

Innovations in corneal transplantation techniques

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Endothelial keratoplasty has transformed the field of corneal transplantation. Over the past 10 years, surgeons have shifted from performing penetrating keratoplasty as the gold standard technique for treatment of corneal edema to the selective replacement of the defective endothelial layer of the cornea through evolving endothelial keratoplasty (EK) techniques.

According to the Eye Bank Association of America endothelial dysfunction accounted for more than a third of the corneal graft procedures performed yearly in the United States. Of those, Descemet stripping with automated endothelial keratoplasty (DSAEK) comprised 28% of the corneal grafts provided world wide (EBAA 2007 Annual Report), a 10-fold increase over 2005. Yet, the procedure is less than 10 years old and very little is known about long-term endothelial loss and survival rates.

The advantages of DSAEK over penetrating keratoplasty (PK) include the avoidance of open sky surgery, minimal induced post-surgical astigmatism and faster visual rehabilitation [1,2]. Ongoing innovations in the surgical technique have significantly improved the most important outcome, which is, of course, donor endothelial survival [3]. Most surgeons currently recommend in cases of endothelial disease with the presence of an anterior chamber (AC) intraocular lens (IOL), the removal of the implant and the use of scleral fixated or iris fixated IOLs prior or simultaneous to the DSAEK in order to improve the endothelial survival. Recently, Wylegala and Tarnawska advocated the advantages of IOL exchange over retention of an AC IOL partly because of the intraoperative difficulty secondary to reduced AC volume [4]. IOL exchange however, may be associated with significant risks that include prolonged surgical time with potential increased risk of infections, iris and/or ciliary body tears, hemorrhage, cystoid macular edema, iritis, retinal detachment and late IOL dislocations.

We reported three cases of DSAEK successfully performed in the presence of Fuchs endothelial dystrophy and well positioned AC IOL [5] with endothelial survival rates comparable with larger series previously published [6,7]. We presented the one and two year follow-up studies of the largest case series to date of the endothelial survival rates of DSAEK grafts performed in patients with phakic IOL and showed similar survival rates compared with endothelial grafting in the presence of a posterior chamber intraocular lens [8,9].

DSAEK surgery is currently the most commonly performed method of endothelial keratoplasty world-wide. More recent modifications of EK have attempted to transplant only donor Descemet's membrane and have been named Descemet's membrane endothelial keratoplasty (DMEK) by Melles and Descemet membrane automated endothelial keratoplasty (DMAEK) by Price. So far, there is limited outcome data available on these newer techniques that because are more technically challenging have not gained widespread use. However, the current trend in modern corneal transplantation techniques is to replace only the failing layer of the cornea leaving behind the rest of the corneal tissue untouched.

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