



Case report

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



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ARTICLE INFO

Keywords:

Retrocorneal fibrous membrane
Intraoperative optical coherence tomography
Descemet's membrane
Penetrating keratoplasty

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 trauma¹ 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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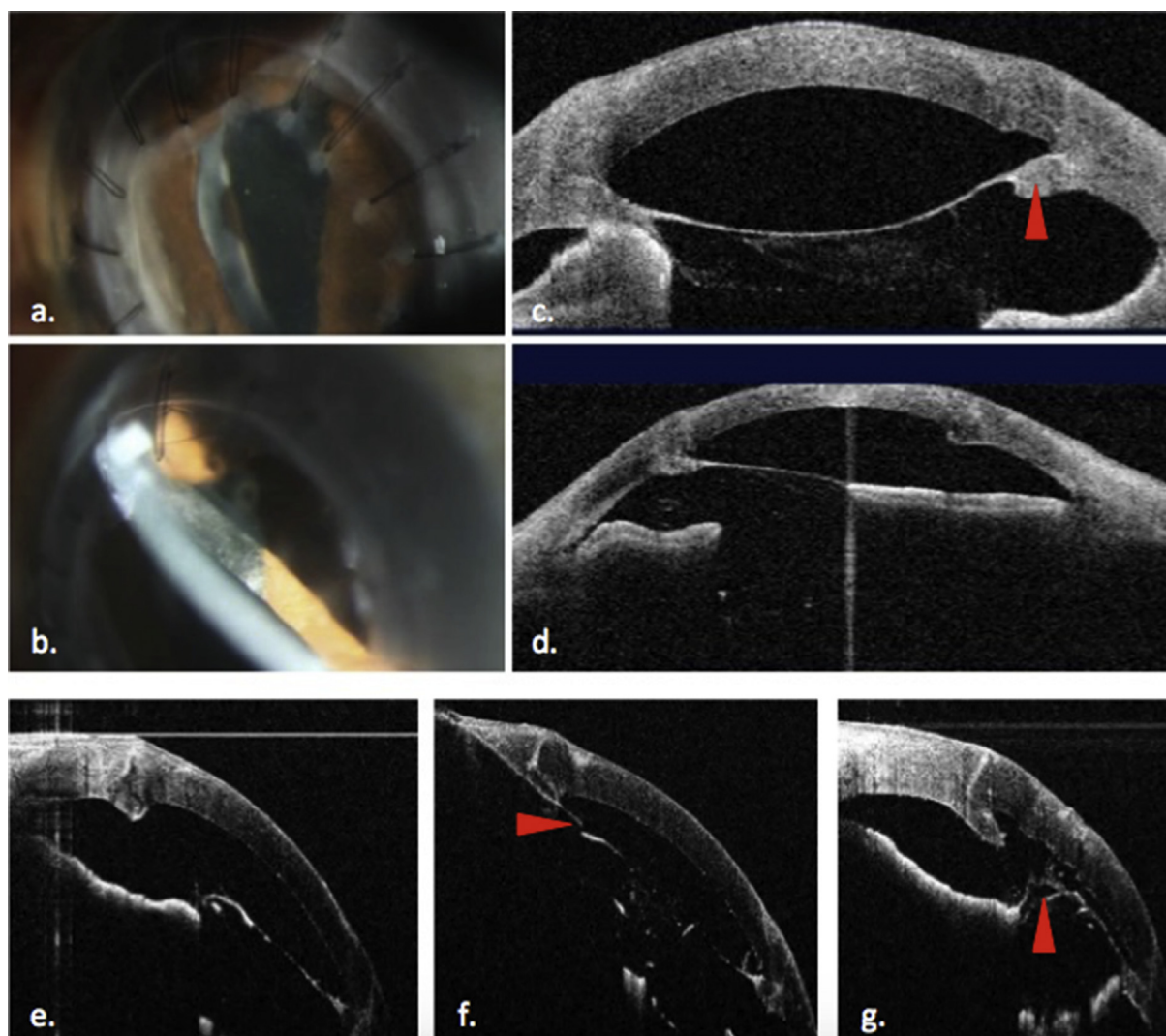


Fig. 1. Slit Lamp Photographs of Retrocorneal Fibrous Membrane and Corresponding Preoperative and Intraoperative OCT Images. a-b) Anterior segment photo of the clear membrane, seen with slit beam in (b), putting traction on the iris. c-d) Preoperative OCT images of the membrane extending from the lip 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 RCFMs 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

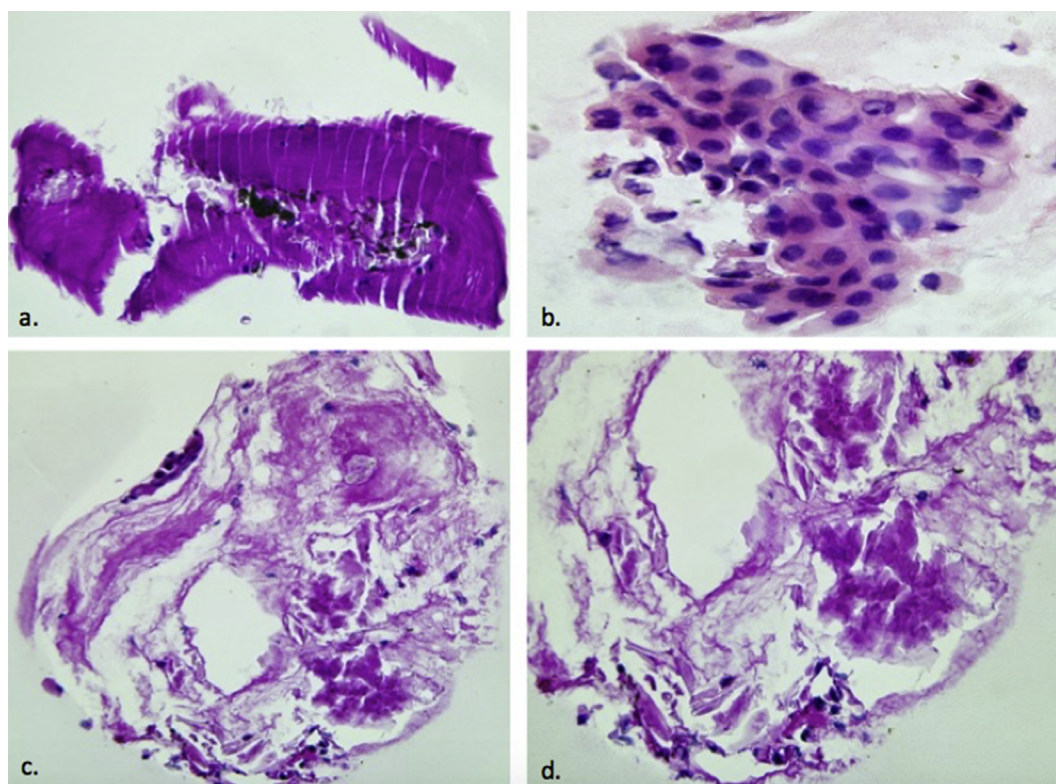


Fig. 2. Histopathology of Excised Retrocorneal Fibrous Membrane. a) PAS-stained section of biopsy specimen reveals PAS-positive amorphous material, consistent with Descemet's membrane. b) H&E-stained section of a small cluster of epithelial cells in the specimen, some of which contain brown pigment consistent with uveal pigment. c) PAS-positive fibrillar material containing aggregates of PAS-positive amorphous material was also in specimen. d) Higher magnification of (c), showing aggregates of PAS-positive amorphous material and a few scattered cells. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

endothelium into the anterior chamber or identify the scaffolding.

In a review of RCFM as a rare but documented complication of PK, Zemba et al. classified membranes into 5 types: epithelial downgrowth, fibrous ingrowth, inflammatory membranes, retained host's Descemet's membrane, Descemet's detachment of the graft. In the case of retained host's Descemet's membrane, severe corneal edema increases the risk of incomplete trephination and removal of the cornea at the stroma, just anterior to Descemet's membrane.⁶ PAS-staining of our excised membrane confirmed presence of Descemet's membrane (Figure 2a, c), and OCT of the intact membrane demonstrates traction on the lip of host cornea (Fig. 1c and d). Because the membrane was apparent almost immediately following PK, at 1-week follow-up, and because no scaffold for endothelial migration into the anterior chamber could be identified, we conclude that this RCFM is retained host's cornea.

Because the patient's vision was beginning to deteriorate, and IOP was no longer well-controlled, the decision was made to remove the RCFM. Recommendations for removal include either surgical excision with 23 Ga or 25 Ga retinal forceps and scissors or Nd:YAG laser to open the membrane and restore normal aqueous flow and clear the central visual axis.⁶ In a similar case of corneal decompensation following placement of two shunt devices complicated by fibrous ingrowth with horizontal Descemet's membrane traction, Shazly et al. utilized real-time intraoperative OCT to perform Descemet stripping automated endothelial keratoplasty (DSAEK) and removal of fibrous membrane, providing distinct dissection planes of the membrane in the setting of corneal opacification.⁷ In our case of fibrous membrane extending from posterior cornea to iris, the poor view of the peripheral anterior chamber secondary to recent corneal transplantation was aided by the use of intraoperative OCT, especially in the manipulation and acquisition of material for biopsy.

4. Conclusions

Awareness of the existence of RCFM in the context of retained host's Descemet's membrane and utilization of intraoperative OCT for biopsy and tissue excision present opportunity to further characterize this uncommon process and address options for management.

Acknowledgements and disclosures

Source of funding

Department of Ophthalmology, University of North Carolina at Chapel Hill, is a recipient of an unrestricted grant from Research to Prevent Blindness.

Conflicts of interest

None to declare

Authorship

All authors attest that they meet the current ICMJE criteria for authorship.

Patient consent

The patient consented to the publication of this case orally.

Acknowledgements

Bioptigen, Inc. for lending an intraoperative optical coherence

tomography unit for this case. Debra Cantrell and Houston Sharpe for imaging and assistance.

Appendix A. Supplementary data

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

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