

Commentary: Microkeratome-assisted ultrathin Descemet's stripping automated endothelial keratoplasty

Ultrathin Descemet's stripping automated endothelial keratoplasty (UT-DSAEK) is a term used to represent a variation of the standard DSAEK technique that may represent a bridge technique between DSAEK and Descemet membrane endothelial keratoplasty (DMEK). The rationale behind this variation is that there have been several reports of the possibility of better visual acuity being associated with thinner endothelial grafts. Evidence suggests that minimizing the amount of residual stroma on a DSAEK graft and using thinner DSAEK grafts can significantly improve visual outcomes, making the procedure more comparable to DMEK.^[1,2]

Several techniques have been described for UT-DSAEK, including a double-pass microkeratome technique, a single-pass technique microkeratome technique and using a femtosecond laser.

Microkeratome-assisted dissection of donor corneas has become the gold standard for preparing grafts for endothelial keratoplasty, primarily because of the ease and reproducibility of the stromal surface.

In single-pass technique, many variations are explained. Vajpayee *et al.* performed using a standard 400 μm microkeratome head slowing the speed of the pass to achieve a thinner donor lenticule without any complications during the donor preparation. A single, slow pass of 400 μm microkeratome yielded thin donor lenticules in all the cases, and the mean graft thickness achieved at the end of 6 months was $111 \pm 17.62 \mu\text{m}$ (range 70–134 μm). Excellent visual outcomes were obtained in the majority of the patients.^[3] Nahum *et al.* have described a nomogram for

choosing the appropriate microkeratome head size in single pass microkeratome-assisted dissection of donor tissue. They reported mean postoperative donor graft central thickness of $63 \pm 29 \mu\text{m}$ in 42 eyes using this nomogram.^[4] Romano *et al.* have described a technique where, donor anterior corneal surface is continuously dried using a polyvinyl alcohol sponge, when the central donor corneal thickness is between 500 μm and 510 μm , an automated microkeratome with a 350 μm head is used to remove the anterior lamellar cap, manual dissection of the peripheral anterior stromal lamella is performed to prevent thick peripheral graft edges. The mean posterior lamellar graft thickness measured immediately after the cut was $83.2 \pm 14.9 \mu\text{m}$ (range 50–98 μm), and the peripheral graft edge thickness was $106.8 \pm 10.9 \mu\text{m}$ (range 90–120 μm) and no graft related complications were noted.^[5]

In double-pass technique: an initial debulking cut is performed using a microkeratome with a 300 μm head. A second cut (refinement cut) is carried out from the direction opposite to the one of the first cut. The size of the head used for this step is selected such that a residual bed with a central thickness of approximately 100 μm or less is left. Hsu *et al.* used specific nomograms to select the microkeratome head size during both the first and the second microkeratome pass, so as to achieve predictable graft thickness in every donor cornea. The double-pass technique, performed by experienced hands and when successful, results in excellent outcome. However, it has some issues such as the potential higher risk of donor tissue perforation (microkeratome is passed twice), difficult manipulation of a thinner graft which may lead to increased endothelial loss, prolonged time for second cut, chances of second pass creating a smaller diameter cut, and unpredictability when donor thickness exceeds 600 μm .^[6]

Kanavi *et al.*,^[7] found the mean central thickness of UT-DSAEK tissues, was not statistically different between the single pass and double pass group.

In this issue, a Randomized Trial comparing Single-Pass versus Double-pass technique in UT- DSAEK have been published. 20 eyes of 20 patients with pseudophakic bullous keratopathy, randomized in two groups. Group 1 eyes underwent microkeratome-assisted DSAEK using the single-pass technique for lenticule preparation, while Group 2 eyes underwent microkeratome-assisted DSAEK using the double-pass technique. Patients were followed-up till 6 months, postoperatively. The study concluded that both techniques provided grafts with comparable thickness and endothelial cell loss and were associated with comparable BCVA, at final follow-up visit. The contrast sensitivity, was however better in eyes receiving grafts prepared with the single-pass technique. two eyes in group 2 experienced complications during lenticule preparation.^[8] Surprisingly, there are hardly any studies, which have compared the outcomes and efficacy of these two techniques in detail.

Standardization of the nomograms for the use of the microkeratome heads in both the single-pass and double-pass technique, which is missing in the published studies so far, has to be done, so as to achieve a uniform reproducibility and predictability in the results. Long-term follow-up is essential to validate the visual outcomes in both the single-pass and double-pass techniques.

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