

Exposed Glaucoma Drainage Device

BY LEON W. HERNDON, MD

CASE PRESENTATION

A 50-year-old black female was referred to my office in 2000 for a glaucoma evaluation due to concerns about progressive cupping of her optic nerves. Her medical history was significant for severe steroid-dependent pulmonary sarcoidosis and bilateral iritis since 1992. In 1993, her IOP had risen above 40 mm Hg in both eyes, and she began using brimonidine and brinzolamide OU b.i.d. and latanoprost OU q.h.s. She was also taking 20 mg of prednisone orally every other day to manage her pulmonary condition. When she first presented to my office, she had no history of previous incisional surgery for glaucoma.

Upon examination, the patient's visual acuity was 20/25 OD and 20/20 OS, and her IOPs measured 22 mm Hg OD and 30 mm Hg OS. Her central corneal thickness was 533 μ m OU. Her cup-to-disc ratios measured 0.80 with inferotemporal thinning in her right eye and 0.85 with inferotemporal sloping in her left eye. A SITA-Standard 24-2 Humphrey visual field test (Carl Zeiss Meditec, Inc., Dublin, CA) revealed partial superior arcuate defects in both eyes.

The patient underwent trabeculectomy with mitomycin C (0.4 mg/mL for 2 minutes) on her left eye in October 2000. Four days postoperatively, she developed a significant bleb leak that was exacerbated by episodes of violent coughing. The bleb leak resolved spontaneously, and, by 3 months postoperatively, the IOP in her left eye was 11 mm Hg with no medications. The IOP in her right eye was 30 mm Hg on brinzolamide and brimonidine b.i.d. and latanoprost q.h.s. She underwent trabeculectomy with mitomycin C (0.4 mg/mL for 2 minutes) in this eye in June 2001. By 1 month postoperatively, she had an IOP of 12 mm Hg OD on a tapering dose of prednisolone. Her IOP was 14 mm Hg OS on no medications. The blebs in both eyes were healthy and avascular.

When the patient returned to the clinic in October 2002, the IOP in her right eye was 7 mm Hg. The IOP in her left eye, however, measured 36 mm Hg despite her use of brinzolamide and brimonidine b.i.d. and travo-



Figure 1. Sixteen months after its implantation, the superonasal drainage tube was completely exposed. The patient also had thinning of the scleral patch over the superotemporal tube.

prost q.h.s. per the orders of her referring ophthalmologist. Her iritis had also flared since 2001, and she was instilling prednisolone in both eyes b.i.d.

I placed an Ahmed Glaucoma Valve (model S-2; New World Medical, Inc., Rancho Cucamonga, CA) in the superotemporal quadrant of the patient's left eye in November 2002. The tube was routed to 12 o'clock to avoid the existing trabeculectomy bleb and was covered with donor sclera. Four months postoperatively, the patient's IOPs were 10 mm Hg OD and 38 mm Hg OS. She was using brinzolamide and brimonidine b.i.d. and travoprost q.h.s. in her left eye and prednisolone in both eyes t.i.d. In April 2003, I placed a second Ahmed drainage device (model FP7) in the superonasal quadrant of her left eye and covered the tube with donor sclera.

In August 2004, the patient's IOPs were 8 mm Hg OD with no medications and 26 mm Hg OS with brimonidine b.i.d. I noted exposure of the superonasal tube

that I had placed 16 months before (Figure 1) and progression of a cataract detected during her initial evaluation.

HOW WOULD YOU PROCEED?

1. Would you remove the superonasal drainage device?
2. Would you cut the superonasal tube and leave the plate?
3. Would you cover the exposed drainage tube with sclera or pericardium?

SURGICAL COURSE

In September 2004, the patient underwent combined phacoemulsification, IOL implantation, and repair of the exposed superonasal tube with a pericardial patch allograft (Tutoplast; IOP, Inc., Costa Mesa, CA) in her left eye. One month postoperatively, her IOPs were 10 mm Hg OD on no medication and 18 mm Hg OS on brimonidine b.i.d. and latanoprost q.h.s. She was also instilling prednisolone in her left eye q.i.d. Both tubes were well covered at that visit, and the patient's BCVA was 20/30 OD and 20/20 OS.

Due to a lack of adequate superior conjunctiva, I used an autograft from the inferior bulbar conjunctiva to cover the pericardial patch graft.

In December 2004, 23 months after its placement, the graft over the superotemporal tube had completely eroded, and I patched the exposed tube with Tutoplast pericardium. Due to a lack of adequate superior conjunctiva, I used an autograft from the inferior bulbar conjunctiva to cover the pericardial patch graft. Two weeks postoperatively, both tubes in the patient's left eye were well covered, and the conjunctival autograft was intact (Figure 2). Two months postoperatively, the tubes remained well covered (Figure 3).

In March 2006, 18 months after its initial repair, the superonasal tube was exposed again. The patient's IOPs were 7 mm Hg OD on diclofenac (Voltaren Ophthalmic; Novartis Pharmaceuticals Corporation, East Hanover, NJ) q.i.d. and 26 mm Hg OS on brinzolamide and brimonidine b.i.d., travoprost q.h.s., and diclofenac q.i.d.. Her BCVA was 20/40 OD and 20/25 OS.

In April 2006, I decided to remove the superonasal device and treat 360° of the left eye's ciliary processes



Figure 2. Both tubes in the patient's left eye were well covered 2 weeks after the placement of a pericardial patch and a conjunctival autograft over the exposed superotemporal tube in December 2004.

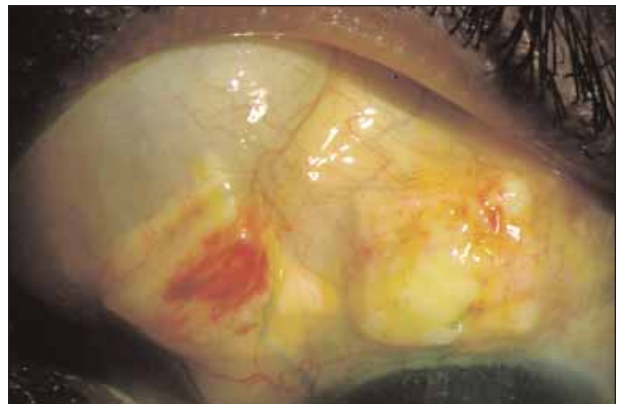


Figure 3. The patch over the superotemporal tube was intact 2 months after its placement in December 2004. The superonasal tube remained well covered at this time.

with endocyclophotocoagulation (ECP). At the completion of ECP, I noted the displacement of one of the IOL's haptics, and vitreous presented to the corneal wound in her left eye. I repositioned the haptic with a Sinsky hook and cleared the vitreous from the anterior chamber with a dry Weck-Cel sponge (Medtronic ENT, Jacksonville, FL).

OUTCOME

In February 2007, the patient's BCVA was 20/40 OD and 20/30 OS. Her IOP measured 8 mm Hg OD on no medication and 34 mm Hg OS on brimonidine b.i.d., travoprost q.h.s., and Nevanac (nepafenac ophthalmic suspension 0.1%; Alcon Laboratories, Inc., Fort Worth, TX) q.i.d. The patch graft over the superotemporal tube showed thinning, but the tube was not exposed (Figure 4).



Figure 4. In February 2007, the superotemporal tube in the patient's left eye was covered by a thin layer of conjunctiva.

An examination of the anterior chambers showed progression of the cataract in the patient's right eye and a centered IOL in her left eye with anterior capsular contraction. I also noted a strand of vitreous at the site of the temporal corneal wound. SITA-Standard 24-2 perimetry showed stable visual fields in the patient's right eye and worsening of the superior arcuate defect in her left eye.

DISCUSSION

Glaucoma drainage devices are useful for the management of complicated glaucoma. They may be placed in the anterior chamber under a partial-thickness scleral flap. Dissecting this flap can be tedious, however, and fraught with complications.¹ In 1987, Freedman described the successful use of glycerin-preserved donor sclera to cover the drainage tube.² Other materials used to create free patch grafts include dura mater, corneal tissue, donor pericardium, fascia lata, and autologous sclera.³⁻⁵

The use of any donor patch material carries the risk of an exposed tube due to the immune-mediated melting of graft materials. The tube's exposure can cause ocular discomfort, inflammation, and infection, and it may necessitate the device's removal. Smith et al⁶ followed 64 glaucomatous eyes for at least 24 months after they received drainage tubes. The devices were covered by donor sclera, dura, or pericardium and evaluated for signs of eroding tubes and thinning of the graft. The researchers found that no material was more prone to melting than another.

The patient described herein experienced exposure of both drainage tubes in her left eye after reinforcement with donor sclera. Thinning of the patch graft over the superotemporal tube was noted 6 months after one of the device's implantation, but it was not completely

exposed until 23 months after its placement.

The superonasal tube was exposed twice, 16 months after its placement and 18 months after its repair in September 2004. I removed the device from the patient's left eye in April 2006 after the second exposure. Although the pericardial patch over the superotemporal tube showed evidence of thinning in February 2007, it is still intact 30 months after it was revised in September 2004.

The repeated failure of the patch graft over the superonasal tube shows the challenge of finding a suitable material for revising scleral flaps after a tube's exposure. In this case, I successfully revised the superotemporal tube with a conjunctival autograft. Amniotic membrane has also been used for this purpose.⁷

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Despite numerous surgical procedures, the IOP in the patient's left eye remains too high. Repeat ECP from an anterior approach would not be advisable because the IOL was displaced during the first intervention. ECP could be repeated from a pars plana approach with vitrectomy. Additional treatment options that may help the patient achieve a lower IOP in her left eye include the placement of an inferior glaucoma drainage device such as the Baerveldt 250 mm² (Advanced Medical Optics, Inc., Santa Ana, CA) or transscleral cyclophotocoagulation. □

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