Abstract:
Although the presence of central corneal opacities could limit the visual prognosis, Descemet Membrane Endothelial Keratoplasty (DMEK) was performed and completely resolved corneal edema and opacities on the visual axis. A rigid contact lens fitting was necessary to treat irregular astigmatism postoperatively.

Keywords: DMEK, corneal opacities, bullous keratopathy.

Introduction
Descemet Membrane Endothelial Keratoplasty (DMEK) surgery has become the treatment of choice for corneal endothelial dysfunction.1-3 It has gradually gained popularity among surgeons as it promotes faster postoperative recovery, excellent visual rehabilitation and a much lower rejection rate.1,4

After corneal injury, corneal opacities occur as the architecture of the stromal collagen fibers is disturbed.5 While DMEK improves transparency by restoring normal function of endothelial cells, it does not replace the corneal stroma.6 As corneal opacities are generally located in the stroma, only full-thickness corneal transplantation allows substitution of posterior stromal tissue and complete recovery of transparency. Therefore, a relative contra-indication for endothelial transplantation is corneal opacities on the visual axis. Nevertheless, it is known that in some cases focal opacities on the visual axis without corneal edema might not cause a significant decrease in visual acuity. This can be observed in early stages of corneal granular dystrophy, for instance.7

We report herein a case of bullous keratopathy with corneal posterior scarring secondary to a complicated cataract surgery in which DMEK surgery was successful.

Case report
A 74-years old Caucasian male presented with poor vision in his right eye one year after complicated phacoemulsification surgery. Despite the history of trachoma, he reported no vision complaints before the diagnosis of cataract. His best-corrected visual acuity was 20/400 (+4,00 135) in the right eye and 20/30 (+0,75) in the left eye. Biomicroscopy revealed diffuse moderate corneal edema, no significant stromal fibrosis and marked posterior stromal scaring, partially compromising the visual axis (Figure 1 and 2). By retro-illumination, the linear aspect of the scaring suggested surgical endothelial trauma. The cell count was not possible and pachimetry was outside normal limits, reaching 650 microns. Corneal topography showed irregular astigmatism. Left eye examination was unremarkable. Ultrasound showed no further alterations. A 46-years old donor cornea was available and DMEK was
performed in the right eye using a standard SCUBA and “no touch” technique as previously described. The procedure was uneventful.

Results: The early postoperative period was unremarkable. After 4 months, the graft was centered and completely attached. The cornea showed no edema and corrected visual acuity improved gradually until reaching 20/50 (+5.00 140) on the 8th month (Figure 3 and 4). A rigid contact lens fitting allowed a 20/25 visual acuity.

Discussion

After DMEK, the nearly perfect anatomical restoration of the cornea allows a rapid and often complete visual rehabilitation. Besides its superior visual outcomes, DMEK has also shown lower rejection rates than other modalities of endothelial transplantation by replacing only the Descemet membrane and endothelium. Being so, it has become the procedure of choice for treating corneal endothelial dysfunction, as in Fuchs endothelial dystrophy or pseudophakic bullous keratopathy.

Our patient had diffuse edema secondary to complicated cataract surgery. It was anticipated that DMEK would restore endothelial function and consequently resolve the edema. Nevertheless, the presence of posterior opacities on the visual axis could limit the visual prognosis. Due to its curvature and transparency, the cornea makes up approximately 70 % of the total refractive power of the eye. This function is partly made possible by the particular organization of the collagen extracellular matrix contained in the corneal stroma that permits a constant refractive power. The maintenance of such an organization involves additional molecules such as type V collagen, fibril-associated collagens with interrupted triple helices and small leucine-rich proteoglycans. These components play a crucial role in the preservation of the correct organization and function of the cornea. After corneal stromal injuries, modification of these components leads to abnormalities such as corneal opacities. The treatment of corneal opacities depends on several factors like depth in the stroma, density, irregular astigmatism and proximity to the visual axis. Poor vision subsequent to corneal scarring and opacities can sometimes be treated with a contact lens fitting; otherwise, a surgical approach might be necessary. Anterior corneal opacities generally cause irregular astigmatism. Improvement in vision with rigid gas permeable or soft lenses over spectacles can be obtained in some cases. When this is not possible, excimer laser photoablation as in PRK or PTK are the least invasive options. Sutureless Femtosecond laser-assisted anterior lamellar keratoplasty and deep anterior lamellar keratoplasty are surgical possibilities for patients with anterior corneal pathology and normal endothelium.

Posterior corneal opacities generally do not lead to such disturbance in the anterior surface. Most of these opacities allow satisfactory visual acuity after spectacle correction. Sometimes, even when the visual axis is compromised. This might take place in some granular dystrophy’s patients, or in the whitish wave-like opacities in the interface after DSAEK, for instance. One study evaluated postoperative haze by...

Figure 2. Optic section: corneal edema and posterior scarring.

Figure 3. Diffuse illumination: improvement of corneal...
confocal microscopy in 18 eyes with bullous keratopathy treated with DSAEK (Descemet Stripping Endothelial Keratoplasty). It was found that minor corneal opacity persisted for the whole follow-up period of 24 months but tended to decrease. They concluded that anterior stromal haze had greater impact on visual acuity than opacities, folds, and birefringent deposits within the host-donor interface.

This case report, about a pseudophakic bullous keratopathy patient, had the peculiarity of the presence of a surgically induced trauma to the endothelium, possibly from direct contact from a chopper or a phaco tip to the endothelium, led to dense posterior scarring. This linear opacity compromised partially the visual axis. It was evident that penetrating keratoplasty would restore corneal transparency, surface regularity and endothelial function. A full thickness procedure, on the other hand, also could result in higher rates of rejection, suture-related problems and the possibility of endophthalmitis or expulsive hemorrhage. As the fellow eye had perfect vision, lamellar keratoplasty would prevent these risks.

It was discussed the matter with the patient that DMEK could help improving low vision resulting from the diffuse edema. Conversely, one could not be sure of the advance of irregular astigmatism nor the central opacity. Anterior corneal opacities can also develop after DMEK. A study showed that incomplete visual rehabilitation after DMEK occurred in almost 80% of a series of 178 eyes due to corneal scarring or irregularities. This subepithelial scarring after endothelial transplantation can be successfully treated by excimer laser photoablation with PTK or PRK.

The benefits and limitations of selective keratoplasty were extensively and clearly addressed. DMEK surgery was carried out and as expected the edema was fully resolved. The opacities diminished partially. Spectacle-corrected visual acuity increased from 20/400 to 20/50. At that point one could not state whether this outcome was topography-related or secondary to the opacities. A rigid contact lens fitting finally improved vision to 20/25, proving that posterior scarring was not the major factor limiting visual acuity.

In conclusion, low vision resulting from pseudophakic bullous keratopathy may be addressed more selectively with posterior lamellar keratoplasty, even in cases with corneal focal opacities in the visual axis. Benefits and limitations of lamellar keratoplasty should always be extensively discussed.

REFERENCES