CASE REPORT

A double Descemet's stripping endothelial keratoplasty on a penetrating keratoplasty

Li Yen Goh,^{1,2} Mohamed Elalfy,³ Noha Mohamed Ghaz,³ Harminder Dua⁴¹Ophthalmology, Kingston Hospital NHS Trust, Kingston upon Thames, London, UK²Academic Section of Ophthalmology and Visual Sciences, Nottingham University Hospitals NHS Trust, Nottingham, UK³Academic Section of Ophthalmology and Visual Sciences, Nottingham University Hospitals NHS Trust, Nottingham, UK⁴Ophthalmology, University Hospital, Nottingham, UK

Correspondence to

Dr Li Yen Goh,
liyengoh@gmail.com

Accepted 15 April 2017

SUMMARY

A patient with keratoconus underwent a penetrating keratoplasty (PK) in his right eye. This failed after 12 years following phacoemulsification surgery. A Descemet's stripping endothelial keratoplasty (DSEK) was carried out which failed and detached after 4 months. Subsequently, a second DSEK was performed which failed after 2 months but remained attached. This graft was retained in the cornea and a third DSEK button was placed without removing the failed DSEK graft. The cornea cleared well and patient's vision was 6/9 at 18 months postsurgery. Optical coherence tomography showed the two DSEK grafts closely applied to each other and to the recipient cornea. Stripping a failed DSEK graft performed for a previous failed PK carries the risk of internal dehiscence of the PK graft–host junction. This was avoided by placing the second DSEK graft on the failed previous DSEK graft with good visual outcome indicating that this option can be clinically considered.

BACKGROUND

Penetrating keratoplasty (PK) has been the mainstay in the management of sight affecting corneal pathology, for over a century. Graft failure especially due to rejection, a weak graft–host junction and graft astigmatism have always been the major problems with PK.^{1 2} With the advent of lamellar surgery, it is now possible to avoid or at least considerably reduce the risk of these major complications. When the corneal stroma is diseased, deep anterior lamellar keratoplasty, wherein the host epithelium and stroma are removed, retaining the endothelium and Descemet's membrane (DM), is the procedure of choice. This completely eliminates the risk of endothelial rejection-related graft failure.³ When the host endothelium is diseased, endothelial keratoplasty (Descemet's stripping endothelial keratoplasty (DSEK) or DM endothelial keratoplasty), wherein only the host DM and endothelium are replaced, is the procedure of choice. These procedures provide a high level of visual rehabilitation, do not induce astigmatism, retain the strength of the eye as there is no full thickness graft–host junction and also reduce the risk of rejection.^{4 5}

We report a case where PK was undertaken for keratoconus but the endothelium decompensated after cataract surgery 12 years postgraft. DSEK was attempted but failed on two occasions. On the third occasion, a DSEK performed on the previous failed DSEK resolved the condition.

CASE PRESENTATION

A 53-year-old Caucasian male underwent a successful PK in the right eye for keratoconus. Twelve years post-graft, he developed a cataract in that eye for which a phacoemulsification procedure with an intraocular lens implant was performed in 2012. The endothelium failed within a few months of cataract surgery and a DSEK was performed in June 2013. Four months following this DSEK, it was noted that the graft had detached and the cornea was oedematous. A repeat DSEK was performed in September 2013 during which the detached previous donor lenticule was removed. The new graft attached well to the host but the cornea did not clear. At this point the patient was referred to us for further management. As the non-functioning DSEK lenticule was well attached and given the risk of graft–host junction dehiscence during stripping of the lenticule, we decided to perform a repeat DSEK without stripping off the one that was in situ (August 2014).

OUTCOME AND FOLLOW-UP

Prior to his third DSEK, the patient's visual acuity was counting fingers in his right eye and 6/12+0.5 in his left eye. Near vision was N10 with a +2.50 add in his right eye and N5 +2.50 add in his left eye. At his 1 year review in August 2015, the patient's cornea was very clear and the eye was quiet and settled (figure 1). His visual acuity in his right eye had improved further to 6/9–3 with the pinhole. Near vision in the same eye was N8 with a +3.00 add. The endothelial cell count in that eye was 2528 cell/mm², contrast sensitivity was normal at 1.2 and pachymetry was 639±3.5. Corneal sensation in the right eye was reduced (Cochet-Bonnet (CB)=15 mm) compared with his left eye (CB=60 mm). The intraocular pressure (IOP) in both eyes was 13 mm Hg. A subsequent follow-up in May 2016 showed that his best-corrected visual acuity had improved to 6/9 in each eye.

DISCUSSION

To our knowledge, this case is unique in that a DSEK on a previous retained DSEK button was performed in the setting of a previous failed penetrating corneal transplant. Compared with full thickness corneal grafts, DSEK has the advantage of rapid visual recovery with minimal induced astigmatism. However, DSEK carries risks of endothelial cell loss, induced hypermetropia and astigmatism that could lead to anisometropia, and raised IOP

CrossMark

To cite: Goh LY, Elalfy M, Mohamed Ghaz N, et al. *BMJ Case Rep* Published Online First: [please include Day Month Year]. doi:10.1136/bcr-2016-218257

Figure 1 Slit lamp image (diffuse illumination) of the right eye after third Descemet's stripping endothelial keratoplasty (DSEK) showing a clear cornea (A). Pentacam corneal topography illustrating the sagittal front curvature, pachymetry and front and back elevation of the right cornea. The patient had 5.4 dioptres of astigmatism but the central corneal thickness was 597 microns in total including the two DSEK grafts (B). Optical coherence tomography cross section of right cornea demonstrating the two interfaces (C).

from pupil block in the immediate postoperative period. Long-term pressure elevation can also occur related to the surgery or steroid used. Anecdotal reports of rarer complications include graft-host interface abnormalities, epithelial down growth, dislocation of the posterior lenticule or intraocular lens into the vitreous and retinal complications including cystoid macular oedema and limited choroidal effusion.⁴ Specifically, in the context of previous PK, there is a small but definitive risk of internal dehiscence of the graft-host junction during DM stripping. It is therefore recommended that the DM stripping be confined to the area within the graft-host junction. This point has been emphasised in some courses on DSEK.

From the outset, this had been a surgically challenging case as we were performing a DSEK for the third time on a cornea with a previous PK. Any surgeon who has performed repeat Descemet's stripping automated endothelial keratoplasty (DSAEK) or DSEK (in eyes without a previous full thickness graft) knows that removal of the first failed graft is difficult at the sites where the graft overlaps sites of paracentesis or venting incisions. It is believed that at these sites, the stroma of the donor lenticule acquires a fibroblastic morphology and actin stress fibres by migration of donor and recipient keratocytes, fibroblasts and myofibroblasts across the breaches causing firm adhesions.⁶ When a repeat DSAEK or DSEK is performed in an eye with failed DSEK on a previous failed PK, removal of the previous graft is again very difficult because firm adhesions are formed along the circumference of the PK graft-host junction and attempt to strip the failed DSEK graft can result in internal dehiscence of the graft-host junction. In this case, as a previous DSEK was in situ, we decided to leave it in place, thus avoiding any disturbance of the graft-host junction of the PK.

At the 1 year follow-up, Pentacam corneal topography demonstrated that central corneal thickness (CCT) was 597 microns (figure 1). Optical coherence tomography (figure 1) measurements showed that the average CCT of the original

corneal post-PK was 532 microns, the overall thickness of the previous DSEK lenticule was 81 microns and the thickness of our DSEK lenticule was 54 microns. The final corneal thickness with the two DSEK lenticules together was 667 microns. Thus, the final CCT was increased by only 135 microns. This would have made an insignificant difference to the final visual outcome and refraction.

For this approach to work, it is important that the interface or the failed DSEK lenticule is not scarred or altered by blood, inflammatory cells and debris or retained DM fragments. In such situations, the failed DSEK lenticule should preferably be removed at the time of surgery.

Learning points

- ▶ In repeat Descemet's stripping automated endothelial keratoplasty or Descemet's stripping endothelial keratoplasty (DSEK) performed on an eye with failed DSEK, on a previous failed penetrating keratoplasty (PK), removal of the failed graft is difficult because firm adhesions are formed along the circumference of the PK graft-host junction and attempt to strip the failed DSEK graft can result in internal dehiscence of the graft-host junction.
- ▶ The approach we adopted by placing the second DSEK graft on the failed previous DSEK graft avoids this risk, which is the clinical relevance of the case report.
- ▶ We demonstrate here a case where the above was performed with a successful visual and overall outcome indicating that this option can be clinically considered.

Contributors LYG, ME, NMG and HD were involved in the conception, design and acquisition of data; were involved in drafting the manuscript and revising it critically for publication purposes; have approved the current submitted version of the manuscript; are in agreement to be held accountable for the article and will ensure that all questions regarding the accuracy or integrity of the article will be investigated and resolved.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

© BMJ Publishing Group Ltd (unless otherwise stated in the text of the article) 2017. All rights reserved. No commercial use is permitted unless otherwise expressly granted.

REFERENCES

- 1 Hoppenreijns VP, Van Rij G, Beekhuis WH, *et al.* Causes of high astigmatism after penetrating keratoplasty. *Doc Ophthalmol* 1993;85:21–34.
- 2 Rahman I, Carley F, Hillarby C, *et al.* Penetrating keratoplasty: indications, outcomes, and complications. *Eye* 2009;23:1288–94.
- 3 Karimian F, Feizi S. Deep anterior lamellar keratoplasty: indications, surgical techniques and complications. *Middle East Afr J Ophthalmol* 2010;17:28–37.
- 4 Lee WB, Jacobs DS, Musch DC, *et al.* Descemet's stripping endothelial keratoplasty: safety and outcomes: a report by the American Academy of Ophthalmology. *Ophthalmology* 2009;116:1818–30.
- 5 Melles GR, Ong TS, Ververs B, *et al.* Preliminary clinical results of Descemet membrane endothelial keratoplasty. *Am J Ophthalmol* 2008;145:222–7.
- 6 Ljubimov AV, Saghizadeh M. Progress in corneal wound healing. *Prog Retin Eye Res* 2015;49:17–45.

Copyright 2017 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow