and Pentacam. A minimum of 3 quality readings was obtained per eye for each aberrometer. Pupil diameter was adjusted to 5mm. Measurements included were spherical and cylindrical errors and Zernike coefficients up to the fourth order in the 3 different devices. For total aberrometry iDesign and iTrace devices were used. For corneal aberrometry we used Pentacam and iTrace. The normalized Zernike coefficients were also used to calculate the root mean square (RMS) of aberrations and Zernike coefficients of Defocus $Z(2,0)$, both Astigmatisms $Z(2,-2)$ and $Z(2,2)$, trefoil $Z(3,-3)$, coma $Z(3,-1)$ and spherical aberration $Z(4,0)$ were determined. Intraclass Correlation Coefficient (ICC) was used to test agreement and reliability. Data analyses were performed with SPSS v.20.0.

Results: Statistically significant differences between iDesign and iTrace were found in total eye aberrometry measurements for each of the parameters tested ($p < 0.05$), except for SA $Z(4,0)$ ($p = 0.96$) and total RMS ($p = 0.54$). Differences in corneal aberrometry measurements performed by Pentacam and iTrace were found to be statistically significant ($p = 0.00$) in all parameters tested. In both the iDesign and the iTrace, high levels of agreement ($ICC > 0.75$) were found in total aberrometry and refraction measurements. However, Pentacam is less reliable for some of the HOA measurements [eg. $SAZ(4,0)$; $ICC < 0.75$].

Conclusions: Significant differences in measurement of corneal aberrations between the Pentacam and the iTrace were shown, with the Pentacam having a tendency to record a lower amount of aberrations. iDesign and iTrace scans are highly reliable and repeatable, while the Pentacam has limited scan reliability for certain aberrations.

Abstract 103

Title: The corneal endothelium in pediatric posterior polymorphous corneal dystrophy: a specular microscopic study

Authors: Hamza Sami, Ali El Hamouly, Simon Fung, Dishay Jiandani, Kamiar Mireskandari, Asim Ali

Abstract Body:

Purpose: To report changes in endothelial cell density and morphology in pediatric patients diagnosed with posterior polymorphous corneal dystrophy (PPCD).

Study Design: Retrospective longitudinal cohort study.

Methods: Patients diagnosed with PPCD and whom were able to undergo specular microscopy at the Hospital for Sick Children, Toronto between July 2013 and September 2016 were included. Electronic patient records and clinical images were reviewed for previous ophthalmic history, visual acuity, slit-lamp biomicroscopic appearances and specular microscopic findings. Changes in endothelial cell density (ECD), hexagonality (HEX) and coefficient of variance (CV) over time were calculated.

Results: Seven patients aged 8-15 at presentation were included. Thirteen eyes had biomicroscopic features of PPCD but none had evidence of corneal decompensation. In these eyes, mean best-corrected visual acuity (BCVA) at presentation and at final follow-up were 0.12 ± 0.12 and 0.13 ± 0.10 logMAR, respectively. Mean ECD was 2198 ± 832 cells/mm², which reduced to a mean of 2115 ± 760 cells/mm² over a period of 0.92-2.23 years ($p=0.68$), representing an annual ECD reduction of 3.85%. Mean HEX were 65.1% and 66.8% ($p=0.66$), and mean CV were 29% and 25% ($p=0.026$) at presentation and at final follow-up, respectively.

Conclusions: PPCD is associated with an annual rate of ECD loss 4 times of that reported in a healthy age-matched paediatric cohort. Children with PPCD, especially those with high rate of ECD loss, may need early intervention in order to minimize visual morbidity.

Abstract 104

Title: Nitric oxide, administered using copper-chitosan derivatives, accelerates corneal epithelial wound healing

Authors: Vasiliki Tellios, Hong Liu, Nikoleta Tellios, Kathleen Fontana, Bulent Mutus, Cindy Hutnik

Abstract Body:

Purpose: Corneal abrasions are the most commonly diagnosed acute eye injury in children and young adults. No treatments are currently available that specifically target the wound healing process, such that moderate to severe abrasions may result in inefficient wound closure causing prolonged pain, vision-impairing infections and corneal scarring. Wound healing in the cornea involves two cell types: corneal epithelial cells to facilitate cell migration, and limbal epithelial cells for proliferation and cell regeneration. Recently, nitric oxide (NO) has gained attention for its role in facilitating fundamental wound healing processes such as cell migration, while displaying cyto-protective properties. NO, administered using a novel and inexpensive copper-chitosan composite (Cu-Ch), may be a promising treatment in accelerating corneal epithelial wound healing using an *in vitro* model.

Study Design: Human corneal epithelial (HCE) and limbal epithelial (LE) cells were cultured and exposed to a scalpel-induced mechanical injury. The cells were monitored over the course of 24, 48 and 72hrs under five different treatments: no scratch (CON), untreated scratch (CS), scratch + plain chitosan composite (0%), scratch + 1% copper solution Cu-Ch (1%), and scratch + 2% copper solution Cu-Ch (2%).

Methods: Samples were analyzed for cell migration, cytotoxicity, apoptosis and nitrate/nitrite production. Cell migration was monitored and quantified using ImageJ. Levels of cytotoxicity were measured using an LDH assay. Apoptosis levels were assayed using a cell death ELISA kit. Total nitrate/nitrite concentrations, an indirect measure of NO production, were measured using Griess reagents.

Results: Cell migration increased significantly on average by 18% in HCE cells treated with both Cu-Ch treatments when compared to CS after 72hrs ($p < 0.05$ and $p < 0.01$, respectively). LE cells showed a significant reduction in wound closure by 35% on average when compared to CS at 72hrs ($p < 0.001$). Cytotoxic fragments were significantly decreased in both Cu-Ch treatments in HCE cells ($p < 0.001$), while no significant decreases were noted in LE cells under Cu-Ch treatment. Apoptosis levels in both HCE and LE cells remained unchanged across all time points. Nitrate/nitrite levels in HCE cells were not significantly different with Cu-Ch treatment compared to CS. Nitrate/nitrite levels with 2% Cu-Ch treatment in LE cells were significantly elevated compared to CS ($p < 0.05$).

Conclusions: Although NO has been marketed as a beneficial biomolecule in wound healing, NO concentrations and cell type must be taken into consideration when used as a therapeutic agent. The biphasic properties of NO are clear when comparing NO by-products (nitrates/nitrites) in treatment conditions between LE and HCE cells. Significant increases in NO by-products, corresponding to NO hyper-production, were not associated with wound healing, rather hindering the process altogether. HCE cells did not show the same increase in NO by-products with treatment, but showed significant increases in wound healing over 72hrs in addition to significant decreases in cytotoxicity. The differences between HCE and LE cells in response to the same NO-donating stimulus may be due to fundamental differences in NO metabolism, which could benefit from further investigation.

Session Title: What's New in Uveitis

Subspecialty: Uveitis

Location: 522ABC

Session Time: Sunday, June 18, 2017, 3:45 pm - 5:15 pm

- 105.** The cascade of care in uveitis: an analysis of the referral characteristics and wait times for consultation in tertiary care centers in Toronto • *Panos Christakis, **Tina Felfeli**, Nupura Bakshi, Efrem Mandelcorn, Radha Kohly, Larissa Derzko-Dzulynsky*
- 106.** Clinical challenges in diagnosis and management of diffuse unilateral subacute neuroretinitis • *Larissa Derzko-Dzulynsky, **Tina Felfeli**, Nilesh Persad, Alan Berger*
- 107.** The corneal endothelium in paediatric patients with uveitis - a longitudinal study • ***Simon S. M. Fung**, Ali El Hamouly, Hamza Sami, Dishay Jiandani, Sara Williams, Nasrin Tehrani, Kamiar Mireskandari, Asim Ali*
- 108.** Guidelines for immunizing adult patients with chronic or recurrent noninfectious uveitis • ***Jordan Isenberg**, Annie Linh Thao Ho, Annie Claude Labbé, Éric Fortin*
- 109.** Laboratory analysis results and predictive characteristics of infectious panuveitis sampling in the Pacific Northwest • ***Kaivon Pakzad-Vaezi**, Macklin Nguyen, Andrew Bryan, Kathryn Pepple*

Abstract 105

Title: The cascade of care in uveitis: an analysis of the referral characteristics and wait times for consultation in tertiary care centers in Toronto

Authors: Panos Christakis, **Tina Felfeli**, Nupura Bakshi, Efrem Mandelcorn, Radha Kohly, Larissa Derzko-Dzulynsky

Abstract Body:

Purpose: To assess the characteristics of referrals to tertiary care uveitis specialists in Toronto, and to identify determinants of wait time for consultation.

Study Design: Multicenter, retrospective consecutive case series.

Methods: Eligible referrals were identified using billing codes for new uveitis consults seen by three uveitis specialists practicing at University of Toronto affiliated academic clinics.

Results: One hundred and five referrals were included. Of the referrals received, 81% were sent by ophthalmologists, 49% of whom were retina or uveitis specialists. Referrals from academic providers constituted 66% of patients. The most common reason for referral was ongoing management (64%), diagnostic workup (36%), and request for a second opinion (24%). Referrals were triaged as urgent (vision-threatening) in 15% of cases, semi-urgent (active or uncontrolled) in 60% of cases, and elective (quiescent or stable) in 25% of cases. Disease was bilateral in 52% of cases, and was classified as posterior (39%), anterior (38%), intermediate (12%) or panuveitis (8%) accordingly. Disease presentation was classified as acute (44%), recurrent (36%) or chronic (18%). The etiology of uveitis was unknown at the time of referral in 54% of cases, was associated with known systemic disease in 29% of cases. Only 42% of referrals included bloodwork, 32% had syphilis testing, 29% included a chest X-ray, and 26% had performed a Mantoux test. At the time of referral, 54% of patients were being treated with topical steroids and 8% of patients were on systemic immunosuppression.

Wait time for consultation averaged 4 ± 5 days for urgent cases, 62 ± 44 days for semi-urgent cases and 90 ± 61 days for elective cases ($p < 0.01$). Acute uveitis had a shorter wait time (44 ± 46 days versus 69 ± 54 days for recurrent/chronic uveitis, $p = 0.03$). Posterior uveitis trended towards a shorter wait time (45 ± 47 days versus 65 ± 54 days for other uveitis classifications, $p = 0.09$). Longer wait times were identified for referrals requesting ongoing management compared to cases requiring workup and diagnosis (71 ± 45 days versus 39 ± 42 days, $p < 0.01$). Referring provider and practice setting did not significantly influence uveitis wait times.

Conclusions: Referrals to tertiary care uveitis providers in Toronto are often challenging, undifferentiated cases being referred by academic retina or uveitis specialists. Disease is often bilateral, acute, and involving the posterior segment. Referrals for vision-threatening disease are usually seen the same week, but semi-urgent and elective consultations may take several months. Half of referrals had no diagnostic workup performed prior to consultation, which may delay diagnosis for patients and lengthen wait times for uveitis specialists.

Abstract 106

Title: Clinical challenges in diagnosis and management of diffuse unilateral subacute neuroretinitis

Authors: Larissa Derzko-Dzulynsky, **Tina Felfeli**, Nilesh Persad, Alan Berger

Abstract Body:

Purpose: To present a case of DUSN in Canada with an unidentified nematode and atypical presentation, and highlight the challenges in diagnosis and treatment of this condition.

Study Design: Case report.

Methods: All medical records and diagnostic investigations of the patient were reviewed retrospectively.

Results: An otherwise healthy 71-year-old female was seen in consultation at an ophthalmology clinic in a tertiary care hospital for a three-month history of progressively deteriorating blurry vision in the right eye. A detailed review of systems and past medical history were unremarkable. Her social history was significant for frequent travels to tropical destinations and gardening in her neighborhood of Northern Toronto where she reported a large population of raccoons. On examination, her visual acuity was 20/60 in the right and 20/20 in the left eye. Slit lamp examination disclosed presence of moderate anterior uveitis (+1 cells). Fundus examination showed mild vitritis and depigmented chorioretinal lesions, some with hyperpigmented edges in the temporal macula and midperiphery. The optic nerve was normal with no edema, hyperemia or pallor. The left eye was normal with no evidence of uveitis. Patient was referred to a uveitis service for further assessment and workup. All investigations and consultations were found to be unremarkable. She was treated with valgancyclovir and then valacyclovir for several months, for possible atypical viral retinitis, followed by a 6 week course of leflunomide. Six months later, she developed a branch retinal vein occlusion on the right and was treated with Triessen intravitreal injection (0.1 mL of 40mg/mL) with significant visual improvement. At this time, DUSN was strongly suspected, and oral treatment with albendazole was recommended but was declined by patient. One month later, her vision acutely declined to counting fingers and examination revealed severe optic nerve edema. At this time, oral albendazole was initiated and IV methylprednisolone was given 2 weeks later resulting in significantly reduced optic nerve edema after 1 month. No worm was identified in the retina at any time, and therefore laser photocoagulation was not performed. The final visual outcome for the right eye was no light perception due to end-stage optic nerve atrophy. The patient was maintained on 40mg prednisone for three months followed by slow tapering. No visual changes were reported for the left eye.

Conclusions: Presentation of DUSN may be atypical and classical ocular features such as significant vitritis and papillitis may be absent on presentation. Early diagnosis can be difficult if the worm is not identified in the retina or subretinal space. Diagnosis of DUSN is challenging but should be considered in Canadian patients presenting with multifocal chorioretinitis.

Abstract 107

Title: The corneal endothelium in paediatric patients with uveitis - a longitudinal study

Authors: Simon S. M. Fung, Ali El Hamouly, Hamza Sami, Dishay Jiandani, Sara Williams, Nasrin Tehrani, Kamiar Mireskandari, Asim Ali

Abstract Body:

Purpose: To study the effect of anterior chamber inflammation on the corneal endothelium in paediatric patients.

Study Design: Prospective longitudinal cohort study with masked observers.

Methods: Patients attending our institution with diagnoses of unilateral or bilateral anterior chamber inflammation (anterior, intermediate, or pan-uveitis) and those who are at risk of developing uveitis due to juvenile idiopathic arthritis were recruited for the study. Changes in central corneal endothelial cell density (ECD) and morphologic variables were determined by repeated specular microscopy. Findings were correlated with previous ophthalmic history and serological markers.

Results: Among eyes with a history of active anterior chamber inflammation (n=136, 20 unilateral uveitis; 58 bilateral uveitis), mean total duration of disease (TDD) was 32.5 ± 30.0 weeks, and mean percentage of time in which active uveitis was found during the entire follow-up period (%AU) was $17.2 \pm 0.17\%$. In eyes with no prior ophthalmic surgeries (Group I, n=107), mean ECD at first measurement (ECD1) was 3445.5 ± 380.3 and mean ECD after follow-up of 12.0 \pm 3.5 months (ECD2) was 3437.5 ± 346.1 cells/mm² (p=0.71). In eyes with previous surgery (Group II, n=29), mean ECD1 and ECD2 were not significantly different (3135.8 ± 446.3 v 3079.6 ± 471.0 ; p=0.10). Between the two groups, significant differences were found in mean ECD1 (p=0.001) and mean ECD2 (P<0.001). In the 5 patients with unilateral uveitis who had not undergone surgery in either eye, no differences were found between eyes with previous episodes of anterior uveitis and those without, both in ECD1 (p=0.39) and in ECD2 (p=0.32). When host and disease-related characteristics were evaluated, correlation was found between ECD1 in Group I and the duration of disease diagnosis before patient recruitment (r=-0.26; p=0.008); and ECD2 was correlated to TDD (r=-0.24, p=0.01). Correlations between endothelial cell morphology and %AU were also found.

Conclusions: In our study patients, surgical treatment of uveitis complications, including cataract and glaucoma, adversely affected the corneal endothelium. Total duration of disease and percentage of time of disease activity were correlated with lower ECD and more abnormal endothelial cell morphology. However, over a 1-year period, no significant changes to ECD occurred. It may be that by optimising anterior chamber inflammation control, endothelial cell loss could be minimised beyond the avoidance of surgical treatment of disease complications.

Abstract 108

Title: Guidelines for immunizing adult patients with chronic or recurrent noninfectious uveitis

Authors: Jordan Isenberg, Annie Linh Thao Ho, Annie Claude Labbé, Éric Fortin

Abstract Body:

Purpose: The vaccination of the adult patients with chronic or recurrent noninfectious uveitis requiring immunosuppression is essential to minimize the risks related to infections occurring during therapy. To date no predefined vaccination program has been described for this patient population in the ophthalmology literature. It is likely that this area of patient management is not properly addressed by clinicians. The aim of this study is to develop guidelines for all adult uveitis patients who are either currently undergoing immunomodulatory therapy or for those recently diagnosed who would benefit from such treatment.

Study Design: Systematic literature review

Methods: Recommendations are based on thorough review of the adult IBD, rheumatologic oncologic and dermatologic literature, as well as international vaccination guidelines and discussion with experts. A real-world application was developed from this process and is proposed as a template to be used by physicians involved in the care of patients with severe uveitis which requires immunosuppression

Results: We describe a two-track guideline: one for patients with uveitis currently undergoing immunomodulatory therapy and another for those with a diagnosis of uveitis and who would benefit from such treatment in the short-term. Although immunologic response to vaccination may be suboptimal during immunosuppression, non-live vaccination is recommended for this patient population. The opportunity for live vaccine administration is often available prior to immunosuppressive therapy. Overall, the literature supports immunization to be a safe and effective strategy for preventing the infections in patients for whom immunosuppression is planned or is ongoing for various systemic diseases. Patients immunosuppressed for recurrent of chronic uveitis should benefit from similar vaccination programs.

Conclusions: We recommend patient specific vaccinations for individuals with the diagnosis of recurrent or chronic uveitis and in whom immunosuppression is considered and that are undergoing immunosuppressive therapy.

Abstract 109

Title: Laboratory analysis results and predictive characteristics of infectious panuveitis sampling in the Pacific Northwest

Authors: Kaivon Pakzad-Vaezi, Macklin Nguyen, Andrew Bryan, Kathryn Pepple

Abstract Body:

Purpose: To evaluate and describe the results, yield, and prognostic characteristics of infectious etiological testing using traditional and new techniques in cases of panuveitis analyzed by the University of Washington reference laboratory.

Study Design: Retrospective database analysis

Methods: Molecular virology and microbiology databases were searched from 2007-2014 for endophthalmitis/panuveitis samples. Sample results included polymerase chain reaction (PCR) for HSV, VZV, CMV, and EBV, PCR for 16S and 28S rRNA, and bacterial and fungal staining and culture results. Demographic and clinical data were also recorded. Logistic regression analyses were performed to identify characteristics predicting a positive PCR or culture result, and an algorithm for specimen handling was created in consultation with laboratory experts in light of modern detection thresholds.

Results: Of 85 patient samples sent for bacterial and fungal testing during the study period, 16 (19%) were dual positive by culture and PCR, 43 (51%) were dual negative by culture and PCR, 10 (12%) were positive by culture only, and 16 (19%) were positive by PCR only. Univariate logistic regression analysis of PCR samples demonstrated that a surgical specimen was associated with a positive result (OR 3.34, 95% CI 1.12-10.51; $p=0.03$), with a trend towards positivity from a vitreous tap (OR 0.37, 95% CI 0.12-1.08; $p=0.08$), pre-sample antibiotic use (OR 2.57, 95% CI 0.85-8.45, $p=0.10$), and prior eye surgery (OR 2.44, 95% CI 0.82-7.57; $p=0.11$). Multivariate analysis demonstrated a significant association of prior eye surgery with PCR positivity (OR 4.06, 95% CI 1.12-17.25; $p=0.04$), and a trend in regards to surgical samples (OR 6.19, 95% CI 0.78-62.97; $p=0.09$). Parameters associated with culture positivity were surgical samples (OR 2.93, 95% CI 0.99-9.08; $p=0.05$) and vitreous taps (OR 0.40, 95% CI 0.13-1.17; $p=0.10$) by univariate analysis, and surgical samples by multivariate analysis (OR 6.12, 95% CI 0.84-61.31; $p=0.09$). Of 112 samples sent for viral PCR, 37 (33%) were positive. Aqueous, vitreous, and vitrectomy samples were positive in 35% (18/51), 27% (10/37), and 33% (8/24), respectively. Most viral titers were very high and could be detected with low sample volumes ($\sim 20 \mu\text{l}$) without a significant miss-rate. An algorithm for specimen handling based on infectious clinical suspicion and volume of sample obtained is presented.

Conclusions: In the Pacific Northwest, PCR is more likely to be positive than culture, although the importance of culture is still apparent. There is a higher likelihood of positive results in cases of post-operative endophthalmitis, and likely from surgical samples independent of sample volume. Low sample volumes are adequate for viral PCR testing. The clinician should play an active role in guiding sample handling with respect to PCR versus culture in the context of sample volume and clinical suspicion.