

Introduction

The traditional procedure for the management of corneal endothelial dysfunction has been penetrating (full thickness) keratoplasty (PKP). Endothelial keratoplasty (EK) describes a group of newer techniques for the surgical management of corneal endothelial dysfunction. The most common of these includes Descemet's membrane endothelial keratoplasty (DMEK) and Descemet's stripping endothelial keratoplasty (DSEK). Repeat keratoplasty has been the treatment of choice for patients with failed corneal transplants. With the development of newer transplant techniques, there have been a variety of reports examining the outcomes of various combinations of repeat keratoplasty techniques for failed grafts (repeat PKP, DSEK following PKP, DSEK following DSEK). Because the number of repeat DSEK cases is low at any one center, we decided to collaborate with the Midwest Eye Bank (Eversight) to establish a multicenter study to evaluate a large number of repeat DSEK cases. Specifically we wanted to examine the risk factors and outcomes of the repeat DSEK procedures. The results of this study will provide a broad sampling of the risk factors and outcomes of repeat DSEK in patients with prior failed DSEK and may shed light on its efficacy as a surgical treatment for corneal endothelial dysfunction.

Methods

An IRB approved, multicenter, retrospective chart review of patients who have had a repeat DSEK following a prior failed DSEK. The Eversight Eye Bank provided us with the names of the top 40 surgeons with the most numbers of repeat keratoplasty cases. Eversight then provided each surgeon with the list of their repeat keratoplasty cases from which they selected the repeat DSEK patients. The Eversight Eye Bank then prepopulated our data spreadsheet with the donor tissue data and forwarded this to each surgeon to complete the remaining clinical information. The data from all surgeons was then pooled and evaluated. Mined parameters included the following: **Donor Information:** endothelial cell density, pre-cut corneal thickness, post-cut corneal thickness, microkeratome blade depth (usually 350 um), final DSEK thickness; **Recipient Information:** indications for prior keratoplasty, indications for current DSEK (immune rejection, endothelial decompensation), best corrected visual acuity (BCVA) at 6 months and 12 months, endothelial cell density (1 m, 6 m, yearly thereafter), central corneal thickness (CCT) (1 m, 6m, 12 m and annually), rejection episodes, primary graft failure (non clearing graft at 3 months); **Associated Eye Disease:** presence and severity of glaucoma, presence of anterior chamber lens, presence of tube shunt (for glaucoma), pseudophakia, number of glaucoma drops, presence of corneal stem cell deficiency, history of retinal detachment repair, history of macular disease, and intraoperative complications.

Results

Data collection is ongoing. Our preliminary data consists of Four eyes from four patients (3 women and 1 man). The mean age of these patients was 67.75 years with a range from 53 to 93 years.

Indications for initial DSEK of these 4 patients included Fuch's Endothelial Dystrophy (n=1), and Failed Penetrating Keratoplasty (n=2). (Table #1).

Indications for repeat DSEK included: Late endothelial graft failure without rejection (n=1), graft failure following subsequent surgery (n=1), and unsatisfactory visual outcome (n=1). (Table #2)

Best corrected distance visual acuity (BCDVA) was measured pre-operatively repeat DSEK as well as 6 months post-operatively repeat DSEK.

BCDVA data was available for 2 of the patients. One of the failed PKP patients saw an improvement by 4 lines from 20/40 to 20/100. Additionally a Fuch's patient saw a massive improvement of their vision acuity by 18 lines from 20/2666 to 20/30. (Table #3)

Data for other parameters are being gathered and analyzed.

Table 1. Indication for initial DSEK

Indications	Eyes, n
Fuch's Endothelial Dystrophy	1, n=1
Failed Penetrating Keratoplasty	2, n=2
Pseudophakic Bullous Keratopathy	n=0

Results

Table 2. Indication for Repeat DSEK

Indication	Eyes, n
Unsatisfactory Visual Outcome	n=1
Late Endothelial Graft Failure Without Rejection	n=1
Graft failure following subsequent surgery	n=1
Graft failure following immune rejection	n=1

Table 3. Preoperative and Postoperative Data of Repeat DSEK

	BCDVA Pt. #1 (Fuch's)	BCDVA Pt. #2 (Failed PKP)
Pre-operative Repeat DSEK	CF 3' (20/2666)	20/100
6 Mo. Post-operative Repeat DSEK	20/30	20/40

Image 1. Fuch's Endothelial Corneal Dystrophy. Image © 2009 by the American Academy of Ophthalmology



Conclusion

There has been only 1 other published report using a single center study with 17 patients. Our goal is to have >40 patients with multiple surgeons representing 5 Midwest academic medical centers (Loyola, Northwestern, Rush, University of Illinois, University of Michigan) and a more realistic distribution of cases in 5 additional private practice settings. The results of this study will provide valuable information regarding the risks and outcomes of repeating the DSEK procedure.

References

- Gorovoy MS, Meisler DM, Dupps WJJ. Late repeat Descemet-stripping automated endothelial keratoplasty. *Cornea*. 2008;27:238-240.
- Letko E, Price DA, Lindoso EMS, et al. Secondary graft failure and repeat endothelial keratoplasty after Descemet's stripping automated endothelial keratoplasty. *Ophthalmology*. 2011;118:310-314.
- Ham L, Dapena I, van der Wees J, et al. Secondary DMEK for poor visual outcome after DSEK: donor posterior stroma may limit visual acuity in endothelial keratoplasty. *Cornea*. 2010;29:1278-1283.
- Kelly TL, Coster DJ, Williams KA. Repeat penetrating corneal transplantation in patients with keratoconus. *Ophthalmology* 2011;118:1538-42.
- Patel NP, Kim T, Rapuano CJ, et al. Indications for and outcomes of repeat penetrating keratoplasty, 1989-1995. *Ophthalmology*. 2000;107:719-724.
- Rapuano CJ, Cohen EJ, Brady SE, et al. Indications for and outcomes of repeat penetrating keratoplasty. *Am J Ophthalmol*. 1990;109:680-695.
- Dirisamer M, Parker J, Naveiras M, et al. Identifying causes for poor visual outcome after DSEK/DSAEK following secondary DMEK in the same eye. *Acta Ophthalmol* 2013;91: 131-9.
- Kim P, Yeung SN, Lichtinger A, et al. Outcomes of repeat endothelial keratoplasty in patients with failed Descemet stripping endothelial keratoplasty. *Cornea* 2012;31:1154-7.
- Clements JL, Bouchard CS, et al. Retrospective review of graft dislocation rate associated with descemet stripping automated endothelial keratoplasty after primary failed penetrating keratoplasty. *Cornea* 2011;30:414-418