Spontaneous restoration of corneal clarity after graft displacement following Descemet membrane endothelial keratoplasty

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We report a case of spontaneous restoration of corneal clarity after graft displacement following Descemet membrane endothelial keratoplasty. The patient had a functioning glaucoma filtering bleb into which air from the anterior chamber escaped, resulting in poor adherence of the graft. The graft was displaced temporally from the optical axis. Corneal edema cleared spontaneously within 6 weeks, and the central cornea remained clear throughout the 11-month follow-up, suggesting that endothelial cells migrated from the eccentric donor graft to the recipient cornea. This might justify the use of smaller donor grafts, and thus a single donor graft might be sufficient for multiple patients.

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Descemet membrane endothelial keratoplasty (DMEK) is the most popular and advanced iteration of endothelial keratoplasty. Descemet membrane endothelial keratoplasty offers the quickest visual rehabilitation because of the lack of posterior stroma on the donor graft and the smaller entry wound in the recipient cornea. Donor graft displacement after DMEK is not uncommon and is usually treated with additional air injection into the anterior chamber or graft exchange when adherence cannot be achieved. Glaucoma filtering surgery often prevents air filling the anterior chamber completely as the air can exit into the subconjunctival space. This may prevent optimum adhesion of the graft, and these cases may demonstrate increased rates of graft dislocation and failure. Recent studies describe corneal clearance after DMEK procedures that involved either partial or total graft detachment. However, it is unclear whether the detachment was due to cell migration from the donor or the host endothelial cells. This report describes spontaneous central corneal clarity despite donor graft displacement in a patient with a functioning glaucoma filtering bleb. Our observations suggest this was a result of endothelial migration from the donor cornea rather than the recipient cornea.

CASE REPORT

An 87-year-old white woman had uneventful DMEK in the right eye for pseudophakic bullous keratopathy. The preoperative corrected distance visual acuity (CDVA) was counting fingers in the right eye and light perception in the left eye. Slitlamp examination on postoperative day 1 showed a grossly decentered graft; air had egressed into the superior functional bleb. Subsequent examination using the confocal microscope showed a wave of cells extending from the decentered graft toward the central posterior stroma; the morphological appearance was similar to that of the donor graft. The eccentric graft remained in place with the edge away from the optical axis, and the central cornea was clear and compact and remained stable throughout the 11-month follow-up.

At 11 months, the corneal thickness by optical coherence tomography was 576 μm. The CDVA improved to 20/30 and the endothelial density, to 667 cells/mm². The endothelial cells were in a uniform arrangement of polygonal cells and appeared identical to the donor graft endothelial cells.
The endothelial cell migration from the eccentric donor graft facilitated the repopulation of the recipient central cornea (Figure 1, D) and improved the visual outcome.

DISCUSSION

Studies have shown endothelialization of denuded cornea following slight decentration or partial or total detachment of a graft after Descemet membrane endothelial keratoplasty or DMEK. Although the exact mechanism is unclear, the findings suggest that the corneal endothelial cells have migratory or regenerative capabilities that may counter the expected endothelial cell loss. Hos et al. further conclude that the donor graft is the origin of repopulating endothelial cells. Our case strongly suggests endothelial migration from the donor cornea rather than the recipient cornea. Confocal microscopy showed a wave of cells extending from the decentered graft toward the central cornea; the morphological appearance was similar to that of the donor graft. Based on our findings, spontaneous clearance might occur and the decision of whether to perform a secondary procedure for a decentered or partially detached graft could be delayed. This is especially important to consider in a functional 1-eyed patient (fellow eye with CDVA of light perception) with a large functioning trabeculectomy.

Descemet membrane endothelial keratoplasty disk detachments can be partial or total, central or peripheral. The peripheral detachments can be rolls that often do not attach, or they can be laminar that often spontaneously reattach with clearance of the overlying corneal edema. In our case, there was significant disk decentration due to premature air escaping from the anterior chamber via the trabeculectomy track. In a recent study by Lam et al., hemi-Descemet membrane grafts were used to obtain visual outcomes similar to those resulting from a full Descemet membrane graft. Our results also justify the use of smaller donor grafts,
and thus a single donor graft may be sufficient for multiple patients. Further studies are needed to show the consistency of these results and to assess the potential of endothelial keratoplasty without the need for continued adherence of the donor Descemet/endothelial lenticule to bare host posterior stroma.

Future directions of endothelial keratoplasty may include clinical applications of rho kinase inhibitors, especially given the recent evidence that such use can increase the number of endothelial proliferating cells, promote adhesion, and simultaneously inhibit apoptosis.19,20

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