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Letter to the Editor

Quality of vision after ultrathin descemet stripping automated endothelial keratoplasty: a multicentre randomized clinical trial

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Editor,

In the era of modern endothelial keratoplasty (EK), focus is gradually shifting from graft survival and visual acuity (VA) to quality of vision and patient-reported outcome measures. Patients routinely seek treatment for symptoms such as glare disability and reduced contrast sensitivity – parameters unrelated to VA. Indeed, VA only represents the small angle domain of the retinal point spread function while straylight (a measure of glare disability) and contrast sensitivity capture the large angle domain (Fig. 1A) (Van den Berg et al. 2009). Recent studies comparing EK techniques found only small differences in best-corrected VA, underscoring the need to define an objective approximation of the entire visual function and well-being.

In this letter, we report a prespecified secondary analysis of different aspects of quality of vision and vision-related quality of life from a prospective multicentre randomized controlled trial (RCT) comparing patients with Fuchs endothelial corneal dystrophy randomized to either ultrathin descemet stripping automated EK (UT-DSAEK) or DSAEK. The study design has previously been described in detail (Dickman et al. 2016).

We measured corneal higher-order aberrations (HOAs), straylight and contrast sensitivity using the Pentacam HR Scheimpflug camera (OCULUS Optikgeräte GmbH, Wetzlar, Germany), C-Quant straylight metre (OCULUS Optikgeräte GmbH) and the CSV-1000 chart (Vector vision Inc., Greenville, OH, USA), respectively.

We used a linear mixed model with the respective mean outcome variable as the dependent variable, and time, study groups and their interaction as covariates. Bivariate relationships were calculated using Pearson correlation analysis. Results are shown as means with 95% confidence intervals in parenthesis, unless otherwise specified. We considered a p value of <0.05 statistically significant.

Anterior corneal HOAs did not significantly differ between the groups at all time-points. In contrast, posterior corneal HOAs values were lower for UT-DSAEK compared to DSAEK at 3 months [0.55 (0.45–0.66) versus 0.78 (0.61–0.95); p = 0.03] and comparable thereafter. Straylight was also elevated before surgery in both groups (Fig. 1B) (Van den Berg et al. 2007). Interestingly, we found a significant negative correlation between patient age and straylight before surgery ($r = -0.35$; p = 0.011), suggesting increased straylight may drive young Fuchs' patients to seek treatment. After surgery, straylight returned to age-normative values in both treatment groups (Fig. 1B) (Łabuz et al. 2015). Contrast sensitivity returned to age-normative values 3 months after UT-DSAEK [log (CS) = 1.34 (1.2–1.47), UT-DSAEK versus log(CS) = 1.05 (0.89–1.21), DSAEK; p = 0.009] and 12 months after DSAEK [log(CS) = 1.37 (1.21–1.52), UT-DSAEK versus log(CS) = 1.29 (1.1–1.48), DSAEK; p = 0.53; Fig. 1C] (Hashemi et al. 2012).

Vision-related quality of life was assessed using the 25-item National Eye Institute Visual Functioning Questionnaire (VFQ-25). No differences between the groups were observed at all time-points. The composite score of the VFQ-25 increased significantly 3 months after surgery [β = 12 (9–14); p < 0.001] and improved further 12 months after surgery [β = 3 (1–6); p = 0.02]. This improvement is clinically relevant on the basis of previous studies, suggesting a cut-off value of ten points (Lindblad & Clemons 2005).

In conclusion, this RCT showed both DSAEK and UT-DSAEK result in comparable improvements in quality of vision and vision-related quality of life. These results can serve a valuable reference for future studies as the treatment for Fuchs' continues to evolve.

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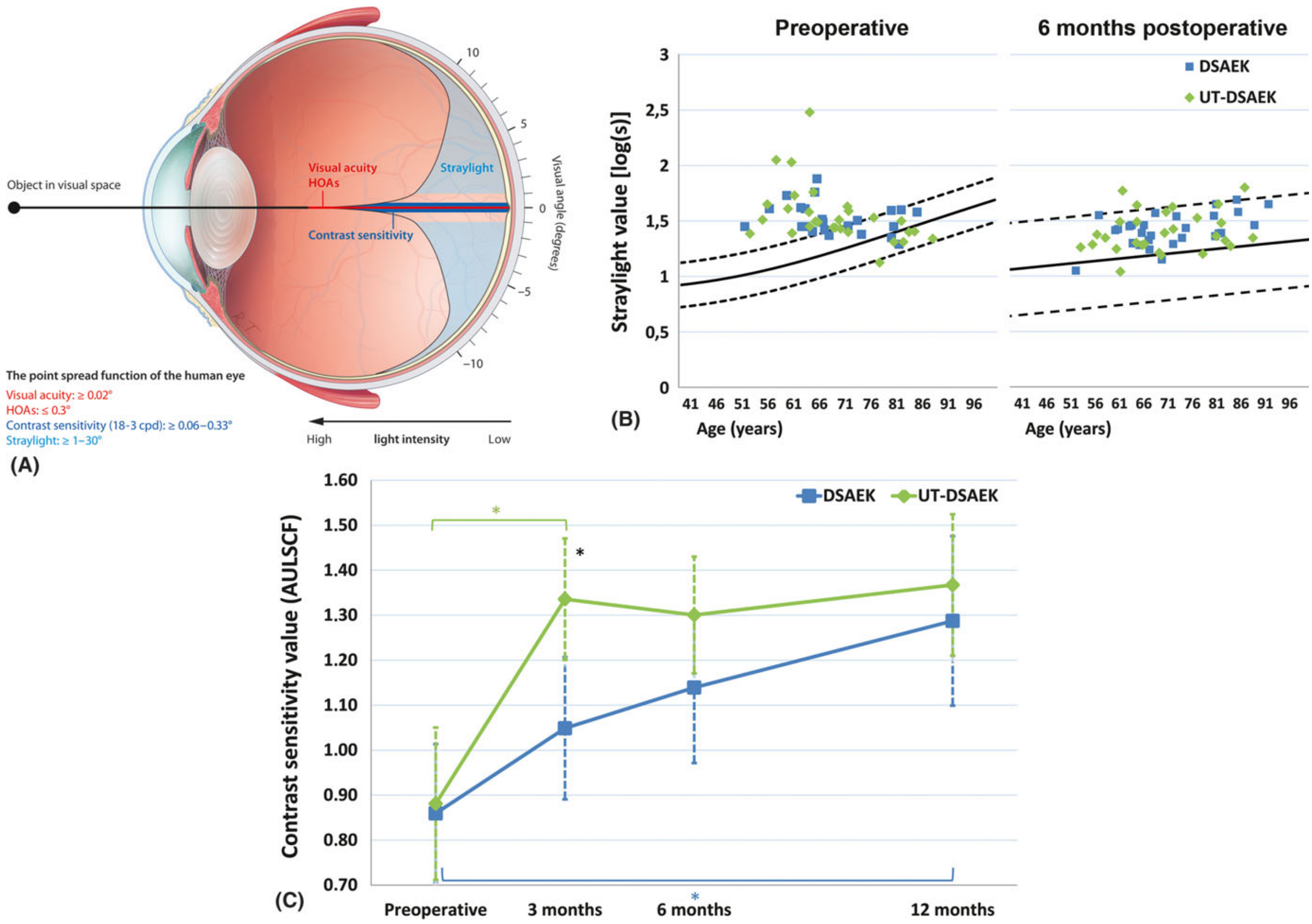

Fig. 1. (A) Schematic retinal point spread function showing visual domains of visual acuity, HOAs, contrast sensitivity and straylight in the human eye. The visual angle is exaggerated for clarity. (B) Intraocular straylight as a function of age in DSAEK and UT-DSAEK before surgery (left) and 6 months after surgery (right). Lines represent mean straylight values ± 95% confidence interval for phakic eyes (left) and pseudophakic eyes (right) (Van den Berg et al. 2007; Łabuz et al. 2015). (C). Contrast sensitivity in DSAEK and UT-DSAEK at baseline, and 3, 6 and 12 months postoperatively. *$p < 0.05$. AULCSF = area under the log contrast sensitivity curve; Cpd = cycles per degree; DSAEK = descemet stripping automated endothelial keratoplasty; HOAs = higher-order aberrations; UT-DSAEK = ultrathin descemet stripping automated endothelial keratoplasty.