
SHORT COMMUNICATION

Endothelial cell loss after pars plana vitrectomy in patients with previous endothelial keratoplasty

Antonio Cano Ortiz, Alberto Villarrubia, Juan M. Laborda, Pedro M. Villa, Mariano R. Maqueda

Instituto de Oftalmología La Arruzafa de Córdoba - Spain

Purpose: To describe the changes in endothelial cell density after pars plana vitrectomy (PPV) in patients with previous Descemet stripping with automated endothelial keratoplasty (DSAEK).

Methods: Pars plana vitrectomy was performed in 3 eyes after DSAEK (16, 14, and 7 months, respectively). Two patients had a retinal detachment and the third patient had an epiretinal membrane. The cell population density and corrected distance visual acuity (CDVA) were measured before and after PPV.

Results: Two months after PPV, the average endothelial cell loss was 11.12% (range 10.3%-12.15%). One patient lost 2 lines of CDVA and the other 2 patients lost only half a line of Snellen CDVA.

Conclusions: Patients who have undergone DSAEK may experience accelerated endothelial cell loss after a subsequent PPV procedure but the extra cell loss should not pose a short-term risk to graft viability unless the endothelial cell density was already borderline.

Keywords: Corneal transplant, DSAEK, Endothelial cell loss, Pars plana vitrectomy

Accepted: January 8, 2014

INTRODUCTION

Endothelial keratoplasty (EK) has emerged as a leading surgical solution for the treatment of corneal edema due to endothelial dysfunction (1). Currently, Descemet stripping with automated endothelial keratoplasty (DSAEK) remains the most popular technique because it provides excellent outcomes and is less technically challenging compared to other EK methods. Descemet stripping with automated endothelial keratoplasty involves the removal of recipient endothelium and Descemet membrane and replacement with a donor disc of endothelium, Descemet membrane, and posterior stroma.

Endothelial cell loss (ECL) in the early postoperative period is higher in some DSAEK series than it is after penetrating keratoplasty (PK). The higher ECL is the likely reason for the higher incidence of primary and long-term graft failure in some DSAEK series (1). Price et al (2) found that graft success was comparable between DSAEK and PK at 5 years. Within 6 and 12 months postoperatively, ECL was

higher after DSAEK, which is consistent with endothelial trauma caused by greater donor tissue manipulation (2, 3). Price et al (2, 3) found that subsequent cell loss occurred at a lower rate with DSAEK than it did with PK performed for similar indications in the Cornea Donor Study.

Any intraocular procedure can produce ECL. However, to our knowledge, there are no peer-reviewed publications in the English literature reporting how pars plana vitrectomy (PPV) can influence the decline in endothelial cell density (ECD) in patients who have undergone previous DSAEK. In this study, we describe ECL due to PPV in 3 patients who had undergone previous DSAEK.

PATIENTS AND METHODS

This was a retrospective case series of 3 patients who required PPV after DSAEK. We investigated how PPV may affect the endothelial cell population and the corrected distance visual acuity (CDVA; Snellen charts). The DSAEK

technique has been described previously (2). The PPV technique (23 g or 25 g) has been described previously (4). Descemet stripping with automated endothelial keratoplasty and PPV surgery were performed in all patients by the same surgeon (A.C. and J.M.L., respectively). Silicone oil was not used. The PPV was performed with a Constellation® Vision System (Alcon Labs, Fort Worth, Texas, USA) and the endothelial cell count was performed with the SP-2000P specular microscope (Topcon, Tokyo, Japan).

Case 1

A 75-year-old man with Fuchs endothelial dystrophy in both eyes and a moderate cataract presented with 0.2 Snellen CDVA in his right eye. Noneventful phacoemulsification and DSAEK were performed in the right eye. Sixteen months later, a retinal detachment was diagnosed in the same eye. A 23-g PPV was performed along with argon laser for retinal tears, and 30% SF₆ was used at the end of the surgery. The follow-up was 48 months from the first DSAEK procedure.

Case 2

An 83-year-old man with Fuchs endothelial dystrophy in both eyes and nuclear cataract presented with 0.1 CDVA in the left eye. Phacoemulsification and DSAEK were performed on the left eye. Intraoperatively, a posterior capsule break occurred and the patient required anterior chamber vitrectomy. The intraocular lens was positioned with the optic captured behind the anterior capsulorhexis and the haptics were left in the sulcus. Fourteen months after DSAEK, the patient was diagnosed with complete retinal detachment with macula off. A 23-g PPV was performed with argon laser for retinal tears, and 25% SF₆ was used

at the end of the surgery. The follow-up from the first DSAEK procedure was 44 months.

Case 3

A 76-year-old man who had undergone phacoemulsification for cataract elsewhere presented with bullous keratopathy in the right eye. Descemet stripping with automated endothelial keratoplasty was performed on the right eye. Seven months later, he presented with an epiretinal membrane. We elected to perform a 25-g PPV to peel off the epiretinal membrane without the application of argon laser or SF₆. The follow-up from the first DSAEK procedure was 21 months.

RESULTS

Table I summarizes the ECD and CDVA before and 2 months after PPV in each case. The mean ECL was 11% (Tab. I). All grafts remained clear during the follow-up period. From the second month after PPV up to the first year of follow-up, the ECD remained stable in all 3 cases.

DISCUSSION

There are potential concerns if another surgical procedure is performed during the postoperative period for DSAEK. For example, the ECD could potentially be affected, thus risking the viability of the graft.

The ECL at 6 months postoperatively has been reported between 16% and 54% (5-8). From the sixth month to the second year, the ECL may be around 1%-5% per year (2, 3, 8). In our series of 3 cases, the average cell loss was

TABLE I - ENDOTHELIAL CELL DENSITY AND CDVA BEFORE AND 2 MONTHS AFTER PPV

	ECD before PPV, cells/mm ²	ECD after PPV, cells/mm ²	Endothelial cell loss after PPV, %	CDVA pre-retinal pathology	CDVA 2 months after PPV
Case 1	1079	948	10.30	0.85	0.65
Case 2	1327	1191	12.15	0.85	0.80
Case 3	1315	1172	10.90	0.30	0.25

CDVA = corrected distance visual acuity; ECD = endothelial cell density; PPV = pars plana vitrectomy.

11.12% 2 months after PPV. All 3 patients had retinal complications between 6 and 24 months post-DSAEK, when ECL should not exceed 5%. Hence, the higher loss of endothelial cells 2 months after PPV in our patients is likely attributable to vitreoretinal surgery. However, to date the graft in all 3 cases remains clear. This observation indicates that the loss of cells did not compromise graft viability.

The outcomes from previous DSAEK studies (6, 8) indicate that ECL plateaus more rapidly than in those who undergo PK for similar moderate risk indications over 1 year (3). Additionally the population of the endothelial cells could remain stable over the following 3 years (6, 8).

In the current study, ECL may be due to iris touch against the cornea when the patient was not in face-down position postoperatively. However, another explanation could be the intraocular inflammatory response that can be found in any intraocular surgery.

One patient lost 2 lines of Snellen CDVA and the other 2 patients lost only half a line postoperatively. This minor loss of visual acuity is more likely attributable to the retinal detachment and the epiretinal membrane rather than

the loss of endothelial cells. Endothelial cell loss does not reduce visual acuity unless the graft becomes edematous, which did not occur in any of the cases reported in the current study.

In conclusion, the results of our case series indicate that PPV did not immediately compromise the graft viability in patients who have a posterior cornea lenticule from DSAEK. However, the ECL is higher with the second surgical procedure compared to the normal evolution of a transplanted cornea after EK.

Financial Support: No financial support was received for this submission.

Conflict of Interest Statement: None of the authors has conflict of interest with this submission.

Address for correspondence:
Alberto Villarrubia, MD
Instituto de Oftalmología La Arruzafa
Avenida de la Arruzafa 9
14012, Córdoba
Spain
alvillarrubia@yahoo.com

REFERENCES

1. Terry MA. Endothelial keratoplasty: history, current state, and future directions. *Cornea* 2006;25:873-8.
2. Price MO, Fairchild KM, Price DA, Price FW Jr. Descemet's stripping endothelial keratoplasty five-year graft survival and endothelial cell loss. *Ophthalmology* 2011;118:725-9.
3. Price MO, Gorovoy M, Benetz BA, et al. Descemet stripping automated endothelial keratoplasty outcomes compared with penetrating keratoplasty from the Cornea Donor Study. *Ophthalmology* 2010;117:38-44.
4. Eckardt C. Transconjunctival sutureless 23-gauge vitrectomy. *Retina* 2005;25:208-11.
5. Phillips PM, Phillips LJ, Much JW, Maloney C. Descemet stripping endothelial keratoplasty: six-month results of the first 100 consecutive surgeries performed solo by a surgeon using 1 technique with 100% follow-up. *Cornea* 2012;31:1361-4.
6. Koenig SB, Covert DJ, Dupps WJ. Jr, Meisler DM. Visual acuity, refractive error, and endothelial cell density six months after Descemet stripping and automated endothelial keratoplasty (DSAEK). *Cornea* 2007;26:670-4.
7. Bahar I, Kaiserman I, Sansanayudh W, Levinger E, Rootman DS. Busin guide vs forceps for the insertion of the donor lenticule in Descemet stripping automated endothelial keratoplasty. *Am J Ophthalmol* 2009;147:220-6.
8. Terry MA, Chen ES, Shamie N, Hoar KL, Friend DJ. Endothelial cell loss after Descemet's stripping endothelial keratoplasty in a large prospective series. *Ophthalmology* 2008;115:488-96.