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Case report

# Epithelial downgrowth after femtosecond laser-assisted cataract surgery

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ABSTRACT

*Purpose:* To present the case of a 72-year-old female with epithelial downgrowth after femtosecond laser-assisted cataract surgery.

*Observations:* The patient previously underwent YAG vitreolysis after uncomplicated femtosecond laser-assisted cataract surgery and presented 1 year later with epithelial downgrowth causing complete pupillary block and severe angle closure glaucoma. Subsequent management with nd:YAG peripheral iridotomies failed rapidly leading to a confusing presentation with a flat anterior chamber and high intraocular pressure ultimately requiring surgical management.

*Conclusions:* We describe the occurrence of epithelial downgrowth after femtosecond laser-assisted cataract surgery and illustrate the utility of ultrasound biomicroscopy to differentiate between severe pupillary block and malignant glaucoma.

## 1. Introduction

Epithelial downgrowth is a rare, but serious, vision-threatening complication after ocular surgery, characterized by a translucent sheet of epithelial cells that spreads across tissues of the anterior chamber.[1,2] Historically, the incidence of this complication ranges from 0.08 to 0.12% for extracapsular or intracapsular cataract surgery[3] and has been reported with an incidence of 0.27% after penetrating keratoplasty.[4] Although no definitive treatment strategy is agreed upon, management is focused on surgical removal of involved tissues.[5] We report a case of epithelial downgrowth following small-incision femtosecond laser-assisted cataract surgery in which the patient presented with very high intraocular pressure and an almost flat anterior chamber.

## 2. Case report

This study was a retrospective case report exempt from Institutional Review Board evaluation by the University of California, Davis Office of Human Research Protection, and it was compliant with the Healthcare Insurance Portability and Accountability Act.

A 72 year-old Caucasian woman was referred to a specialty cornea clinic for an “unusual pupillary membrane of unclear etiology, right eye”. Her past ocular history included femtosecond laser-assisted cataract surgery in both eyes 15 months prior to presentation. Her post-operative course for the left eye was unremarkable, but in the right eye, she underwent YAG vitreolysis at post-operative month 2 for a strand of vitreous to the temporal corneal wound causing mild iris peaking. Her vision was excellent in both eyes for several months. However, 13 months after the surgery, her vision began to decline and, at presentation, the best-corrected visual acuity was 20/60, right eye and 20/15, left eye, with a manifest refraction of −0.75 + 1.50 @ 74°, right eye and-3.00 + 0.50 @ 67°, left eye.

The right pupil was irregular and non-reactive, but the left pupil was round and reactive. There was no relative afferent pupillary defect in either eye, and the intraocular pressures (IOP) were 10 mmHg right eye, 7 mmHg left eye. The anterior segment examination of the right eye revealed a pigmented membrane that almost completely occluded the pupil with only a pinhole opening at the inferior pupillary border (Fig. 1). This pigmented membrane extended ~0.5mm onto the anterior surface of the iris infero-temporally. Additionally, bands of non-pigmented vascularized fibrotic tissue extended from the anterior surface of the iris into the angle infero-temporally. Gonioscopy revealed 2-3 clock hours of broad, peripheral anterior synechiae with a neovascular membrane in the temporal quadrant of the right eye aligned with the cataract incision site (Fig. 2A) and patchy peripheral anterior synechiae nasally. Anterior segment optical coherence tomography revealed a membranous sheet-like growth on the iris extending into the angle (Fig. 2B). A view of the fundus was not possible in the right eye; the left eye had a moderately enlarged cup-to-disc ratio of 0.8 with a normal macula, vessels, and periphery.

Suspicion for epithelial downgrowth was communicated to the referring physician, and recommendation was made for diagnostic low-

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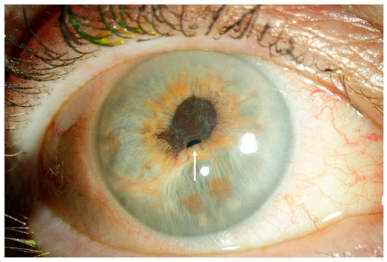

**Fig. 1.** Slit lamp photo of the right eye depicting near complete pupillary occlusion with a darkly pigmented membrane. White arrow points to pinhole opening.

power argon laser to the affected iris to check for confirmatory blanching. If the diagnosis of epithelial downgrowth were confirmed, further recommendations included sectoral iridectomy versus pupilloplasty with care to avoid spreading of epithelial cells.

Two weeks later, the patient developed headaches, nausea with vomiting, eye pain and dizziness and presented to the referring comprehensive ophthalmologist in acute angle closure with IOP in the right eye of 70 mmHg. Shallowing of the anterior chamber was noted with exuberant neovascularization of the previously described membrane, which was thought to be epithelial downgrowth.

The patient underwent two laser peripheral iridotomies (LPI) superiorly (11 o'clock and 1 o'clock) by the referring ophthalmologist and again by a glaucoma specialist to enlarge one of the 2 iridotomies. Maximal medical glaucoma therapy was initiated with temporary relief but rapid closure of the LPI's ensued. The patient then presented to the UC Davis Eye center with IOP of 58 mmHg, right eye, and a severely shallowed anterior chamber (Fig. 3) in which no central depth to the chamber could be appreciated. Suspicion for malignant glaucoma was high. Ultrasound biomicroscopy (UBM, Fig. 4B) revealed a confusing image of a deep anterior chamber with an intraocular lens in good position. However, comparison to a prior UBM (Fig. 4A), suggested that the iris was flattened against the cornea secondary to severe pupillary block. The patient was taken to the operating room for Ahmed glaucoma drainage device implantation with drainage of aqueous humor from the posterior chamber, iridectomy, and removal of the pupillary and iris membranes. Multiple intraoperative specimens were sent including aqueous humor for cytology, iris tissue, and pupillary membranes. These specimens confirmed the diagnosis of epithelial downgrowth with epithelial tissue lining both iris specimens on hematoxylin & eosin staining (Fig. 5A) and positive AE1/AE3 (anti-cytokeratin monoclonal antibodies) staining of the pupillary membrane specimen

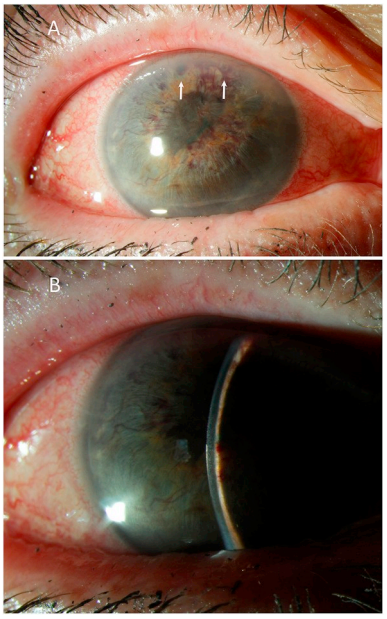


**Fig. 3.** A) Severe neovascularization with complete pupillary block, closure of 2 prior peripheral iridotomies (white arrows) and a B) flat anterior chamber.

(Fig. 5B). At post-operative week three, her visual acuity was 20/150 and her IOP was controlled at 14 mmHg while on three topical glaucoma medications. The patient subsequently underwent Descemet's stripping automated endothelial keratoplasty (DSAEK) and then a penetrating keratoplasty (PKP) due to failure of the DSAEK graft. 5-fluorouracil was not used since further growth of a membrane was not detected at this time.

The patient subsequently re-presented with a shallow chamber, high IOP, and UBM imaging which suggested a malignant glaucoma process. The patient underwent 25 gauge pars plana vitrectomy, pupilloplasty, Ahmed glaucoma drainage device conversion to pars plana location, and repeat penetrating keratoplasty. Six months later, she developed a *Streptococcus viridans* corneal ulcer, which stabilized after topical antibiotic treatment with moxifloxacin and polymyxin. At the last visit, her visual acuity was counting-fingers at 3 feet with an intraocular pressure of 10 mmHg. She remains on the following topical medications: two glaucoma drops, antibiotic, corticosteroid, nonsteroidal anti-inflammatory drugs, and a cycloplegic.

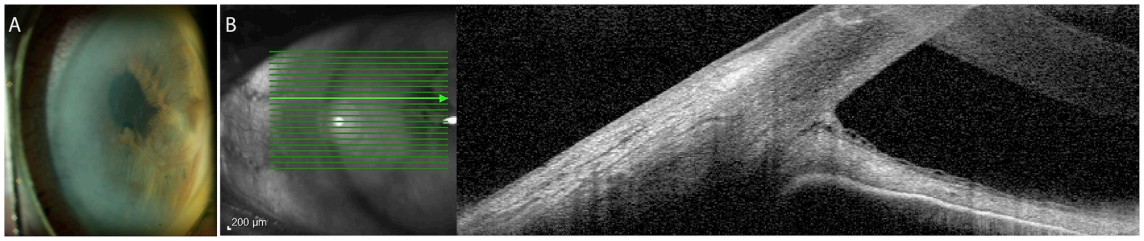


**Fig. 2.** A) Broad peripheral anterior synechiae and neovascular membrane across the temporal angle of the right eye B) Anterior segment optical coherence tomography imaging showing a membranous sheet-like growth on the iris and extending into the angle.

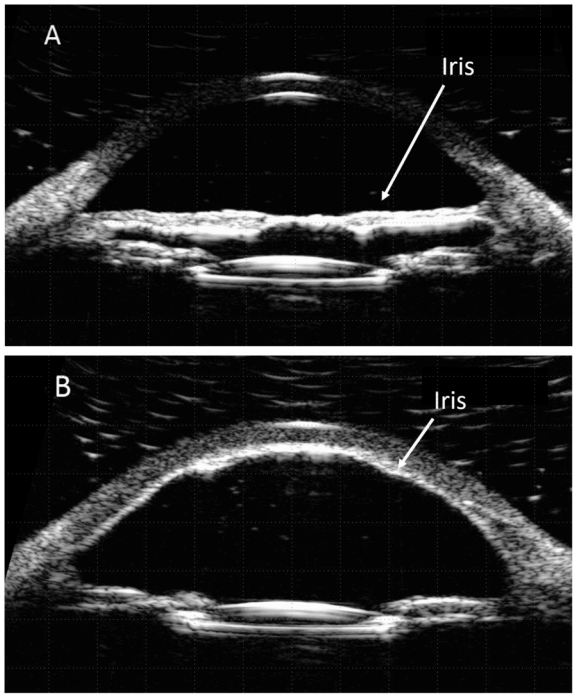


**Fig. 4.** A) Ultrasound biomicroscopic (UBM) appearance of the anterior and posterior chamber upon first presentation. B) Subsequent UBM with obliteration of anterior chamber with iris pressed directly up against the cornea and a large posterior chamber with stable intraocular lens.

## 3. Discussion

Although epithelial downgrowth is a well-known complication of both intracapsular and extracapsular cataract surgery,[3] it is far more rare in modern clear corneal phacoemulsification,[5] and as far as we know, it has not been reported after femtosecond laser-assisted cataract surgery. Our case raises the possibility that vitreous to the wound served as a scaffold for epithelial cells and that the YAG vitreolysis may have triggered this atypical presentation of sudden and diffuse dissemination of epithelial tissue in the anterior chamber. The photodisruption mechanism of YAG laser may disperse epithelial cells and exacerbate the morbidity of this already severe complication. It is not known why the vitreous was present in the first place because the cataract surgery operative note indicated a smooth surgery with no complications. Another observation in this case is that YAG peripheral iridotomy is only a temporizing solution in the management of pupillary block from epithelial downgrowth, since even widely patent iridotomies will rapidly close. Finally, an important aspect of this case is the utility of UBM in differentiating pupillary block from malignant glaucoma in the setting of a potentially confusing clinical presentation.

## 4. Conclusions

Epithelial downgrowth is a rare, but a potentially devastating complication after femtosecond laser-assisted cataract surgery. In addition, UBM imaging is helpful in distinguishing severe pupillary block from malignant glaucoma.

## Patient consent

Consent to publish the case report was not obtained. This report does not contain any personal information that could lead to the identification of the patient.

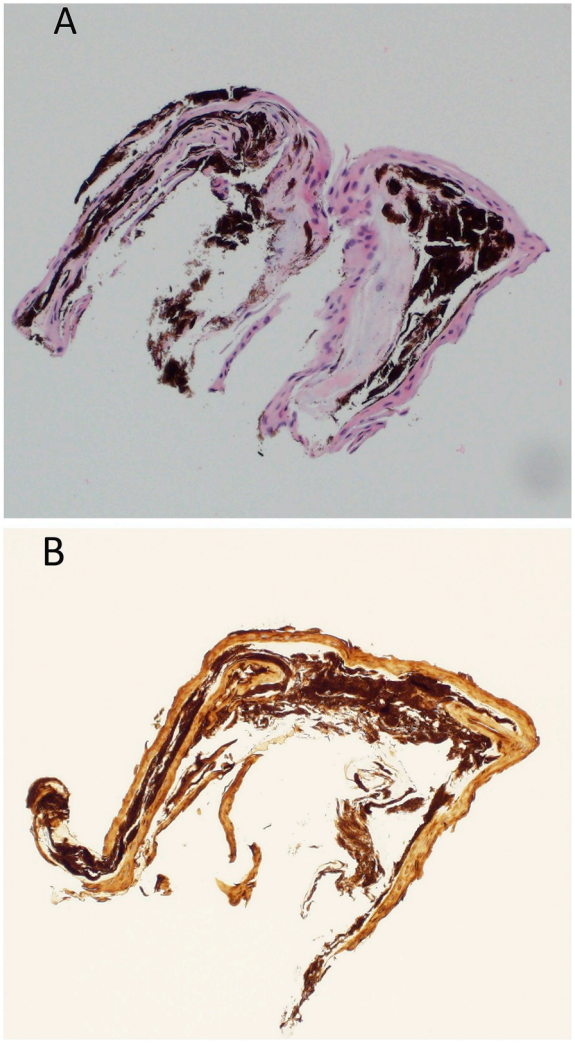


**Fig. 5.** A) Hematoxylin & Eosin staining of epithelial tissue lining iris tissue and B) positive immunohistochemical staining with AE1-AE3 (anti-cytokeratin monoclonal antibodies).

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## Conflicts of interest

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## Authorship

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

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ajoc.2019.100507.

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