

# Late Onset Corneal Epithelial Bleb Following DMEK

Steven B. Koenig, MD<sup>1</sup>, Lisa R. Koenig, BA<sup>2</sup>

## ABSTRACT

**Purpose:** To report the case of a late onset large corneal epithelial bleb following uncomplicated Descemet's membrane endothelial keratoplasty (DMEK).

**Patient and Methods:** A 78 y.o. man underwent uncomplicated DMEK for pseudophakic bullous keratopathy in the right eye.

**Results:** On post-operative day one, the anterior segment optical coherence tomography revealed a small peripheral detachment of the Descemet's membrane at 10 o'clock. Despite a clear graft that appeared attached clinically, he developed a late onset large corneal epithelial bleb that contributed to visual loss. The lesion was successfully removed with simple corneal epithelial debridement resulting in a clear cornea.

**Conclusions:** Late onset corneal epithelial bleb formation may occur after uncomplicated DMEK surgery. Although the exact mechanism remains unclear, it most likely resulted from an occult persistent focal detachment of the donor graft.

**Key Words:** DMEK, epithelial bullae, corneal edema

**D**MEK is the latest iteration of posterior lamellar corneal transplantation in which diseased host endothelium and Descemet's membrane is replaced with an allograft of identical healthy tissue. The most common complications include partial or total detachment of the donor tissue due to the inherent elasticity of Descemet's membrane. Small detachments may resolve spontaneously.<sup>3,4,5</sup> We herein report the case of a late onset corneal epithelial bleb overlying an area with a previously detected peripheral detachment of Descemet's membrane.

## CASE REPORT

This patient is a 78 y.o. man who underwent phacoemulsification with posterior chamber lens implantation in his

right eye eight months earlier. His cornea failed to clear post-operatively. His history was remarkable for age-related macular degeneration.

Examination revealed a best-corrected visual acuity of 20/100 OD. Best-corrected spectacle visual acuity of the left eye was 20/50. The right cornea demonstrated mild microcystic epithelial edema and stromal edema; the pachymetry measured 782  $\mu$ . A posterior chamber lens implant was in good position with an intact posterior capsule. The left eye demonstrated a clear cornea with rare gutta and a brunescant cataract. Pachymetry measured 609  $\mu$  in the left eye. The right retina was flat and attached. The left fundus demonstrated atrophic retinal pigment epithelial changes in the macula. A diagnosis of pseudophakic bullous keratopathy OD was made.

On 9/16/14, the patient underwent uncomplicated DMEK using an 8.0 mm pre-cut donor graft and 8.5 mm host desmetorrhesis, OD. Two paracenteses were created at the limbus at 7:30 and 10:30 position with a 1 mm blade. The donor tissue was tamponaded with a large air bubble. Post-operatively, the patient was treated with prednisolone acetate (Allergan, Irvine, California) drops q.i.d. for three months then tapered over three months and Ofloxacin 0.3% (Allergan, Irvine, California) drops q.i.d. for one week. On the first post-operative day, the uncorrected visual acuity was 20/400 OD, the intraocular pressure was 20 mm Hg, and the graft appeared attached clinically with a 40% residual air bubble in the anterior chamber. Anterior segment Optical Coherence Tomography (OCT) revealed a small localized Descemet's detachment superotemporally (Fig. 1). At one month post-operatively, the DMEK graft appeared attached and clear. The desmetorrhesis conformed closely to the edges of the donor graft for 360 degrees. No detachment of Descemet's membrane was

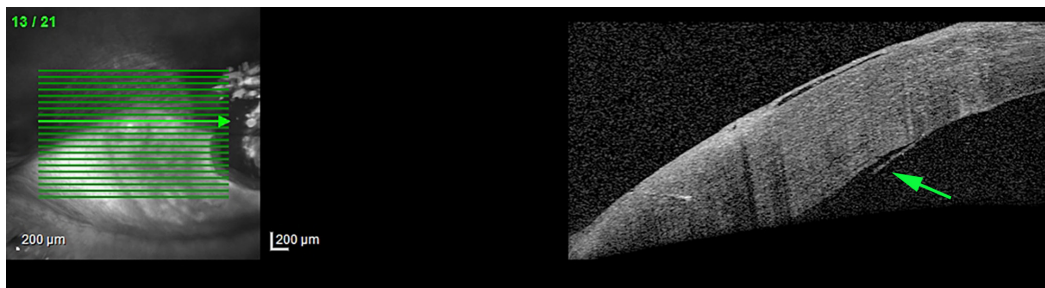
**Author Affiliation:**<sup>1</sup>Department of Ophthalmology, Froedtert and the Medical College of Wisconsin, Milwaukee, WI, USA,

<sup>2</sup>Weill Cornell Medical College, New York, NY, USA

**Corresponding Author:** Steven B. Koenig, MD, Department of Ophthalmology, Froedtert and the Medical College of Wisconsin, Eye

Institute 925 N. 87th Street, Milwaukee, WI 53226 414-955-7842, Fax: 414-955-6300 skoenig@mcw.edu

**Non-Corresponding Author:** Lisa R. Koenig, BA, lisa.r.koenig@gmail.com



**Fig 1.** Anterior segment optical coherence tomography demonstrating small peripheral detachment of donor Descemet's membrane endothelial keratoplasty graft at 10 o'clock. (arrow)

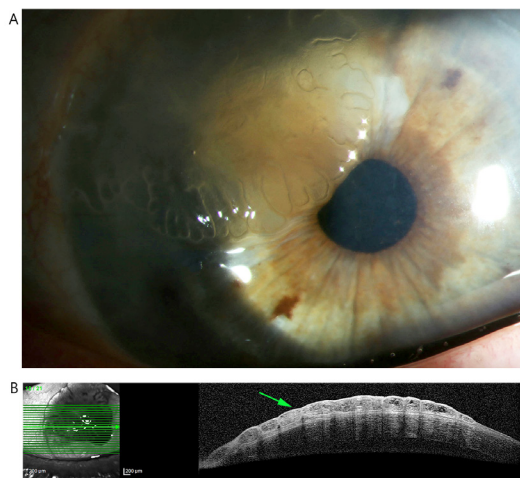
detected on slit lamp exam, therefore anterior segment OCT was not performed. The uncorrected vision of 20/40 -2 was felt to be consistent with his history of wet AMD.

On 7/5/16, the patient was referred back for new onset corneal epithelial edema superotemporally OD. The best corrected visual acuity was 20/40 -1. Slit lamp examination revealed corneal epithelial edema and small bullae adjacent to the superotemporal limbus, extending onto the cornea for 3.5 mm and overlapping the edge of the Descemet's membrane endothelial graft. Since the patient was asymptomatic, observation was recommended.

On 1/30/17, the patient was referred back with a diagnosis of a large "blister" in the right eye. At that time, the best-corrected vision was 20/70 -2 with pinhole. The intraocular pressure measured 8 mm Hg. No wound leak was detected. A 5.7 mm multicystic epithelial bleb occupied the superotemporal quadrant of the right cornea and extend to the pupillary margin. (Fig. 2A) The bleb did not extend onto the conjunctiva and was densely adherent to the un-

derlying cornea. The observable DMEK graft and remainder of the cornea appeared clear. Anterior segment OCT was not performed.

On 3/9/17, the patient underwent excision of the corneal epithelial bleb under topical anesthesia. Anterior segment OCT performed on the day of surgery demonstrated a large, multicystic epithelial bleb occupying the superotemporal quadrant of the cornea; the underlying Descemet's membrane appeared attached. (Fig. 2B) The three-month post-operative OCT demonstrated a fully attached DMEK graft and slit lamp exam demonstrated a clear cornea with no stromal edema and no epithelial edema superotemporally. (Fig. 3) The spectacle visual acuity was 20/50 -2. The histopathology demonstrated corneal epithelium with small



**Fig 2.** Post-operative images

A. Large elevated cystic corneal bleb occupying superotemporal quadrant.

B. Anterior segment optical coherence tomography showing thickened epithelium and intraepithelial cystoid spaces. (arrow)



**Fig 3.** Slit lamp photograph demonstrating clear cornea and Descemet's membrane endothelial keratoplasty one year following surgical excision of bleb.

cystic structures in underlying myxoid stroma associated with scattered bland fibroblasts. Specular microscopy was attempted, however an image was unable to be captured. The cornea has remained clear during a follow-up period of 1 year.

## DISCUSSION

Our patient developed a late onset corneal epithelial bleb following uncomplicated DMEK. Although the exact

mechanism of bleb formation remains unclear, it appears most likely that it resulted from a persistent small occult detachment of the donor graft that was initially detected in the immediate post-operative period on OCT. Although the DMEK graft appeared clear and totally attached on subsequent slit lamp examination<sup>5</sup>, it is probable that a shallow detachment persisted in the superotemporal portion of the graft causing late onset microcystic epithelial edema at 22 months post-operatively and a large multicystic bleb noted approximately two and one-half years after the initial surgery. Other possible mechanisms for bleb formation include damage or inadvertent stripping of the peripheral host endothelium and Descemet's membrane during surgery as well as an undetected wound leak from the 10:30 limbal paracentesis. There was no clinical evidence to support either of these mechanisms. However, there was also no OCT evidence to document a persistent occult detachment of the DMEK graft. Although corneal decompensation due to low host endothelial cell density could not be confirmed with specular microscopy, it is highly unlikely since the cornea remained clear for more than a year following bleb excision.

Large corneal epithelial bullae have been previously reported in the literature and are not specific to endothelial keratoplasty.<sup>8</sup> Corneal endothelial decompensation due to trauma, surgery or hydrops may lead to chronic corneal edema and bullous keratopathy.<sup>8</sup> The presence of fibroblasts presumably allowed the cyst to markedly enlarge.

Although not unique, our patient is highly unusual since there was no clinical evidence of graft detachment, or persistent corneal edema in the early post-operative period and the large multicystic bleb occurred very late post-operatively. In addition, the bleb led to loss of vision which returned following simple corneal epitheliectomy.

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