

NCC 'Beyond 2020' Paper Abstracts
Free paper sessions
Monday, March 16, 2020 13:30 – 14:30
Netherlands, Veldhoven, de Koningshof,
Diezezaal

Organization Section: NCC/ BCLA

Moderator: Mark Bullimore

Paper Number: 34

Presentation time: 13:30-13:37

Evaluation of children in the Netherlands fitted with a dual focus 1 day contact lens

Gabi Steenbekkers

Purpose: While studies on dual focus 1 day lenses for myopia control have demonstrated their efficacy and clinical performance on children in controlled clinical trials, performance and wearer acceptance in a real-world practice environment is also an important consideration. This work was to evaluate the progression of myopia in a small cohort of children fitted with a dual focus 1 day contact lens.

Method: Fifteen children (five male and ten female) aged 10 to 18 years with myopia (right eye mean spherical equivalent refraction = -2.68, $\pm 1.08D$, range -1.00 to -4.75D) were assessed as suitable for contact lens wear. Refractive error was assessed by standard clinical objective and subjective methods. Children were fitted with a dual focus design, 1 day lens (omafilcon A; DF1d). Visual acuity were recorded using a LCD chart (Topcon CC-100XP). Distance and near phoria was assessed by cover uncover test. The change in myopia progression was assessed 12 months after wearing DF1d. Data are presented for right eye.

Results: Visual acuity ranged from 0.90 to 1.10 while wearing the DF1d. After 12 months of DF1d wear the progression of myopia was $-0.05 \pm 0.10D$, range 0 to -0.25D. Myopia progression was assessed as a change in contact lens power dispensed. No change in phoria was found and no asthenopic symptoms were reported. There was also good acceptance

subjectively for comfort and handling. All children found the vision acceptable and reported they were happy wearing the lens.

Conclusions: Children who were fitted with DF1d have a stable refraction after 12 months of wearing this myopia management lens.

Research funding received: N/A

Paper Number: 35

Presentation time: 13:37-13:44

Visual acuity, vision performance acceptability and subjective over-refraction in myopic children wearing dual-focus contact lenses

Nicola Logan, Paul Chamberlain, Chris Hunt, Graeme Young

Purpose: To compare visual acuity (VA), vision performance acceptability and over-refraction with the dual focus MiSight® 1 day (MS) contact lens and the single vision Proclear® 1 day (SV) contact lens in children with myopia.

Method: A randomised control trial of 144 children aged 8 to 12 years was conducted. Children were randomised to wear either MiSight® 1 day or Proclear 1 day (both omafilcon A, CooperVision, Inc.) over a 3-year period. Assessments included monocular and binocular high-contrast logMAR VA at distance and near, vision performance acceptability of the contact lenses using questionnaires and back vertex power of lenses dispensed versus refractive error measured as both manifest and by cycloplegic autorefraction.

Results: No statistically significant differences were seen in high contrast VA at distance (MS -0.03 ± 0.06 logMAR, SV -0.01 ± 0.05 logMAR) or near (MS -0.06 ± 0.10 logMAR, SV -0.05 ± 0.09 logMAR) with either lens design ($P < 0.01$). No significant differences in acceptability of vision with the contact lens was found between groups. The difference in spherical back vertex power of lens dispensed compared spherical equivalent refractive error as measured with both cycloplegic autorefraction and manifest

refractive error was similar for both the MS (lens dispensed was $0.11 \pm 0.24D$ more myopic than cycloplegic SER and $0.09 \pm 0.24D$ more hyperopic than manifest SER) and SV contact lenses (cycloplegic difference $-0.09 \pm 0.26D$, manifest difference $+0.14 \pm 0.24D$) (Mixed model ANOVA $P \geq 0.12$).

Conclusions: The findings demonstrate that MS contact lenses for myopia management provided good levels of VA and comparable with SV contact lens correction in children. In this cohort manifest refraction is sufficient to dispense MS contact lenses without using cycloplegia. The standard fitting methods and ease of use makes this lens suitable for young children with myopia.

Research funding received: The study was sponsored by CooperVision Inc. No additional funding was received by the investigator or CRO.

Paper Number: 36

Presentation time: 13:44-13:51

Myopia Control: Comparing Benefits and Risks Across Treatments

Mark Bullimore

Purpose: Myopia management has benefits, but there are risks associated with some treatments. The years of uncorrectable visual impairment that might be prevented by 5-years of myopia control with progressive addition spectacle lenses (PALs), 0.01% atropine, daily disposable dual-focus soft lenses, and overnight orthokeratology was compared to the risks of vision loss associated with each modality.

Method: Previous analysis of the data from Tideman et al. (2016) has led to the following: Probability of visual impairment = $1 - \text{EXP}(-10^{(0.041(\text{AGE} + 2.4\text{MYOPIA} - 107)))$ This function was combined with life expectancy data (<https://www.mortality.org>) to calculate the expected years of visual impairment for a -5 D myope along with years prevented by different amounts of myopia control. Years of visual impairment associated with contact lens

wear was calculated assuming that the incidence of microbial keratitis was 1 and 14 per 10,000 patient years wear for daily disposable soft lens wear and overnight orthokeratology, respectively, that vision loss occurs in 15% of cases (Stapleton, 2008), and that any loss is experienced for 70 years. Vision loss with PALs and atropine was assumed to be zero.

Results: Five years of myopia control should accrue 0, 0, 53, and 810 years of visual impairment per 10,000 patients treated with PALs, atropine, daily disposable soft lenses, and overnight orthokeratology, respectively. Note that this is unilateral loss. The predicted years of visual impairment saved for treatment benefits of 0.25, 0.50, 0.75, and 1.00 D is 1713, 3348, 4909, and 6400 years, respectively. Years prevented minus years of vision lost is greatest for daily disposable dual-focus soft lenses ($>1.00 D$, Chamberlain, BCLA 2019) and lowest for PALs (0.25 D, Gwiazda, 2003)

Conclusions: Even for 5-year myopia management benefits as low as 0.25 D, the potential years of visual impairment prevented is greater than the potential visual loss for all modalities.

Research funding received: Supported in part by CooperVision

Paper Number: 37

Presentation time: 13:51-13:58

Four Contact Lens Designs for Myopia Progression Control

Peg Achenbach, Rosa Lee

Purpose: To use a wavefront sensor to analyze the power profile of four lenses used for myopia progression control (MPC) to help correlate to the respective clinical performance.

Method: Omafilcon_A, filcon_V3, SiHy_75% H_2O , and etafilcon_A lenses were analyzed on a Phase Shifting Schlieren wavefront sensor, NIMO TR1504 [λ -x]. Lenses were placed inside a cuvette, with its own packaging solution and allowed to equilibrate for 5 minutes. Power profiles were analyzed to understand the power progression from

the center point out to the periphery of the central 5mm treatment zone (TZ) and used to correlate with published clinical performance data of each design, if available.

Results: Omafilcon_A power profile shows alternating rings of power with an amplitude of $\sim 1.5D$. The Filcon_V3 and SiHy_75%H2O power profiles look very similar (apart from the center of the lens) showing alternating rings of decreasing amplitude (peak $\sim 1D$) out to the periphery of the TZ. The etafilcon_A power profile shows a rapid progression of plus power throughout the TZ with an amplitude of $\sim 3D$. The omafilcon_A lens is advertised as a dual-focus lens where published data showed a decrease in the progression of myopia by 59%. The filcon_V3 and SiHy_75%H2O are advertised as EDOF designs. Published data was not available, but would hypothesize similar clinical responses for both the designs based on the power profiles. The etafilcon_A lens is advertised as EDOF design where the published data demonstrated a refractive error decrease in the progression of myopia by 96%.

Conclusions: Few lenses are available for MPC. Understanding the power profile, in the TZ, is important to help predict how the different designs will perform clinically. This study showed one dual focus and three EDOF designs, all with different power profiles. More research is needed to fully understand the optical mechanisms that are hypothesized to decrease the progression of myopia.

Research funding received: Study sponsored by Visioneering Technologies Inc. (VTI)

Paper Number: 38

Presentation time: 13:58-14:05

5 years of daily disposable contact lens wear in children

Jill Woods, Deborah Jones, Lyndon Jones, Graeme Young, Chris Hunt, Paul Chamberlain, John McNally

Purpose: To report on the ocular health data and safety profile of soft hydrogel

daily disposable contact lenses when fitted to children and worn during the first five years of an ongoing clinical trial of a dual-focus contact lens designed to control myopia progression.

Method: Children aged 8-12 years old, who were new to contact lens wear, were fitted in a randomised masked study to wear omafilcon A daily disposable contact lenses in either a spherical (Proclear 1 day, CVI) or a myopia control design (MiSight 1 day, CVI) for 3-years. The two lens designs were identical in geometry except for the front surface optical zone, which provided the myopia control design. During years four and five, all children wore the myopia control design lens. Follow-up visits were scheduled after 1-week, 1-month, 6-months and thereafter every 6-months. At each visit, visual performance and biomicroscopy were assessed and subjective feedback was collected.

Results: 144 children were enrolled in the study: mean age 10.1 ± 1.4 years; mean cycloplegic spherical equivalent refraction of $-2.11D$ (-0.77 to -4.00); 69F/75M; multiple ethnicities including 34 East Asian, 12 West Indian, 79 Caucasian. 98 completed this 5-year period. The average wearing schedule was 12.4 hours a day, 6.5 days a week. Over these 5-years, there were no contact lens related, serious adverse events and the contact lens related ocular adverse event rate was 3.4 per 100 lens wearing years (95%CI: 2.2 to 5.2). The majority of biomicroscopy findings across all visits were grade 0 (equivalent to no findings) and at the end of 5-years the grade distribution was similar to baseline levels, before lens wear commenced. There was no evidence of hypoxic changes from biomicroscopy

Conclusions: These results support that children in this age cohort successfully wore hydrogel, daily disposable contact lenses over a 5-year period with minimal impact on ocular physiology.

Research funding received: Research funding was provided by CooperVision,

Inc.

Paper Number: 39

Presentation time: 14:05-14:12

Comparison of two instruments for corneo-scleral-topography

Stefan Bandlitz, Patrick Esper, Magdalena Stein, Torsten Dautzenberg, James S. Wolffsohn

Purpose: To investigate the agreement and repeatability of fourier-based profilometry and Scheimpflug imaging in the measurement of sagittal height and toricity of the corneo-scleral region.

Method: Minimal (Minsag), maximal (Maxsag) sagittal height, toricity (Maxsag-Minsag) and the maximum possible measurement zone diameter of 38 subjects (mean age 25.4 SD \pm 3.2 years; 22 F, 16 M) were compared using the Eye Surface Profiler (ESP, Eagle Eye, Houten, The Netherlands) and the CSP module of the Pentacam (Oculus, Wetzlar, Germany) at two different sessions. Correlations between the instruments were analysed using the Pearson coefficient. Differences between sessions and instruments were analysed using Bland-Altman and paired-t-tests.

Results: Minsag ($3266 \pm 392 \mu\text{m}$) and Maxsag ($3436 \pm 416 \mu\text{m}$) measured with the ESP and Minsag ($3609 \pm 408 \mu\text{m}$) and Maxsag ($3716 \pm 442 \mu\text{m}$) measured with the Pentacam were significantly very high correlated ($r = 0.989$ and $r = 0.988$; $p < 0.001$), while toricity measured with ESP ($170 \pm 105 \mu\text{m}$) and Pentacam ($107 \pm 87 \mu\text{m}$) was moderately correlated ($r = 0.562$; $p < 0.001$). Maximum possible measurement zone diameter with ESP ($16.4 \pm 1.3\text{mm}$) was significantly greater than with Pentacam (14.8 ± 1.1) ($p < 0.001$). For an equal chord length the measurement with Pentacam was significantly greater for Minsag ($344 \mu\text{m}$; CI 322 to 364; $p < 0.001$), significantly greater for Maxsag ($280 \mu\text{m}$; CI 256 to 305; $p < 0.001$) but significantly smaller for toricity ($-63 \mu\text{m}$; CI -95 to -31; $p < 0.001$). Repeated measurements from session 1 and session 2 were not significantly

different for Pentacam and ESP (paired-t-test: $p = 0.737$ and $p = 0.636$, respectively). The 95% CIs around differences indicate better repeatability for Pentacam (95% CI: -6.7 to $4.8 \mu\text{m}$) compared to ESP (-21.1 to $34.0 \mu\text{m}$).

Conclusions: Although both instrument deliver useful data especially for the fitting of soft and scleral contact lenses, the sagittal height and the toricity measurements cannot be considered as interchangeable.

Research funding received: None

Paper Number: 40

Presentation time: 14:12-14:19

Toric lens fitting success supported by an online fitting App

Doerte Luensmann, Jill Woods, Marcella McParland

Purpose: To provide eye care professionals quick access to lens parameter availability and to make soft toric lens fitting easier, online tools are now available to calculate and suggest a first choice prescription based on the patient's subjective refraction. How close the recommended prescription matches the dispensed lens has been investigated in this study.

Method: In clinical studies, two daily disposable toric lenses, stenfilcon A and somofilcon A, and one monthly replacement toric lens, comfilcon A (all CooperVision, Inc.), were fitted and dispensed to 54, 37 and 47 habitual lens wearers respectively, following the manufacturer's fitting guides. The final lens prescriptions were determined by the clinician based on over-refraction and lens rotation (Final-Rx). In a secondary analysis the subjective refraction data and back vertex distance were entered in the OptiExpert™ app to determine the recommended initial trial lens (App-Rx). The prescription results from both approaches were compared by calculating the mean differences (Bland-Altman) and the percentages of matching prescriptions following predetermined allowances for sphere, cylinder and axis.

Results: The mean differences between OptiExpert™ and the clinician final prescriptions for sphere, cylinder and axis were within ± 0.13 DS, ± 0.01 DC and ± 1.38 degrees, respectively. For allowance combination sphere ± 0.25 D, cylinder ± 0.00 DC, axis ± 10 degrees, the lens prescriptions from both methods matched in 75-82% of eyes (82% stenfilcon A, 75% somofilcon A, 79% comfilcon A). For allowance combination of sph ± 0.50 D, cyl ± 0.00 DC, axis ± 20 degrees the Final-Rx and the App-Rx matched in 86-92% of eyes (91% stenfilcon A, 92% somofilcon A, 86% comfilcon A).

Conclusions: All three toric lens types showed a predictable on-eye performance, resulting in a close agreement between the initial OptiExpert recommended prescription and the lens prescription dispensed by the clinician. The OptiExpert™ app can therefore confidently be used to assist CooperVision toric lens fitting in order to help optimize patient chair time.

Research funding received: Study sponsored by CooperVision, Inc.

Paper Number: 41

Presentation time: 14:19-14:26

The use of a modern web-application to assist reusable toric lens fitting success

Doerte Luensmann, Jill Woods, Marcella McParland

Purpose: Increasing numbers of online tools are available to assist ECPs in fitting contact lenses. In this study, the contact lens prescription of a reusable toric silicone hydrogel lens was determined using a traditional fitting guide and the results were compared to the prescription recommended by the lens fitting app OptiExpert™.

Method: Forty-seven habitual lens wearers were fit with monthly replacement toric silicone hydrogel contact lenses (comfilcon A; CooperVision, Inc.). The manufacturer's fitting guide was followed and the final lens prescription was determined based

on the subjective refraction, the over-refraction and lens rotation (Final-Rx). Following this clinical study, the participant's subjective refraction data and back vertex distance were entered in the OptiExpert online app to determine the recommended initial trial lens prescription (App-Rx). In this secondary analysis, the fitting results from both approaches were compared using Pearson correlation analysis. Different allowances for sph (± 0.25 , ± 0.50 D), cyl (± 0.00 DC) and axis (± 10 , ± 20 degrees) were combined to calculate the percentage of matching fitting results between both methods. Additionally, Bland-Altman graphs were plotted.

Results: A high correlation was found in respect to sphere, cylinder and axis between the Final-Rx and the App-Rx (all $r \geq 0.88$). For the allowance combination of sphere ± 0.25 D / cylinder ± 0.00 DC / axis ± 10 , the lens prescriptions from both methods matched in 79% of eyes. For the allowance combination of sphere ± 0.50 D / cylinder ± 0.00 DC / axis ± 20 , the Final-Rx and the App-Rx matched in 86% of eyes. Bland-Altman comparisons between methods determined a mean difference of +0.06D for sph, +0.01D for cyl and 1.38 degrees for axis.

Conclusions: For most participants, the initial trial lens power recommended by the OptiExpert app was in close agreement to the final power dispensed in the clinical setting. The OptiExpert app can confidently be used as a clinical tool to aid comfilcon A toric lens fitting success.

Research funding received: Study sponsored by CooperVision, Inc.

End of session