Preoperative visual acuity predicts outcomes after DMEK

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Purpose: To identify if and how preoperative visual acuity predicts visual acuity outcomes after DMEK.

Methods: 1000 consecutive patients having undergone pseudophakic DMEK or Triple-DMEK from the prospective Cologne DMEK database were analyzed for correlations between pre- and postoperative visual acuity values at 1, 3, 6, and 12 months after transplantation. Analysis was done using Latex text processing combined with R statistical analysis (www.r-project.org).

Results: There is a significant correlation between pre- and postoperative visual acuity (VA) after (Triple)-DMEK. Preoperative VA below 20/80 leads to delayed and reduced final visual acuity results after 12 months, whereas VA between 20/80 and 20/40 just take longer to reach good final VA values, which are reached faster for preoperative VA values above 20/40. There is only a mild predictive value of preoperative corneal thickness on postoperative VA. There is no significant differences for preoperative VA values above 20/40. The chance to reached postoperative VA above 20/25 is 40% for preoperative VA of 20/200, 50% for preoperative VA of 20/60 and > 60% for preoperative VA of 20/40.
Conclusions: DMEK results in very good final postoperative visual acuity results even in eyes with bad preoperative vision due to corneal pathology. However, below preoperative acuity values of 20/80 recovery is significantly poorer and delayed. This suggests to operate early enough to achieve good final visual acuity results. Preoperative visual acuity seems to be a good predictor for final outcome.

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Presentation Time: 4:30 PM–4:45 PM

Descemet Stripping and Automated Endothelial Keratoplasty Performed by Residents

Purpose: Surgical educations is an important issue in corneal transplantation. We have reported that outcomes of penetrating keratoplasty performed by residents were similar to those performed by an experienced surgeon (Shimmura-Tomita M, et al. J Surg Educ 2016). As Descemet stripping automated endothelial keratoplasty (DSAEK) becomes a leading surgical method for the treatment of bullous keratopathy (BK), surgical education for DSAEK attracts more attention. The purpose of the study is to compare the outcomes of DSAEK performed by residents with an experienced surgeon.

Methods: In this case control study, we analyzed outcomes of DSAEK performed by residents (R group, n=41) and by a single experienced surgeon (JS, E group, n=35). First 5 to 10 DSAEK cases performed by residents were analyzed. The residents had experiences for penetrating keratoplasty, and the surgery was performed under guidance with experienced surgeons. Graft clarity rate, incidence of postoperative complications, visual acuity, surgical time, and % endothelial cell loss at 1, 3, 6, and 12 months following surgery were studied.

Results: Both groups had similar preoperative status including age (P=0.94) and visual acuity (P=0.10). The leading causes for BK included laser iridotomy-induced BK and pseudophakic BK. Surgical time was significantly longer in R group compared with E group (67.6 vs. 49.2 minutes, P=0.0013) At 12 months, graft clarity was maintained in 100% and 97.1% of cases in R and E groups, respectively. Three and one eyes in the R and E groups, respectively, later developed endothelial decompensation. Mean corrected visual acuity was significantly better in E group compared with that in R group at 6 (P=0.031) and 12 months (P=0.0044) postoperatively. Mean corneal endothelial cells loss at 12 months was 56±18.9 % and 44.0±24.5 % in R and E groups, respectively (P=0.077). Postoperative double chamber/graft dislocation was observed in 6 and 4 eyes in R and E group, respectively, and pupillary block was observed only in R group (4 eyes). There were no eyes that developed primary graft failure.

Conclusions: While DSAEK performed by residents produced high graft clarity rate, visual outcome and endothelial cell density were worse compared with those performed by an experienced surgeon. Proper management of early postoperative complications seemed to be a key to success for inexperienced surgeons.

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Presentation Time: 4:45 PM–5:00 PM

Multicenter Study on Descemet membrane endothelial keratoplasty (DMEK)
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Purpose: Endothelial keratoplasty (EK) has replaced penetrating keratoplasty as the standard treatment method for endothelial disorders over the last years. Since Descemet membrane endothelial keratoplasty (DMEK), the most selective EK technique, is gaining more and more popularity, with this retrospective, multicenter interventional cohort study we want to document the current surgical approach, clinical outcomes and complications of standardized ‘no-touch’ DMEK in eyes operated by starting as well as experienced corneal surgeons.

Methods: A total of 2,485 eyes undergoing DMEK for Fuchs’ endothelial corneal dystrophy (74%), bullous keratopathy (17%), failed previous transplants (8%), or unspecified indications (1%) were included in this study. The ‘no-touch’ DMEK surgeries were performed by 55 different surgeons in 23 countries. Main outcome measures were best corrected visual acuity (BCVA), endothelial cell density (ECD), and intra- and postoperative complications.

Results: After DMEK, BCVA improved in 87% of eyes, remained unchanged in 6%, and deteriorated in 7% of eyes (n=2,102). At 6 months, 71% of eyes reached a BCVA of ≥20/40 (≥0.5), 43% ≥20/25 (≥0.8), and 24% ≥20/20 (≥1.0) (n=2,126). Postoperative ECD averaged 1,575 (±489) cells/mm2 (n=1,405) representing a decrease of 40 (±19) % compared to preoperative cell counts (n=1,272, P<0.05). Intraoperative complications were reported for 9% of eyes including difficulties in graft maneuvering (3%) and intraoperative hemorrhage (1%). DMEK failure was the most common postoperative complication (27%). A re-bubbling procedure was performed in 20% of eyes; 14% of eyes required a secondary keratoplasty within the first six months. Surgeons that had performed >100 DMEK surgeries had lower intra- and postoperative complications rates than surgeons with fewer than 25 DMEK surgeries (P<0.05).

Conclusions: Our study showed that the standardized ‘no-touch’ DMEK technique is feasible for surgeons in various clinical and surgical settings. After a learning curve of about 25 cases, clinical outcomes improve and postoperative complication rates are lower.

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Presentation Time: 5:00 PM–5:15 PM

Crosslinking characterization of corneas submitted to açai (Euterpe oleracea) extract by enzymatic digestion
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Purpose: To characterize in vitro corneas subjected to crosslinking with aqueous extract of Euterpe oleracea by enzymatic digestion using collagenase

Methods: Rabbit eyes obtained from a slaughterhouse (Granja dos Ipês, Mairinque, Brazil) were deepithelialized and divided into three groups. The control group received no treatment. The eyes of the...
riboflavin/UVA group were treated according to standard procedure, receiving 0.1% riboflavin drops for 30 min and UV-A irradiation (365 nm) for 30 min (dose=5.4 J/cm²). The corneas subjected to açaí (*Euterpe oleracea*) were treated with 4% of the aqueous plant extract for 2 hours. The tissue was analyzed to determine the rate of enzymatic degradation by collagenase (Sigma-Aldrich) by overnight immersing in the DMEM/F12 medium (pH 7.4), containing dextran 10%, to achieve the hydration equilibrium and then submerged in collagenase 5.0 mg/ml. The mass values of the corneas were determined in different time intervals (0, 24, 48 h). The hydroxyproline content was measured in the supernatant at the initial time and after 24 h of digestion, using an assay kit (Sigma-Aldrich).

**Results:** The rate of corneal digestion by collagenase was reduced in the crosslinked groups. The relative mass value in 24 and 48 h for the control group was 0.57 ± 0.09 and 0.32 ± 0.04, respectively. The corneas of the açaí group were not degraded by collagenase, and the relative mass values in 24 and 48 h were 1.02 ± 0.04 and 1.00 ± 0.03. In the riboflavin/UVA group, the mass had a statistically significant decrease (0.64 ± 0.13 in 24 h and 0.56 ± 0.16 in 48 h) which was lower than in the control group. The assay to determine the hydroxyproline content in 24 hours of digestion revealed that there was no digestion in the group treated with açaí. The values of the hydroxyproline concentration were 0.43 ± 0.04 mg/ml and 0.006 ± 0.0005 mg/ml for control and açaí groups, respectively. In both methodologies, the results clearly show that the açaí extract is adequate to avoid the biochemical degradation of corneas.

**Conclusions:** The results of this work make clear that the corneas treated with *Euterpe oleracea* extract remained intact after enzymatic digestion by collagenase, which shows that corneal crosslinking using this plant extract was very effective.

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