

NCC2016 Paper Abstracts

Free paper sessions

Sunday, March 13, 2016 13:00 – 14:00  
Netherlands, Veldhoven, de Koningshof,  
Baroniezaal

**Organization Section:** NCC/ BCLA

**Moderator:** James Wolffsohn

**Paper Number:** 4

**Presentation time:** 13:00-13:15

**Equivalent Oxygen Percentage (EOP)  
under scleral lenses fitted with different  
fluid reservoir thickness**

*Langis Michaud, Claude Giasson, Jeanne  
Morency*

**Purpose:** To evaluate the percent oxygen pressure (pO<sub>2</sub>) under scleral RGP scleral lenses fitted with different clearances.

**Methods:** Subjects (8) were fitted with 18 mm scleral lens, 300 µm thick (Boston XO<sub>2</sub>), to achieve a clearance of 200 and 400 µm (SL200 and SL400), as validated with an OCT. Shortly as possible after a 5 minute-wear, pO<sub>2</sub> level was measured at the corneal surface with a Clark electrode and an electrometer (PHM 73, Radiometer, Copenhagen) linked to a computer. A reference curve was obtained with the same exposure to gases with oxygen tensions of 0, 1.01, 5.00, and 20.9% of oxygen. The exponential decay of oxygen was calibrated with a non-linear regression. Corneal pO<sub>2</sub>s (2 replicates/visit x 2 visits/lens x 2 lenses x 8 subjects) were analyzed with a repeated measures mixed model ANOVA, followed with a post hoc contrast variance analysis to determine if the difference in the estimated averages was statistically significant at p < 0.05.

**Results:** Fluid thickness trapped under the lens was 240 ± 35 and 435 ± 33 µm for the SL200 and SL400, respectively (p<0.05). Considering a lens material DK of 150, this gave a DK/t of 19.6 and 13.2 (x 10<sup>-9</sup>) (cm/sec)(ml O<sub>2</sub>/ml X mmHg) respectively. Mean pO<sub>2</sub> were 9.0 ± 2.6 (SL200) and 6.7 ± 1.9 % (SL400), a difference found statistically significant. Both were below the threshold of EOP to alleviate corneal hypoxia during daily wear (9.9%).

**Conclusions:** Increased thickness of the layer of fluid trapped under scleral lens reduces the oxygen tension at the level of the cornea after 5 minutes of wear. These results confirm the validity of a theoretical model implying that higher level of clearance is associated with a higher risk to generate central corneal hypoxia.

**Research funding received:** NONE

**Paper Number:** 5

**Presentation time:** 13:15-13:30

**Analysis of complications related to the fitting of small diameter scleral lenses**

*Langis Michaud*

**Purpose:** To evaluate the rate of clinical complications associated with the prescription of a small diameter (14.6mm) mini-scleral lens (SDMS)

**Methods:** This was a retrospective study. Chart of every patient fitted with SDMS lenses in 2012 at Universite de Montreal was reviewed. Subject's files were assigned to 2 groups: keratoconus (group A) and non-keratoconus (group B). For each group, a rate of success in the fitting process, the number of lenses to achieve an optimal fit, and the clinical complications diagnosed during 1-year follow-up visits were recorded. The drop-out rate was also estimated.

**Results:** A total of 113 eyes were fitted in 2012. In KC group (A- 39 eyes), the rate of successful fitting was 82% compared to 83% for the group B (74 eyes). In group A, it took 1.8 (+ 0.5) lens/eye to achieve an optimal fit and after a year, 90% of these patients still worn their lenses. This is similar to group B where 1.6 (+ 0.6) lenses / eye were needed to achieve an optimal fit. 83% of the patients remained in lenses after a year. The rate of clinical complication was 39% (group A) and 52% (group B), most cases showing grade 1 SPK secondary to the use of preserved saline solution in the reservoir. Other issues were related to handling (corneal staining) or conjunctival hyperemia (grade 1). No statistical difference was found between groups.

**Conclusion:** It is possible to fit SDMS with a high level of success (>80%). Clinical complications occurred in half of the cases, most of them being associated with the use of preserved saline in the reservoir. SDMS was not associated with negative outcome in the limbal area. Based on these results, the regular use of SDMS can be considered a safe alternative to fit KC and non-KC subjects.

**Research funding received:** NONE

**Paper Number:** 6

**Presentation time:** 13:30-13:45

**Limbal changes following short-term soft contact lens wear**

*Alejandra Consejo, Robert Iskander*

**Purpose:** The aim of this pilot study is to ascertain whether short-term soft contact

lens wear alter the topography of corneo-scleral limbus.

**Methods:** Two volunteer subjects wore soft silicone hydrogel daily (-0.5 D) contact lenses during 5 hours period. Data was acquired using Eye Surface Profiler (ESP, Eaglet Eye BV, Netherlands), a profilometer with the potential of measuring the corneo-scleral topography up to 20 mm diameter. Baseline measurements were obtained without contact lens wear (session 1). Later, measurements were collected immediately after lens removal following 5 hours of wear (session 2) and finally 2.5 hours after lens removal (session 3). Raw 3D profilometry height data was fitted with the 2nd radial order Zernike polynomial expansion. It is assumed, that the position of the limbus in each semi-meridian of the anterior surface of the eye occurs at the point corresponding to the largest difference between the original and fit data within the region of interest ( $5 < R < 7.5$  mm). The residual error between the original surface and the fitted one is calculated and its maximum is located and assigned as limbus. Finally, a best-fit-circle is estimated using the points which demarcate the limbus for each semi-meridian. The radius of this circle is assigned as the limbal radius.

**Results:** Short term soft contact lens wear modify corneo-scleral topography and increases limbal radius around 3%. 2.5 h is not enough time to reverse this effect. Asymmetry between temporal and nasal side was observed before and after contact lens wear.

**Conclusions:** Accurate limbus demarcation is important in many applications, particularly in scleral and soft contact lens fitting and cataract surgery. This pilot study supports the use of ESP technology in studying minor corneal changes (e.g., swelling) caused by contact lens wear.

**Research funding received:** This work was supported by the Marie Curie ITN grant, AGEYE, 608049.

**Paper Number:** 8

**Presentation time:** 13:35-14:00

**A comparison of toric and spherical soft contact lenses on visual quality of life and ease of fitting in astigmatic patients**

*Jason Nichols, David Berntsen, Katherine Bickle, Stephanie Cox, Jessica Mathew, Daniel Powell, B. Kim Little, Kathrine Osborn-Lorenz, Anna Sulley*

**Purpose:** Despite innovations in toric soft contact lenses (TCLs), low astigmats are

often fitted with spherical lenses (SCLs), hence, TCLs are under-prescribed. This may be partly due to perceived time and complexity of fitting TCLs. Previous work comparing TCL versus SCL in lower astigmats showed TCLs significantly improve VA. This study determined the benefits of fitting low astigmats with TCLs versus SCLs for subjective performance and fitting ease and success.

**Methods:** Sixty current soft CL wearers with -0.75 to -1.75DC were fitted binocularly with a SCL (etafilcon A) and its toric counterpart for 1-week of wear each. A validated patient-reported outcomes questionnaire (National Eye Institute Refractive Error Quality of Life(QoL)-42, NEI-RQL-42) was used to assess each lens' impact on vision-specific QoL. Fitting time and success were also recorded.

**Results:** Mean age ( $\pm$ SD) was  $27.5 \pm 5.0$  years, spherical Rx  $-3.68DS \pm 2.01$  and cylinder  $-1.28DC \pm 0.36$ . Snellen VA 20/15 was achieved for 77.5% of eyes wearing TCLs versus 35.8% wearing SCLs. TCL correction showed improved visual QoL scores compared to SCL after 1-week (overall 74.9 vs 67.6; vision clarity 75.7 vs 50.1; correction satisfaction 79.7 vs 62.0; all  $p=0.007$ ). Fitting time period with TCLs was similar to SCLs (10.1 vs 9.0 minutes; LS mean 10.17 for TCLs vs 8.96 for SCLs adjusted 95% CIs (8.55, 11.79) TCLs and (7.34, 10.61) SCLs). All fits (100%) for both lenses were acceptable at fitting and follow-up; 84% eyes fitted successfully with first TCLs selected vs 79% eyes with SCLs. There was no difference between SCLs and TCLs in number of CLs for a successful fit (LS mean 1.2 both lenses;  $p=0.68$ ).

**Conclusions:** TCLs resulted in significant improvements in two QoL subscales and the overall score compared to the SCLs counterpart in low/moderate astigmats after one week of wear. TCLs fitting process and success were similar to the SCLs. The results support TCLs use in patients with low-to-moderate astigmatism.

**Research funding received:** Johnson and Johnson Vision Care (grant)