

Plateau Iris and Acute ACG Following Retinal Detachment Repair

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CASE PRESENTATION

A 53-year-old white female presented late in 2005 with a complaint of seeing a dark shadow with her right eye for 2 days. Her medical history was significant for bilateral ocular hypertension that had been treated for several years with daily travoprost 0.004% (Travatan; Alcon Laboratories, Inc., Fort Worth, TX), open angles on gonioscopy, high myopia, and uncomplicated phacoemulsification with the placement of posterior chamber IOLs in both eyes in 2004.

Upon examination, the patient's visual acuity was 20/20 OU, and her IOP measured 21 mm Hg OU. Her pseudophakic lenses were centered in the posterior chambers. We noted an inferior rhegmatogenous retinal detachment in her right eye. Her asymptomatic left eye had some inferior tears, which were treated with laser retinopexy and cryopexy on the day of presentation.

One day later, the patient underwent vitrectomy, retinotomy, endolaser treatment, cryopexy, and 12% perfluoropropane (C_3F_8) fluid-gas exchange with her head in a left-sided position. On the first postoperative day, she had pain, hand motion acuity, and an IOP of 60 mm Hg OD. The IOP in her left eye was 21 mm Hg.

After treatment with oral acetazolamide 500 mg (Diamox; Wyeth Pharmaceuticals, Philadelphia, PA), timolol maleate 0.5% (Falcon Pharmaceuticals, Ltd., Fort Worth, TX), and apraclonidine 0.5% (Iopidine; Alcon Laboratories, Inc.), the IOP in the patient's right eye dropped to 39 mm Hg. We instructed her to take acetazolamide 250 mg q.i.d. and instill atropine 1.0% (Falcon Pharmaceuticals, Ltd.) b.i.d., brimonidine 0.15% (Alpha-gan P; Allergan, Inc., Irvine, CA) t.i.d., timolol 0.5% b.i.d., and tobramycin 0.3%/dexamethasone 0.1% ophthalmic suspension (Tobradex; Alcon Laboratories, Inc.) q.i.d. in her right eye postoperatively.

The patient returned 5 days after surgery with a complaint of nausea and severe pain in her right eye.

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Her visual acuity was hand motion, and her IOP was 54 mm Hg on medical therapy. The anterior segment of the patient's right eye showed moderate conjunctival injection, diffuse microcystic and stromal corneal edema, a deep central anterior chamber with mild inflammation, and optic capture of the IOL at the pupillary margin inferiorly. Gonioscopy through the edematous cornea appeared to show a plateau iris with peripheral anterior synechiae over the trabecular meshwork in the inferior and temporal quadrants. Her left angle was open to the ciliary body band for 360°. The cup-to-disc ratios were 0.6 OD and 0.4 OS.

HOW WOULD YOU PROCEED?

1. Would you recommend a tap of the intravitreal gas considering the presence of optic capture?
2. Add a prostaglandin agent to nearly maximally tolerated medical therapy?
3. Perform laser iridotomy?
4. Perform laser gonioplasty?
5. Perform trabeculectomy or place a glaucoma drainage device?
6. Consider further diagnostics with ultrasound biomicroscopy (UBM) to evaluate the angle given the asymmetry in the drainage angles between her two eyes?

SURGICAL COURSE

The left-sided head position for the tamponading gas effect explains the peripheral anterior synechiae in the

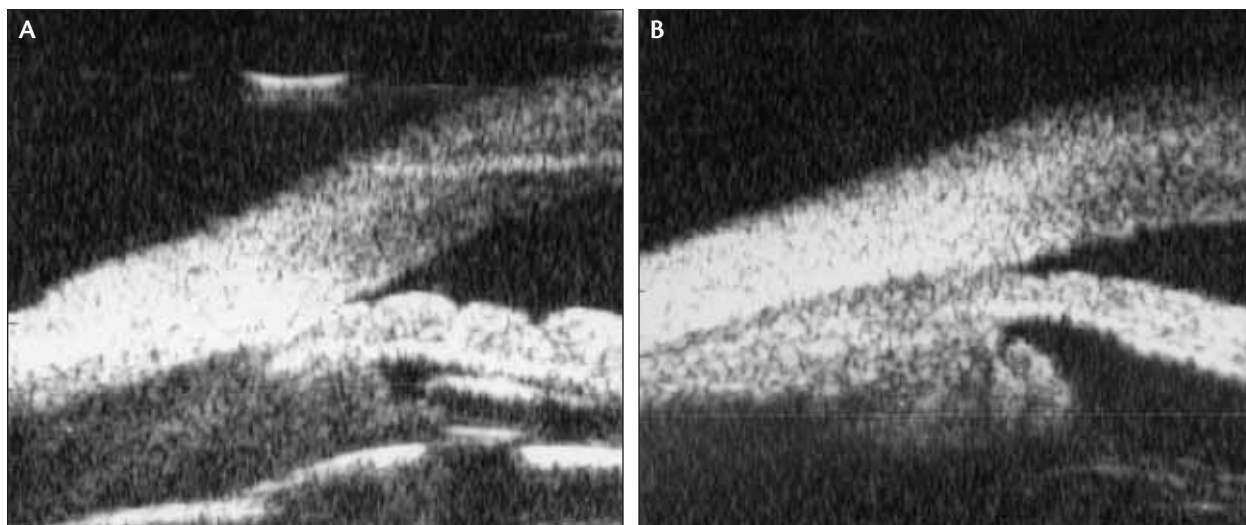


Figure 1. UBM of the patient's right eye demonstrated the highly reflective gas bubble interface inferiorly, which created a mass effect of the capsule on the posterior iris of the ciliary processes onto the iris root (A). Her left eye had prominent ciliary processes at the iris root (B).

inferotemporal angle, the inferior optic capture, and the symptomatic plateau iris mechanism of angle-closure glaucoma (ACG). Given the peripheral anterior synechiae and the lack of pupillary block on biomicroscopy, laser peripheral iridotomy and goniotomy are not indicated for this type of glaucoma. We therefore performed a vitreous tap of the C_3F_8 gas bubble, which lowered the patient's IOP to 18 mm Hg OD.

The next day, the optic capture was still present, and her IOP measured 23 mm Hg. She was instructed to discontinue combination tobramycin/dexamethasone, to resume travoprost 0.004%, and to add fluoromethalone 0.1% ophthalmic suspension (FML; Allergan, Inc.) b.i.d. to her existing medical regimen.

Three weeks postoperatively, the patient returned complaining of pain in her right eye, for which we prescribed acetaminophen with codeine (Tylenol No. 3; Ortho-McNeil Pharmaceutical, Inc., Raritan, NJ). Her visual acuity in this eye was count fingers, and the IOP was 42 mm Hg. Examination of the anterior segment of the same eye showed microcystic corneal edema and near resolution of the optic capture. Approximately 1 hour after giving the patient 500 mg of oral acetazolamide and instilling topical timolol 0.5% and apraclonidine 1% in the office, the IOP in her right eye decreased to 29 mm Hg.

Given the wide range of IOP fluctuation in the patient's right eye, we performed UBM. The images of her right eye showed plateau iris configuration (Figure 1A). Her left eye exhibited prominent ciliary processes adjacent to the iris root (Figure 1B).

Based on the results of UBM, we performed an uncomplicated trabeculectomy with adjunctive 5-fluorouracil to manage IOP fluctuation. During the post-trabeculectomy course, the patient's IOP remained between 27 and 29 mm Hg. She did not tolerate ocular compression or laser-mediated suture lysis. Repeat UBM of her right eye confirmed the persistent presence of plateau iris (Figure 2). The trabeculectomy failed, and we placed an Ahmed Glaucoma Valve (model FP7; New



Figure 2. Repeat UBM of the right eye after trabeculectomy showed the highly reflective gas bubble causing a mass effect of the ciliary body with the posterior capsule, the IOL's haptic, and the ciliary processes pushing against the posterior iris.

World Medical, Inc., Rancho Cucamonga, CA) with a scleral patch graft in her right eye. The procedure was uncomplicated.

OUTCOME

We re-evaluated the patient 6 months after her initial presentation for retinal detachment. She was using timolol b.i.d., her UCVA was 20/25 OD, and her IOP was 16 mm Hg OD. An examination of the anterior segment of the patient's right eye showed a well-positioned tube in the superotemporal anterior chamber and a centered posterior chamber IOL without optic capture. The cup-to-disc ratios were 0.7 OD and 0.4 OS. The retina of her right eye was flat and exhibited peripheral scars from the previous retinal surgery.

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plateau iris may have been a mechanism
of expansile gas-induced glaucoma.

DISCUSSION

This case is interesting for the findings of peripheral anterior synechiae formed after vitrectomy on gonioscopy and of plateau iris on both gonioscopy and UBM in an eye that was previously documented to have an open angle. One might argue that a subtle plateau iris configuration was missed before the surgical repair of her retinal detachment.

Based on a careful anatomic assessment by gonioscopy¹ and UBM,² the prominent ciliary processes at the iris root may have predisposed the patient to develop symptomatic plateau iris and secondary ACG in the presence of intravitreal gas. This case suggests a possible mechanism of intraocular gas-associated plateau iris and secondary ACG.

The use of intraocular expansile gases such as sulfur hexafluoride (SF₆) and C₃F₈ with vitrectomy is likely to increase, because the surgical outcomes appear to be similar between scleral buckle and vitrectomy in the management of retinal detachment.³⁻⁵ Elevated IOP after vitreoretinal surgery is common.^{6,7} Expansile gases can cause an anterior rotation of the lens-iris diaphragm, even if the patient is positioned face down. Secondary ACG associated with expansile gases may occur with or without pupillary block.⁸

Typically, the highest IOP occurs while the gas is at maximum expansion. Undiluted SF₆ expands to twice its original volume in 24 to 48 hours, and undiluted C₃F₈ expands to four times its original volume in

48 to 72 hours.⁹ These gases expand more slowly in diluted forms. In the posterior segment, SF₆ remains for 10 to 14 days, whereas C₃F₈ can last for 55 to 65 days. According to the literature, the incidence of secondary IOP elevation ranges from 6.1% to 67% after SF₆ injection¹⁰ and from 18% to 59% for C₃F₈ injection.¹¹

Most incidents of elevated IOP after fluid-gas exchange are transient. For the patient described herein, however, plateau iris may have been a mechanism of expansile gas-induced glaucoma.

It is possible that previously described cases of "refractory" glaucoma after vitrectomy were associated with plateau iris. A prospective comparison of imaging and gonioscopic findings might yield informative mechanisms for this uncommon form of glaucoma after vitreous surgery. □

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