

**Sir,
Clinical evidence of the pre-Descemet's layer (Dua's layer) in corneal pathology**

The posterior-most 10–20 μm of the corneal stroma has unique characteristics and provides a plane of cleavage in deep anterior lamellar keratoplasty (DALK). This has been termed the pre-Descemet's layer or Dua's layer (DL).^{1,2} The initial publication on DL created some controversy. Many corneal surgeons readily related to it^{3,4} and others contested its identity as a distinct layer.⁵ Herein, we present clear clinical evidence of the distinct nature of DL, in a patient who presented with persistent corneal edema following cataract surgery.

Case report

A 74-year-old lady presented with poor vision in the left eye (LogMar +0.52) on account of posterior sub-capsular cataract and nuclear sclerosis. She underwent an uncomplicated phacoemulsification procedure with a posterior chamber lens implant through a temporal incision. A week later, she presented with 'hand movements' vision and a cloudy cornea, with epithelial bullae and stromal edema. The anterior chamber did not show any cells and the intraocular pressure was 14 mm of Hg. She was treated with topical dexamethasone 0.1%, 2 hourly, and chloramphenicol 0.5%, four times a day.

The corneal edema did not settle. Eleven weeks post surgery an optical coherence tomography (OCT) of the cornea revealed Descemet's membrane (DM) detachment

and she was managed with air injection into the anterior chamber. Repeat OCT carried out at 4 and 8 weeks post air injection showed persistent 'Descemet's detachment' and a well-defined patch of corneal edema (Figure 1a and b) covering most of the pupil. Her vision was 'counting fingers'.

At 5 months post her original cataract surgery she presented to one of us (HSD) for a second opinion. The edema had cleared to some extent (Figure 1c and d), but pachymetry was $930 \pm 12 \mu\text{m}$. She complained that her vision was blurry on waking in the morning and clearer by mid-morning, especially on the nasal side. OCT scans were repeated. She was offered endothelial keratoplasty, but she declined.

A review of all her OCT scans revealed that there was a detachment of the DM and DL, which corresponded accurately to the area of corneal edema (Figure 2a). At places two distinct lines were seen indicating separation of DM and DL (Figure 2b). In the lower third, the two hyper-reflective lines of detachment were clearly evident. The anterior line was thicker and taut, whereas the posterior line was curved with a scroll at the end. The scroll was better seen on the nasal edge of the posterior line (Figure 2c). The posterior hyper-reflective line was characteristic of a DM detachment and tear. The detached DL with detached and torn DM was seen in all scans taken before the air injection procedure and the others taken at ~4-weekly intervals thereafter. The site of DM tear corresponded to the side-port incision and was possibly related to intraoperative trauma.

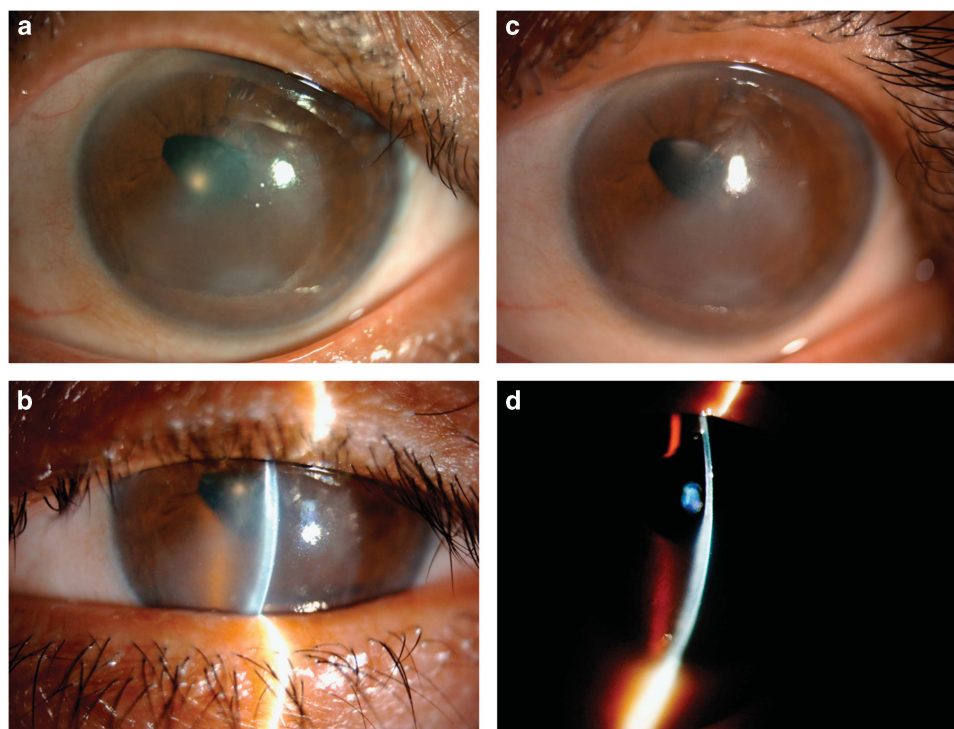


Figure 1 Slit-lamp diffuse and slit images of left cornea: 11 weeks post cataract surgery. (a) Corneal edema affecting predominantly the infero-temporal quadrant of the left cornea and covering more than half the pupillary area. The pupil is oval shaped. (b) Slit image shows considerable thickening of the stroma. Five months post cataract surgery. (c) The corneal edema shows some improvement as more than half the pupillary area is clear. (d) The slit image does not show much improvement in the stromal thickening.

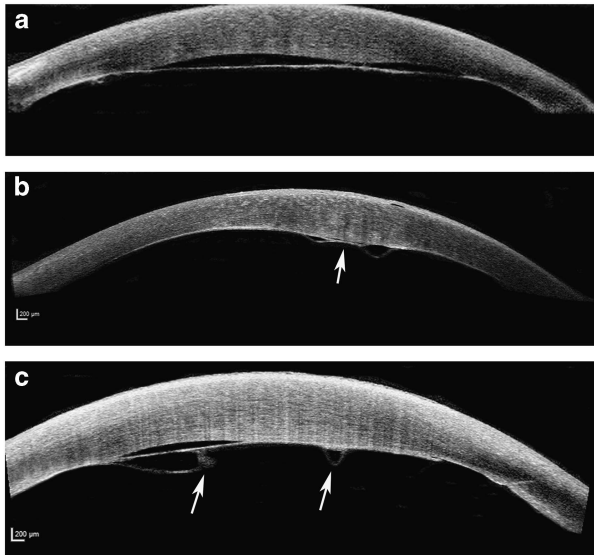


Figure 2 Optical coherence tomography (OCT) of the cornea (Spectralis, Heidelberg Engineering, Heidelberg, Germany). (a) OCT scan in a plane corresponding to the upper third of the area of edema. A clear thick line of detachment is seen along the posterior (Descemet's membrane and endothelium) aspect of the cornea. The detached layer is not torn. (b) OCT scan in a plane corresponding to the mid-third of the area of edema. The posterior hyper-reflective line with folds into the anterior chamber corresponds to the detachment of Descemet's membrane, which in the middle (arrow) is attached to the Dua's layer (DL) that itself is separating from the posterior stroma. (c) OCT scan in a plane corresponding to the lower third of the area of edema. A posterior-curved hyper-reflective line with a central-scrolled edge, corresponding to detachment of the Descemet's membrane is clearly visible. Anterior to this is the distinct taut image of the detached DL. Arrows point to the two central ends of the torn Descemet's membrane.

Comment

This is the first demonstration of DL in clinical pathology of the posterior cornea. Dua *et al*¹ had postulated that DL could have a role in acute hydrops of keratoconus. Subsequently, Yahia Chérif *et al*⁴ showed that suturing the DL without DM resulted in rapid resolution of the hydrops and presented this as evidence of the existence of DL. The plane between DL and deep stroma can be accessed surgically, and two surgical procedures namely DALK-triple and pre-Descemet's endothelial keratoplasty have been designed around DL.⁶

DL is made of five to eight compact thin lamellae of type 1 collagen, has an abundance of type 6 (long spacing) collagen, is devoid or sparsely populated with keratocytes, is impervious to air, is populated by trabecular cells at the peripheral 350 μ m and continues as the collagen core of the trabecular meshwork.^{1,7} Recently, Lewis *et al*⁸ demonstrated an extensive network of elastin fibers in the cornea that are concentrated in the pre-Descemet's layer and as an annulus at the limbus. The case reported herein adds to the body of evidence

illustrating the unique nature of DL, and the increasing recognition of its role in corneal pathology and lamellar surgery.

Conflict of interest

The authors declare no conflict of interest.

Acknowledgements

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