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Case report

Intraoperative optical coherence tomography-assisted retrocorneal fibrous membrane biopsy and excision

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ABSTRACT

Purpose: We report a case of retrocorneal fibrous membrane (RCFM) formation following penetrating keratoplasty (PK) and intraoperative optical coherence tomography (OCT)-guided excision of this membrane.

Observations: A 68-year-old woman with primary open angle glaucoma and corneal decompensation of the right eye secondary to tube shunt presented for 3-month follow-up of PK. On examination of the right eye, the patient was noted to have a glassy pupillary membrane with traction on the iris. Anterior segment OCT confirmed a membrane connecting the iris to host cornea. The patient underwent biopsy and excision of the membrane assisted by intraoperative OCT. Pathological examination was consistent with Descemet's membrane proliferation. We suspect that this membrane represents retained host's Descemet's membrane following corneal transplantation.

Conclusions: This case highlights the existence of RCFM formation in the context of retained host cornea following PK and the role of intraoperative OCT in management.

1. Introduction

Retrocorneal fibrous membrane (RCFM) formation is an infrequently reported process associated with corneal trauma[1] and vitreous touch syndrome.[2] This case report details a rare presentation of RCFM and highlights how new imaging and operative techniques can advance our understanding and management of this process.

2. Case

A 68-year-old female with history of severe primary open angle glaucoma bilaterally and a blind left eye from complications of glaucoma surgery and corneal transplantation, who is status post right eye penetrating keratoplasty (PK) for corneal decompensation secondary to injury, presented for 3-month follow-up of corneal transplantation. Six years prior to this visit, the patient had a phaco-trabeculectomy with Ex-Press of the right eye with Ologen implant that failed within one year. An Ahmed valve was placed with tube in the superotemporal anterior chamber. Her cornea initially developed a focal area of decompensation in the region of the tube, but, following a seizure, fall, and injury to the eye, the cornea precipitously decompensated with decline in vision from 20/25 to 20/200. After 3 months of failed conservative management, the patient underwent PK. One week following the corneal transplantation, the patient was noted to have a membrane in the anterior chamber. This was mistaken for a fibrinous membrane and treated aggressively with steroids with no success. Her intraocular pressures (IOP) began to increase from a normal range up to 25 mmHg.

At her 3-month follow-up visit, visual acuity was 20/60 OD with no improvement on pinhole and intraocular pressure (IOP) of 25 mm Hg despite Ahmed valve and compliance with medical management. On anterior segment exam, the patient was again noted to have a glassy pupillary membrane with apparent traction on the iris. (Fig. 1a, b, c, d). When she returned one week later, vision had declined to 20/200 OD, pinhole to 20/70, and IOP remained elevated at 26 mm Hg. Anterior segment optical coherence tomography (OCT) revealed a membrane that connected the iris to a lip of host cornea. Given the reduction of vision and loss of IOP control, the patient underwent placement of a second Ahmed valve, intraoperative OCT-guided biopsy of the clear membrane, and membrane lysis. (Video, Fig. 1e, f, g). Vitreous was not appreciated in the anterior chamber with intracameral triamcinolone. Pathological examination (Fig. 2) of the specimen was consistent with a Descemet's membrane. Vision improved over the following months and is now 20/60, pinhole to 20/25, and IOP is well controlled.

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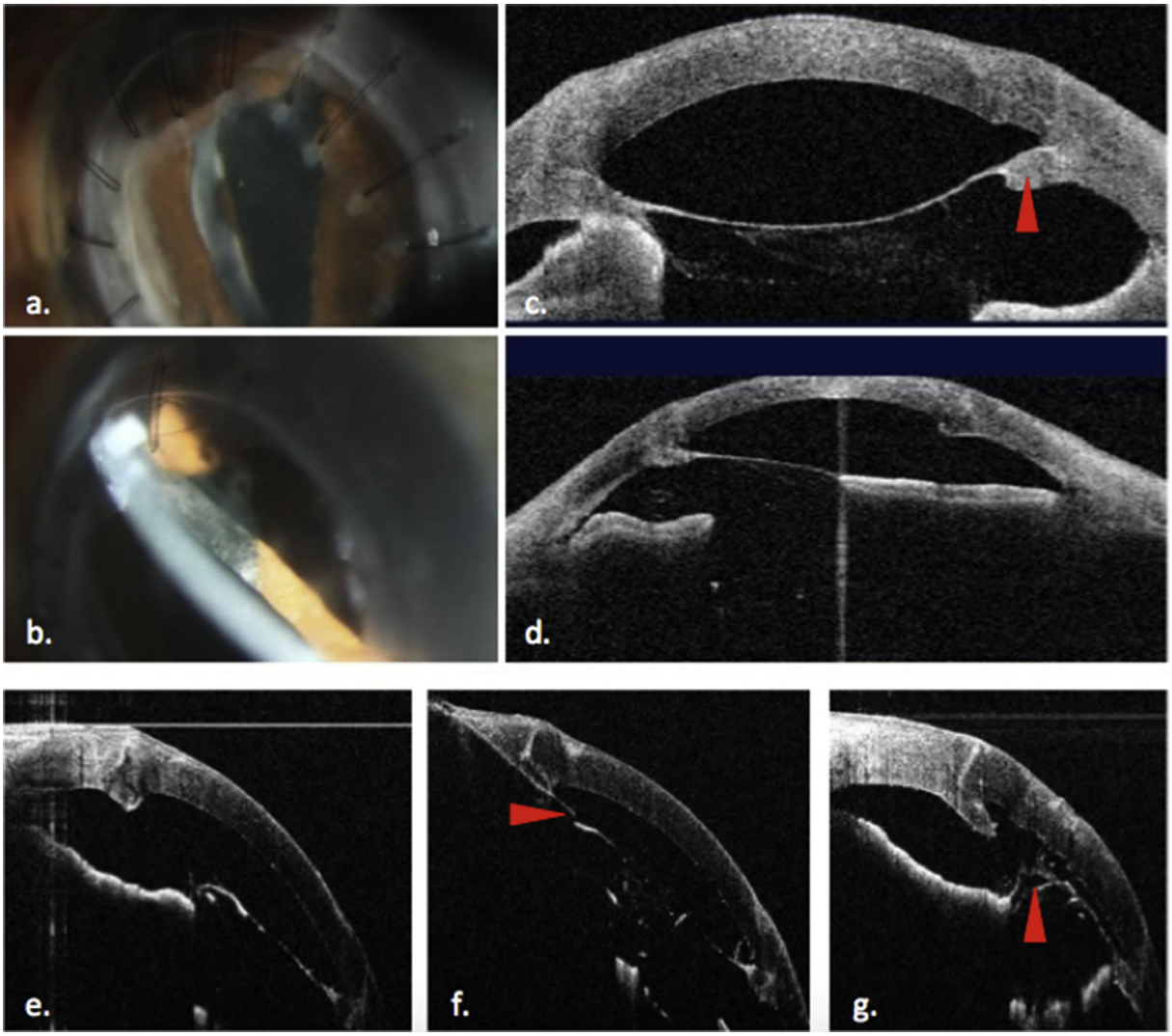

Fig. 1. Slit Lamp Photographs of Retrocorneal Fibrous Membrane and Corresponding Preoperative and Intraoperative OCT Images. a-b) Anterior segment photo of the clear membrane, seen with slit beam in (b), putting traction on the iris. c-d) Preoperative OCT images of the membrane extending from the lip of host cornea (arrow) at the graft-native cornea junction, adhering to the iris at the pupillary margin (d). e-g) Images from intraoperative OCT showing membrane extending from host cornea to the iris at the pupillary margin (e), paracentesis slit knife entering the anterior chamber (arrow) to initiate excision of the membrane from the nasal attachment at the iris (f), and use of intraocular forceps and scissors in performing excisional biopsy of the membrane (g).

Supplementary video related to this article can be found at http://dx.doi.org/10.1016/j.ajoc.2018.06.020

3. Discussion

Donaldson et al. described 18 cases of a glassy tubular structure extending from the posterior cornea at the site of a prior penetrating corneal wound. They hypothesized that these tubes resulted from endothelial proliferation over a strand of prolapsed vitreous with subsequent production of Descemet's membrane.[3] Pathological examination of a similar membrane in an enucleated eye of a patient with history of full thickness corneal laceration confirmed cells continuous with the endothelium overlying periodic acid-Schiff (PAS)-positive material consistent with Descemet's membrane.[4] Current understanding of corneal endothelial behavior implicates endothelial migration in wound healing and indicates limited ability of cells to proliferate,[5] suggesting that endothelial cells could transfer from the posterior cornea to a free surface in the anterior chamber following corneal insult.

RCFM is a known complication of trauma, surgery, or inflammation.[1] A retrospective histopathological examination of RCFMs compared with undisturbed corneal layers categorized these membranes based on cell of origin: fibrous, endothelial, epithelial, indeterminate, and mixed. The endothelium-derived RCMFs were characterized by an eosinophilic fibrillar matrix with PAS-positive deposits.[1] An earlier case series evaluated excised corneas from 8 eyes with aphakic bullous keratopathy from vitreous touch syndrome. RCFMs found in all 8 eyes were viewed under light microscopy and, similarly to the membranes discussed above, found to have a continuous endothelial layer, to be fibrillar in nature, and to stain with hematoxylin-eosin (H&E) and PAS. Authors concluded that RCFM resulted from fibrous metaplasia between endothelium and Descemet's membrane because of endothelial irritation by the adherent vitreous.[2]

Slit lamp examination of our patient showed a membrane similar in appearance to Donaldson's Descemet's membrane tube (Fig. 1a and b). Staining of our excised membrane was restricted to H&E and PAS because of limited tissue, but histology of the sample (Fig. 2) is consistent with the RCFMs previously described. While vitreous touch could explain the fibrous metaplasia and provide the free surface necessary for endothelial migration, this patient did not have evidence of anterior chamber vitreous. Her history of corneal transplantation could explain RCFM formation, but does not account for the migration of