

CANADIAN CORNEA, EXTERNAL DISEASE & REFRACTIVE SURGERY SOCIETY

THURSDAY 12 JUNE

Paper #A-00023

How to improve treatment predictability and outcomes with femtosecond and wavefront-guided ablations

Louis Probst

Purpose: To describe how advances in refractive technology have continually helped reduce enhancement rates in a high-volume practice.

Methods: Retrospective review of enhancement rates from September 2004 through August 2007. Analysis of all procedures vs all custom vs all conventional IntraLase vs all custom IntraLase.

Results: In 9/04, enhancement rates were 6.72%, and were 1.04% in August 2007. Wavefront-guided technology was introduced in our facility in 2/05, when overall enhancements were 7.86% (conventional 8.51% vs custom, 6.73%). The IntraLase was introduced in 7/06, when overall enhancement rates were 2.65%. Conventional IntraLase consistently had higher enhancement rates than custom IntraLase, and all customized procedures overall had lower enhancement rates than all conventional procedures.

Conclusions: The lowest enhancement rates occurred after using combined IntraLase and wavefront guided technology. By August 2007, overall enhancement rates had decreased 1.04%. All conventional procedures had an overall enhancement rate of 5.91% compared with all IntraLase procedures with an overall enhancement rate of 1.29%.

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THURSDAY 12 JUNE

Paper #A-00024

Fine-tuning wavefront guided Myopic LASIK: should we aim for the wavefront refraction with the Visx Star S4?

Igor Kaiserman, Irit Bahar, Allan R. Slomovic, David S. Rootman

Purpose: To analyze the target deviation, efficacy and safety of correcting the wavefront refraction in CustomVue guided laser in situ keratomileusis (LASIK).

Methods: 127 eyes (67 consecutive patients, mean age 33.8±8.7 years) that underwent myopic astigmatic wavefront guided LASIK were included in this study. The LASIK flap was created with the IntraLase femtosecond laser (60 KHz) while the excimer treatment was wavefront guided and performed with VISX STAR S4 IR (CustomVue). The surgeons were allowed to modify the amount of spherical correction. Preoperative visual acuity, manifest refraction, wavefront analysis (WaveScan system) as well as demographics were collected. One month postoperatively visual acuity and manifest refraction were evaluated.

Results: Preoperative manifest refraction (MR) revealed a mean spherical equivalent (SEQ) of $-3.82 \pm 2.2D$ (range -0.75 to $-9.37D$) and a mean cylinder of $0.66 \pm 0.63D$ (range 0 to $2.5D$) while wavefront simulated refraction (WFR) resulted in $-3.61 \pm 2.2D$ (range -0.37 to $-9.73D$) and $0.80 \pm 0.60D$ (range 0 to $2.8D$) respectively ($p < 0.0001$ for both SEQ and cylinder). The mean intended correction (as modified by the surgeons) was in-between the MR and WFR: $-3.81 \pm 2.2D$ (SEQ) on average. One month post operatively mean manifest SEQ was $-0.20 \pm 0.39D$ (range -2 to $0.37D$). The mean efficacy index was 1.0 ± 0.22 and the mean safety index was 1.03 ± 0.18 . Correcting the WFR alone would have resulted in a mean post-operative refraction of $-0.44 \pm 0.41D$ (SEQ) (range -2 to $0.37D$) while correcting the MR alone would have resulted in a SEQ of $-0.25 \pm 0.34D$ (range -1.1 to $0.5D$) ($p < 0.001$). Regression analysis produced a linear nomogram: recommended spherical correction = $MR - SEQ * 1.018 - 0.184$. Utilizing the nomogram would have resulted in a significantly better SEQ of $-0.01 \pm 0.34D$ (range -0.8 to $0.6D$; $p < 0.0001$ compared to the achieved correction).

Conclusions: In CustomVue wavefront guided LASIK, using a nomogram to adjust the spherical correction while maintaining the wavefront guided correction of high-order aberrations would result in a higher accuracy of correction.

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THURSDAY 12 JUNE

Paper #A-00025

Importance of cyclotorsion and pupil centroid shift in refractive outcomes after wavefront-guided LASIK

Joseph King

Purpose: Review of the importance of cyclotorsional registration and pupil centroid shift compensation on excimer laser photoablation.

Methods: Review of published papers and reports. Author will be presenting his own data on a prospective study of 100 consecutive eyes undergoing LASIK with the VISX S4 IR that had cyclotorsion, pupil centroid shift, and pupil size change measured between their wavefront capture and at the time of surgery.

Results: Cyclotorsional rotation can greatly influence cylindrical error. In a study by Chernyak of rotation in 51 eyes, mean movement was 2.2 degrees +/- 2.0 degrees. In another study by Swami (n=240), mean movement was 4.1 degrees +/- 3.7 degrees, 8% with over 10 degrees of movement. Smith et al. found mean movement of 4.3 degrees +/- 3.5 degrees in 50 eyes, with 25% having >7 degrees of movement (up to 16 degrees). Two other studies show an average nasal displacement of 0.25mm, with shifts up to 0.6mm when measured in photopic and scotopic conditions. The larger the pupil size difference between the wavefront and laser capture, the larger the centroid shift.

Conclusions: Pupil centroid does shift between wavefront acquisition and the laser treatment. Ignoring the pupil centroid shift may lead to sub-optimal results in wavefront-driven refractive surgery. Iris registration with compensation for cyclorotation and centroid pupil shift seems to be an essential contribution for further improvement of refractive outcome and patient satisfaction.

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THURSDAY 12 JUNE

Paper #A-00026

Does the corneal flap alter the cyclotorsion rotations during iris registration?

Rani N. Al Karmi, David S. Rootman

Purpose: To determine if the lifting of corneal flap will have an effect on cyclotorsion rotations during iris registration with Visx Star S4 IR.

Methods: A non randomized, interventional consecutive study. Patients were recruited and treated by Laser In Situ keratomileusis for myopic or compound myopic astigmatic refractive error. A total of 18 patients (32 eyes) were treated. Flaps were created by Intralase Femtosecond laser. After bubbles been clarified, the iris pattern and cyclotorsion of patient's eyes in the supine position were registered using the STAR S4 Iris Registration (IR) in the Visx S4 Excimer Laser system. Under the same conditions of illumination flaps were lifted and another measurement of Iris Registration and cyclotorsion were made.

Results: Cyclotorsion rotation before the flap had been lifted ranged from 9.6° to 0.6° CCW and 7.6° to 0.3° CW with a mean of $3.02^\circ \pm 2.32$ And after the flap had been lifted ranged from 7.2° to 0.3° CCW and 6.4° to 0.1° CW with a mean of $2.7^\circ \pm 2.17$. The absolute degrees of difference in rotation error before and after flaps were lifted $1.08^\circ \pm 1.06$. (Range from 6° to 0.1°). 2 eyes (6.25 %) had rotation error more than 2 degrees.

Conclusions: No significant difference was noted in cyclotorsion rotation during Iris Registration before and after the flap been lifted ($P < 0.05$). Doing Iris Registration before flap lift makes proceeding with Laser ablation smoother with less delay and reduces drying of exposed stroma.

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THURSDAY 12 JUNE

Paper #A-00027

Rochester (Enhanced) Nomogram improves predictability of customized LASIK

Scott MacRae, Manoj Subbaram

Purpose: To test the efficacy of the Rochester nomogram for custom LASIK to reduce outliers and improve predictability of refractive outcome. The Rochester nomogram calculates myopic sphere treatment based on preoperative manifest refraction and higher order aberrations.

Methods: 265 myopic eyes (mean SE: $-4.72 \pm 2.02D$; and HORMS: $0.53 \pm 0.16\mu m$) were treated using the Rochester nomogram on the B&L Zyoptix platform (study group). 1-month postoperative visual acuity and refractive error were measured and compared to the previous Zyoptix FDA results on 340 myopic eyes (control group; mean SE: $-3.66 \pm 1.52D$; and HORMS: $0.41 \pm 0.16\mu m$, 6mm aperture). Note greater preop myopia (mean SE difference: $-1.06D$) and HORMS (mean difference: $0.12\mu m$) among study eyes than the previous FDA control group.

Results: 94% (Rochester nomogram) and 91.5% (FDA control group) attained UCVA of 20/20 or better ($p < 0.05$). Mean 1-month SE was $-0.07 \pm 0.34D$ (Rochester nomogram, range: $\pm 1D$) and $+0.17 \pm 0.51D$ (FDA control group, range: -1.04 to $+1.81D$, $p < 0.001$). 92.8% (Rochester nomogram) and 75.9% (FDA control group) of eyes were within $\pm 0.5D$ of target SE ($p < 0.01$). Hyperopic overcorrections (SE $> +0.5D$) dropped, nearly 10-fold from 21.8% (FDA control group) to 2.3% (Rochester nomogram, $p < 0.001$).

Conclusions: The Rochester nomogram treated eyes with more preop myopia and HOA, yet provided significantly better postoperative visual acuity, better predictability, and reduced range of postoperative SE than previous FDA study. The Rochester nomogram compensates for preop HOA on postop refractive error, thereby reducing post-LASIK overcorrections and outliers.

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FRIDAY 13 JUNE

Paper #A-00028

Visual function after implantation of bilateral AcrySof Toric natural intraocular lens

Irit Bahar, Ike Ahmed, Reye Stein, Allan Slomovic

Purpose: The objective of this ongoing, prospective, multi-centre study is to assess the post-operative visual acuity, rotational stability and spectacle independence after implantation of the AcrySof Toric IOL.

Methods: A total of 225 (450 eyes) bilateral patients are planned. Sixty-eight patients (136 eyes) underwent phacoemulsification with posterior chamber AcrySof Toric IOL implantation. Visual and refractive outcomes were evaluated at 1 day, 1 month and 3 months postoperatively.

Results: 68 patients have been collected with a mean age of 69 years (age range 42-91), and 3 months of follow up. Prior to surgery, 78% of patients were seeing 20/50 or worse compared to 85% seeing 20/30 or better after surgery. The average rotational stability was 1.7 degree at three months. A total of 89% of patients had 0.5 diopter or less of post operative astigmatism. Post surgical spectacle freedom was significantly improved with 87% of patients at three months reporting distance vision spectacle independence.

Conclusions: The AcrySof Toric IOL provides excellent rotational stability, significantly reducing the absolute residual refractive cylinder, improving visual acuity and spectacle independence.

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FRIDAY 13 JUNE

Paper #A-00029

Variability in pre-operative measurement of astigmatism in refractive patients: a case of instrument variability or patient positioning?

Peter Lee, Howard Gimbel, Maria Ferensowicz

Purpose: To report the variability in pre-operative measurements of astigmatism in refractive patients using three different corneal topographies and compared to manifest refraction.

Methods: Using online medical records, 1151 consecutive eyes underwent corneal topography by Orbscan, OPD and Pentacam and manifest refraction before refractive surgery (2005-2007). All surgeries were done by one surgeon and the surgeon chose the measurement of astigmatic correction based on pre-operative data.

Results: The pre-operative measurements of cylinder power (mean +/- SD) for the different modalities were: 0.88+/-0.89 (manifest refraction), 1.18+/-2.49 (Orbscan), 0.91+/-1.40 (OPD) and 1.06+/-1.38 (Pentacam). Using dependent T-test for comparison: manifest refraction vs Orbscan $p=0.000043$ (highly significantly different), manifest refraction vs OPD $p=0.389666$ (not significantly different), and manifest refraction vs Pentacam $p=0.000008$ (highly significantly different). The pre-operative measurements of cylinder axis (mean +/- SD) for the different modalities were: 80.13+/-67.33 (manifest refraction), 86.74+/-75.63 (Orbscan), 90.61+/-70.07 (OPD), and 81.39+/-70.95 (Pentacam). Using dependent T-test for comparison: manifest vs Orbscan $p=0.006629$ (significantly different), manifest vs OPD $p=0.000004$ (highly significantly different), and manifest vs Pentacam $p=0.613283$ (not significantly different). Long term outcomes including vector analysis of astigmatism will be correlated to pre-operative measurements to determine which instrument best predicted astigmatic error.

Conclusions: Inter-instrument variability and patient positioning and facial asymmetry add to the challenges of determining the true measurement of astigmatism in the refractive surgical population.

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FRIDAY 13 JUNE

Paper #A-00030

The continuing rise of Acanthamoeba keratitis

Hall F. Chew, Kristin M. Hammersmith, Ralph C. Eagle, Christopher J. Rapuano, Brandon D. Ayres, Peter R. Laibson, Elisabeth J. Cohen

Purpose: To update the continued increase of Acanthamoeba keratitis (AK) recently diagnosed at Wills Eye Institute from 2006 to 2007. To verify the risk factors, clinical characteristics, treatments and outcomes of patients with AK.

Methods: Retrospective consecutive case series of 26 eyes with AK.

Results: Twenty-six patients were diagnosed with AK: ten patients in all of 2006 and 16 patients in 2007. Two patients did not wear contact lenses, one patient wore orthokeratology rigid contact lenses, and 23 patients wore frequent replacement soft contact lenses (FRSCL). All 23 FRSCL wearers used one-step multipurpose: cleaning solutions (MPS). Twelve (52%) used Complete MoisturePlus (AMO, Santa Ana, CA); three (13%) used Renu (B&L, Rochester, NY); three (13%) used Opti-Free (Alcon, Fort Worth, TX); four (17%) used an unknown/generic MPS. From Jan. 1, 2006 to May 31, 2007, there were 12 cases of AK in FRSCL wearers: five used Complete MoisturePlus. After June 1, 2007, there were 11 cases involving FRSCL: seven used Complete MoisturePlus. Ten patients (43%) swam in their FRSCL. Nine patients (39%) were exposed to well water. Mean time to diagnosis was 28 days (range: 4-90; SD=23.4). Herpes simplex keratitis was misdiagnosed in 16 cases (62%). Topical steroids were used in 19 cases (73%) prior to diagnosis of AK. High intraocular pressures developed in 7 (27%) patients. Narcotic medication was required by 24 of the 26 patients (92%). Fourteen cases (54%) were diagnosed by histopathology, 11 cases (42%) by clinical examination and response to treatment, and one (4%) by corneal biopsy.

Conclusions: There is a continued increase in the incidence of AK at our institution (Ref: Thebpatiphat N. et al. Acanthamoeba Keratitis a Parasite on the Rise. Cornea 2007;26:701-706). The risk factors for AK are multifactorial. AK remains a diagnostic challenge. Despite the voluntary recall of Complete MoisturePlus by the United States Food & Drug Administration, AK with this and other MPS still occurs.

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FRIDAY 13 JUNE

Paper #A-00031

Acanthamoeba: a five-year review of Acanthamoeba keratitis and an evaluation of contamination of contact lens cases in asymptomatic wearers

Catherine Marquis, Patricia-Ann Laughrea, Virginie Leblanc-Simard, Claudine Rancourt, Louise Côté, Pierre Douville, Richard Bazin, René Dinh

Purpose: We reviewed cases of Acanthamoeba keratitis (AK) that presented over a five-year period in the Québec City area, and we evaluated complications and associated risks factors. The contamination of contact lens storage cases with Acanthamoeba was further studied prospectively in an asymptomatic population.

Methods: A retrospective consecutive series of 29 patients with AK (culture-confirmed or presumed) seen between January 2002 and December 2007 at the Cornea Service of the Centre hôpitalier de l'Université Laval was reviewed. Information included visual acuity, risk factors, brand of contact lens disinfecting solution, and complications. We also evaluated 194 contact lens cases of asymptomatic wearers from 2 clinics in a prospective study covering a 24-month period (2006-2007). Subjects completed a survey on their lens care habits and we looked for bacterial and Acanthamoeba contamination of their lens cases.

Results: We observed an increasing incidence of AK from 2002 to 2007: respectively 3, 2, 3, 6, 4 and finally 11 cases in 2007. There were 16 women and 13 men, 16 to 91 years old. Twenty-six of the 29 patients wore contact lenses, and 27 frequent-replacement soft contact lenses. Acanthamoeba was isolated from the cornea in 19 of 29 patients, including 2 samples obtained during penetrating keratoplasty (PK), and from the lens case in 12 of 21 patients. Information about contact lens disinfecting solution use was available in 21/29 medical records: 17 patients used multipurpose solution, which was AMO Complete Moisture Plus for 10 of them. Some patients had poor outcome: 3 patients suffered corneal perforation, 7 needed PK and 4 others were still on the waiting list for PK. In our population of asymptomatic contact lens wearers, Acanthamoeba was isolated from 13.7% of the cases (n=25). Of the 192 lens cases collected, 182 could be cultivated. Among the 25 lens cases positive for Acanthamoeba, 6 were associated with AMO Complete Moisture Plus use (24%) and 8 with B&L Renu MultiPlus use (32%). Fifteen percent of the asymptomatic wearers used AMO Complete Moisture Plus solution and 37% used B&L Renu MultiPlus solution.

Conclusions: During the past 5 years, there appears to be an increasing incidence of Acanthamoeba keratitis in our area. Among AK cases, patients were contact lens wearers in 89.7% of cases and the AMO Complete Moisture Plus solution was the most frequently disinfecting solution used. Acanthamoeba contact lens case contamination is frequent and most likely a risk factor for Acanthamoeba keratitis. Actual contact lens disinfecting solutions need to have improved efficacy and contact lens care practices reviewed.

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FRIDAY 13 JUNE

Paper #A-00032

Comparison of antibiotic-only and antibiotic-steroid combination treatment in corneal ulcer patients: interim report of a double-blinded, randomized clinical trial

Jason Blair, William Hodge, S. Al-Ghamdi, R. Balabanian, B. Lowcock, Y. Pan, D. Fergusson, S. Aaron, W. B. Jackson, G. Mintsioulis, A. Slomovic

Purpose: Standard antibiotic treatment effectively treats cornea infection, but often leaves a scar that can impair vision. In order to reduce the size of the scar and improve vision, topical corticosteroids could be used early in treating the infection. However, topical steroids have many known side effects. Therefore, a randomized, double-blinded, controlled trial was conducted to determine the benefit of corticosteroid in addition to antibiotics in the early treatment of corneal ulcers.

Methods: Patients were recruited if they met the eligibility criteria and consented to participate. Subjects were randomized before enrollment. Primary outcome is residual ulcer size at 10 weeks compared to baseline measurement, based on digital photographic documentation. Secondary outcomes are VF-14 score, rate of cure or treatment failure, and visual acuity. This report is an interim analysis.

Results: All subjects (n=30) demonstrated a reduction in ulcer size over the 10-week study period. Subjects randomized to receive antibiotic-steroid treatment showed greater mean percent reduction in ulcer size than individuals who received antibiotic-only (49.28% vs. 29.26%, p=0.1188), as determined by photographic measurement. Treatment with antibiotic plus steroid was beneficial in terms of visual acuity over antibiotic-only (mean improvements of 1.00 vs. 0.76, p=0.5590). Two participants from different treatment groups have experienced a total of three adverse events.

Conclusions: While these results are not statistically significant with the present sample size, the trend favours the antibiotic-steroid group. Treatment with antibiotic-steroid demonstrated better improvements in visual acuity and ulcer size, compared to treatment with antibiotic-only.

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FRIDAY 13 JUNE

Paper #A-00033

Posterior lamellar keratoplasty: comparison of objective and subjective outcomes for DLEK and DSAEK performed in the same patients

Wiwan Sansanayudh, Irit Bahar, Eliya Levinger, Sathish Srinivasan, David Rootman

Purpose: To evaluate the patients' perspective about the endothelial keratoplasty and to compare the outcomes of deep lamellar endothelial keratoplasty (DLEK) and descemets stripping automated endothelial keratoplasty (DSAEK), performed in the same patients.

Methods: We reviewed the records of 14 patients (28 eyes) who underwent DLEK in one eye and DSAEK in their fellow eye between 2003 and 2007. The techniques were compared for visual outcomes, pre- and postoperative refraction, corneal topographies, high order ocular aberrations, and complications rate. The patient's satisfaction from each procedure was evaluated via a questionnaire.

Results: Nine (75%) of the patients percept better vision in the DSAEK operated eye. Eight (66.6%) of the patients reported faster recovery following DSAEK. Ten (83%) of them preferred the outcomes of the DSAEK surgery. The visual outcomes of the two techniques were similar. The DLEK operation was associated with a significantly higher rate of postoperative hyperopia ($p < 0.05$), and higher levels of high order ocular aberrations (HOA). Both contrast acuity and contrast threshold were significantly better in the DSAEK operated eyes. There were no significant differences between the techniques in intraoperative and postoperative complications.

Conclusions: We conclude that most patients prefer the DSAEK operation, although there are no differences in visual outcomes between DLEK and DSAEK. Better contrast acuity and threshold together with avoidance of surgery-induced hyperopia and HOA is the main benefit of the DSAEK technique.

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FRIDAY 13 JUNE

Paper #A-00034

Intralase enabled keratoplasty: the top hat wound configuration

Irit Bahar, Alex Lange, Igor Kaiserman, Eliya Levinger, Wiwan Sansanayudh, Allan Slomovic, Neera Singal, David Rootman

Purpose: To evaluate the outcomes of top hat wound configuration Intralase enabled keratoplasty (IEK).

Methods: A total of 23 patients underwent top hat IEK and were followed for 6-12 months. Main outcome measures included best-corrected Snellen visual acuity (BCVA), topographic and refractive results, high-order ocular aberrations, endothelial cell counts, and complications rate.

Results: The visual outcomes and mean BCVA will be evaluated. The mean spherical equivalent power, the mean astigmatism, endothelial cell count and time to all suture removal will be investigated as well. High order ocular aberrations will be presented.

Conclusions: The top hat Intralase enabled keratoplasty resulted in excellent wound apposition, fast visual recovery and moderate astigmatism within months of surgery.

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FRIDAY 13 JUNE

Paper #A-00035

Composite corneal substitutes with incorporated anti-HSV drugs delivery system

William Hodge, Zin Zhang, Masoud Ghorbani, Subhadra Dravida, Shazia Chaudry, Francisco Diaz-Mitoma, May Griffith

Purpose: We have fabricated corneal substitutes based upon collagen hydrogels that reproduce key properties of the normal human corneal ECM. When implanted into pig models as deep lamellar grafts, they have permitted regeneration of corneal cells and nerves, while retaining optical clarity over 12 months. Present obstacles now include overcoming enhanced Pseudomonal growth on these substrates compared to human controls and overcoming HSV keratitis, a well-known clinical entity requiring cornea transplantation. The latter is the topic for this presentation.

Methods: The anti-viral, acyclovir (ACV), was encapsulated in silica nanoparticles (SiO₂) and the drug-loaded particles are then dispersed within the collagen-based implant hydrogels. The particle-laden hydrogels were characterized by light and electron microscopy (TEM and SEM). Delivery and releasing kinetics of ACV were studied.

Results: Both TEM and SEM Results: indicate that the ACV-loaded SiO₂ nanoparticles had average diameters (D) of 30 nm. The nanoparticles were biocompatible and non-cytotoxic between concentrations of 25 to 100 µg/ml. A concentration of 3.5 µg/ml of ACV encapsulated by SiO₂ nanoparticles shows promising anti-viral activity against HSV-1 in cell cultures of human corneal epithelial cells. TEM showed that SiO₂ particles were generally localized to the exterior surface of corneal epithelial cells, although internalized particles were observed. Testing of activity in cultured sensory neurons is ongoing.

Conclusions: We show the possibility of developing corneal substitutes with anti-viral therapeutic properties. Such tissue substitutes may in the future be useful for corneal transplantations in HSV-1 patients. For precisely controlled delivery, a nanoparticle system based on photocages is being developed that will replace the SiO₂ nanoparticles.

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FRIDAY 13 JUNE

Paper #A-00036 Keratoconus Management Study

Marie Eve Légaré, Richard Bazin, Guillermo Rocha

Purpose: Keratoconus is the most common noninflammatory ectatic disorder with a prevalence estimated between 50 and 230 per 100000. Patients with progressing keratoconus face contact lens (CL) intolerance, decreasing vision and the severe cases ultimately need penetrating keratoplasty (PK). In the hope to delay or avoid PK, new treatments are under study and seem promising to restore CL tolerance, slow, stop and even partially reverse the ectasy. The main purpose of this survey is to map the actual trends in keratoconus management. Also, we aim to identify the place of the rising therapeutic avenues in the actual flowchart of treatment.

Methods: An online survey was designed with 24 questions divided in five sections: demographic information, evaluation, follow-up, treatment management as well as research and future options. The survey link was distributed during November and December 2007 to specialists in Cornea, Anterior segment and Refractive surgery via the COS cornea list, Keranet and Bloss Web.

Results: We received 110 responses with higher proportions coming from Canada (31.8%), United-States (31.8%), and Brazil (20.9%). The analysis shows that the Canadian trends differ in some areas when compared with trends outside Canada. Among them figures a lower CL management: CL verification (3.1% vs 46.4%) and CL prescription (6.3% vs 42.0%). Also, Canadians seem to rely less on ultrasonic pachymeter (40.6% vs 67.1%), follow moderate keratoconus patients every 12 months (53.1%) compared to every 6 months (52.2%) outside Canada and have the highest rate of relaxing incisions and compression sutures to manage astigmatism following PK (80.6%). Furthermore, our percentage of keratoconus patients requiring PK appears to be higher with 50% of respondents reporting PK rates from 10 to 20%, while 50% of the respondents elsewhere reported rates from 5% to 10%. Interestingly, other treatment options are more frequently used outside Canada: Intracorneal ring segments 43.9% vs 12.9% and Corneal collagen cross-linking 19.7% vs 0%. These two options are used in other countries for moderate to severe cases. Finally, 100% of Canadians think that research on collagen cross-linking should be an area of focus.

Conclusions: The survey analysis indicates that the new therapeutic options for keratoconus seem to progressively change the practice patterns in the countries beginning to use them. This study also shows a strong interest in Canada for further research on these treatments.

CANADIAN CORNEA, EXTERNAL DISEASE & REFRACTIVE SURGERY SOCIETY

FRIDAY 13 JUNE

Paper #A-00037

Introducing and assessing the Femtosecond-UVA-Riboflavin (FUR) approach to PKP

Michael Butler, Guillermo Rocha, Andrea Butler

Purpose: To determine the effectiveness of a new femtosecond-UVA-riboflavin (FUR) approach to penetrating keratoplasty as determined by burst IOP. The goal of the FUR technique is to reduce the amount of stabilizing sutures required for safe graft-recipient adhesion.

Methods: Twelve human cadaver corneas were divided equally into three groups. Group 1 underwent UVA-riboflavin cross linkage prior to IEK. Group 2 underwent IEK transplantation prior to UVA-riboflavin cross linkage. In group 3, conventional PKP was performed. Each cornea was mounted on an artificial anterior chamber model, and pressure was progressively increased until bursting was observed. Each specimen began with 8 sutures post-transplantation. Sutures were progressively removed and burst IOP was measured.

Results: The FUR technique appears to enable graft-recipient adhesion that can withstand higher IOPs than conventional approaches, as determined by ANOVA analysis.

Conclusions: Combining the benefits of IEK with the collagen cross linking effects of UVA-riboflavin therapy may allow for a novel PKP approach that necessitates fewer sutures.

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FRIDAY 13 JUNE

Paper #A-00038

Boston Keratoprosthesis outcomes and complications

Hall F. Chew, Brandon D. Ayres, Kristin M. Hammersmith, Christopher J. Rapuano, Peter R. Laibson, Jonathan S. Myers, Elisabeth J. Cohen

Purpose: To evaluate the clinical outcomes of the Boston Keratoprosthesis at Wills Eye Institute.

Methods: A retrospective study was performed. Thirty-six patients received a Boston Keratoprosthesis from August 2005 to October 2007. Outcome measures included device retention rate, pre-operative and post-operative best corrected visual acuities (BCVA), and post-operative complications.

Results: The mean age of all patients was 67.5 years (median 71, range: 24-93). Mean time of follow-up was 12.1 months. Twenty-three patients were male. The primary indication for the Boston Keratoprosthesis was failed penetrating keratoplasty in 28 patients, 21 from multiple failed penetrating keratoplasties. Pre-operative comorbidities included glaucoma (26 patients) and limbal stem cell deficiency (10 patients). The main post-operative complications included: retroprosthetic membrane or posterior capsular opacification (22 patients), glaucoma progression (5 patients), endophthalmitis (4 patients) and corneal melting (4 patients). At last follow-up, 35 Keratoprostheses were retained, one extruded and was replaced. The median pre-operative BCVA was hand motions (range: light perception to 20/100). The median BCVA on last follow-up was 20/60 (range: light perception to 20/25). On last follow-up, the BCVA improved in 33 patients, two patients had no improvement, while one had worse vision.

Conclusions: Complications following Keratoprosthesis occur and require careful, frequent follow-up to monitor and treat glaucoma progression, endophthalmitis and inflammation. Despite these potential complications, the Boston Keratoprosthesis provides visual improvement in a patient population with a poor prognosis.