Commentary: Ultrathin Descemet's stripping automated endothelial keratoplasty

Endothelial keratoplasty has come a long way in the past two decades. The journey began when Melles started performing Descemet lamellar endothelial keratoplasty (DLEK) in the early 2000s.[1] The technique, however, could not gain widespread popularity because of extensive tissue dissection and a complicated technique. This was followed by Descemet stripping automated endothelial keratoplasty (DSAEK), developed by Price and Mark Gorovoy.[2] The technique could be standardized, delivered reproducible results and became immensely popular. However, the issues of stromal haze and minimal rejection still remained. These issues were addressed by Descemet membrane endothelial keratoplasty (DMEK). Still DSAEK remains the most commonly performed endothelial keratoplasty because of its relative ease, less stringent donor criteria and good outcomes.

Ultrathin DSAEK (UT-DSAEK), where the thickness of donor graft is <100 μm, is a useful bridge technique between DSAEK and DMEK. The visual results of UT-DSAEK were compared with DSAEK in a prospective randomized multi-centric study.[3] The study concluded that UT-DSAEK results in faster and better recovery of visual acuity with similar refractive outcomes, endothelial cell loss, and incidence of complications. Another RCT compared the results of UT-DSAEK versus DMEK.[4] The authors concluded that DMEK provided superior visual acuity as compared with UT-DSAEK with similar complication rates and similar endothelial cell loss. DMEK also results in lesser posterior corneal higher order aberrations. Another concept of nanothin endothelial grafts (50 μm) was introduced by Cheung *et al*. They concluded nanothin-DSAEK to be safe and reported no significant endothelial cell loss compared with UT-DSAEK and DMEK grafts.[5]

Several techniques have been described for the preparation of UT-DSAEK grafts. The one introduced by Busin *et al*. involves the use of two microkeratome passes (the first one to debulk the donor tissue and the second one to refine it to an ideal thickness thinner than 100 μm) in different settings.[6] Vajpayee *et al*. described the use of single, slow pass 400 μm microkeratome for preparation of UT-DSAEK grafts.[7] Both reported good visual and refractive outcomes in their respective non-comparative studies. Villarrubia *et al*. have devised a nomogram incorporating advancement speed, blade holder size, and corneal thickness for preparation of thin endothelial grafts.[8] Apart from these techniques other approaches have been described for preparation of thinner grafts such as low-pulse energy, high-frequency femtosecond laser,[9] drying the cornea to achieve stromal dehydration before passing a 350 μm microkeratome blade[10] and preconditioning with deswelling media before microkeratome pass.[11] The advantages of one technique over the other have not been evaluated in head-to-head randomized trials.

The authors in the current study have compared the results of single pass versus double pass technique for the preparation of UT-DSAEK tissue.[12] The authors have reported similar graft thickness with the two techniques, which is of much relevance as single pass technique is much easier and reproducible even by eye bank technicians. It would have been more enlightening to have the post cut endothelial cell count and to compare it with the post surgery count.

Thus, UT-DSAEK is a valuable potential alternative to DSAEK in terms of superior visual quality as well as a practical alternative to DMEK as it does not require the surgeon to learn a new challenging technique. In addition, UT-DSAEK can be performed in eyes with complex anatomies where DMEK may not be possible as well as minimizes the complications associated with DMEK.

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References

1. Melles GR, Eggink FA, Lander F, Pels E, Rietveld FJ, Beekhuis WH, *et al*. A surgical technique for posterior lamellar keratoplasty. Cornea 1998;17:618-26.
2. Price MO, Price FW Jr. Descemet's stripping with endothelial keratoplasty comparative outcomes with microkeratome-dissected and manually dissected donor tissue. Ophthalmology 2006;113:1936-42.
3. Dickman MM, Kruit PJ, Remeijer L, van Rooij J, Van der Lelij A, Wijdh RH, *et al*. A randomized multicenter clinical trial of ultrathin Descemet stripping automated endothelial keratoplasty (DSAEK) versus DSAEK. Ophthalmology 2016;123:2276-84.
4. Chamberlain W, Lin CC, Austin A, Schubach N, Clover J, McLeod SD, *et al*. Descemet endothelial thickness comparison trial: A randomized trial comparing ultrathin Descemet stripping automated endothelialkeratoplasty with Descemet membrane endothelial keratoplasty. Ophthalmology 2019;126:19-26.
5. Cheung AY, Hou JH, Bedard P, Grimes V, Buckman N, Eslani M, *et al*. Technique for preparing ultrathin and nanothin Descemet stripping automated endothelial keratoplasty tissue. Cornea 2018;37:661-6.

6. Busin M, Madi S, Santorum P. Ultrathin Descemet's stripping automated endothelial keratoplasty with the microkeratome double-pass technique: Two year outcomes. Ophthalmology 2013;120:1186-94.
7. Vajpayee RB, Maharana PK, Jain S, Sharma N, Jhanji V. Thin lenticule Descemet's stripping automated endothelial keratoplasty: Single, slow pass technique. Clin Exp Ophthalmol 2014;42:411-6.
8. Villarrubia A, Cano-Ortiz A. Development of a nomogram to achieve ultrathin donor corneal disks for Descemet-stripping automated endothelial keratoplasty. J Cataract Refract Surg 2015;41:146-51.
9. Phillips PM, Phillips LJ, Saad HA, Terry MA, Stolz DB, Stoeger C, *et al*. 'Ultrathin' DSAEK tissue prepared with a low-pulse energy, high-frequency femtosecond laser. Cornea 2013;32:81-6.
10. Romano V, Steger B, Myneni J, Batterbury M, Willoughby CE, Kaye SB. Preparation of ultrathin grafts for Descemet-stripping endothelial keratoplasty with a single microkeratome pass. J Cataract Refract Surg 2017;43:12-5.
11. Bucher F, Roters S, Mellein A. 'OSMO-UT-DSAEK' using THIN-C medium. Graefes Arch Clin Exp Ophthalmol 2013;251:2181-5.
12. Sharma N, Hussain AY, Nagpal R, Rathi A, Maharana PK, Sinha R, *et al*. Microkeratome-assisted ultrathin Descemet's stripping automated endothelial keratoplasty: A randomized trial comparing single-pass versus double-pass technique. Indian J Ophthalmol 2019;67:1289-94.

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Quick Response Code:

Website: www.ijo.in

DOI: 10.4103/ijo.IJO_863_19

Cite this article as: Dave A, Acharya M. Commentary: Ultrathin Descemet's stripping automated endothelial keratoplasty. Indian J Ophthalmol 2019;67:1294-5.