

Can Surgeons Perform a Better Trabeculectomy?

The procedure is still viable.

BY RICHARD A. LEHRER, MD

Although surgeons now have more glaucoma procedures available to them than at any time in history, Cairns' trabeculectomy¹ remains the gold standard in glaucoma filters. With the introduction of antimetabolites such as 5-fluorouracil and mitomycin C (MMC), the long-term success rate of the procedure has improved from 26% to 90% plus.^{2,3} Unfortunately, along with greater success in terms of IOP control have come increased complications^{4,5} such as bleb leaks, shallow chambers, hypotony maculopathy, and choroidal effusions.

It is possible to achieve excellent IOP control while minimizing complications through meticulous attention to each step of surgery and recent modifications⁶ in the use of antimetabolites. Many of the techniques described herein are the result of my 20 years' experience with filtering surgery, including lessons I learned from mentors and others (Figures 1 and 2).

THE SELECTION OF PATIENTS

A number of procedures can now lower IOP to a range of 13 to 20 mm Hg with fewer complications than in the past in eyes with primary open-angle glaucoma. For this reason, I reserve trabeculectomy with MMC for patients with primary open-angle glaucoma for whom I am targeting an IOP of 12 mm Hg or less. I also perform the procedure in cases of uveitic glaucoma and some cases of angle-closure glaucoma for which a low IOP is required or when extracting the crystalline lens if endocyclophotocoagulation or goniosynechialysis may not adequately control the pressure. In uveitics, I use MMC cautiously, because I find that these patients may be more prone to hypotony.



Figure 1. A thin, avascular, leaky bleb with the typical "ring of steel" appearance,⁶ the result of a trabeculectomy with MMC performed in 2008. This is the type of bleb to be avoided, because it carries a high risk of infection and hypotony. It may also cause the patient discomfort based on its morphology.

PREOPERATIVE CONSIDERATIONS

Unless IOP control is extremely tenuous, I instruct patients to discontinue miotics and prostaglandin analogues 3 days before surgery to reduce hyperemia and inflammation. I also stop oral carbonic anhydrase inhibitors 3 days prior, if possible, to minimize the risk of suprachoroidal effusions. I recommend discontinuing antiplatelet agents 5 days before surgery unless the patient is at extreme risk of stroke or myocardial infarction per his or her medical physician. Warfarin usually is not discontinued unless a retrobulbar block may be used. I rarely perform a retrobulbar or facial block, because I usually find the combination of topical and subconjunctival anesthesia to be adequate. Occasionally, however, blocks are appropriate



Figure 2. A low-lying, diffuse, posterior bleb with mild vascularization 3 months after a trabeculectomy with MMC. This type of bleb is desirable, because it will likely remain functional and carries a low risk of infection or other bleb-related complications.

in patients with a history of multiple prior surgeries and those who tightly squeeze their eyelids.

I start patients on a fluoroquinolone, steroid, and non-steroidal anti-inflammatory drug (NSAID) q.i.d. beginning 3 days prior to surgery. A drop of 5% povidine-iodine and tetracaine is instilled before the patient is transported to the OR.

ANESTHESIA

My patients receive topical anesthesia with tetracaine and subconjunctival 1% lidocaine with epinephrine after routine preparation and draping. I use a 30-gauge needle and avoid vessels.

BRIDLE SUTURE

I pass a 6-0 polyglactin suture on a spatulated needle in a half-thickness fashion through the superior or inferior peripheral cornea and secure it to the drape in order to rotate and fixate the globe.

FORNIX-BASED FLAP

To keep from making holes, I use nontoothed forceps (Chandler's) to handle the conjunctiva. Next, using sharp scissors, I make a superior peritomy but leave a 1-mm strip of conjunctiva at the limbus for closure. Dissection of the conjunctiva and Tenon capsule is carried 10 to 15 mm posteriorly as well as laterally. During lateral dissection, I have found it important not to go farther than the 10- and 2-o'clock hours, where the Tenon capsule is firmly attached. Otherwise, excessive lateralization of the bleb may occur, which can lead to dellem and leaks. I use cautery sparingly to avoid inflammation and scleral ectasia. I prefer 23-gauge, tapered, blunt-tipped, bipolar cautery with linear control of power.

SCLERAL FLAP AND MMC

I outline a 3- × 3-mm flap of one-third to one-half scleral depth at the 12-o'clock limbus. Next, I carry dissection anteriorly until 1 mm into clear cornea. Usually, I apply MMC at a concentration of 0.4 mg/mL on cellulose sponges. These are counted and placed widely and posteriorly as well as under the scleral flap for 30 seconds to 2 minutes, depending on the thickness and vascularity of the conjunctiva and Tenon capsule. I am careful to keep the edges of the conjunctiva from the MMC by holding the tissue away, as described by Khaw,⁶ to prevent leaks and healing problems. After removing the sponges, I rinse the area with copious balanced salt solution. I make a paracentesis to begin slowly reducing the IOP and to avoid the possibility of MMC's entering the eye. Lowering a very high IOP too quickly can lead to a suprachoroidal hemorrhage, especially in short eyes, or uncontrolled systemic hypertension.

FLAP SUTURES

Using a spatulated needle with a thin profile (TG160-6; Ethicon, Inc.), I preplace nylon 10-0 sutures in the scleral flap. I prefer 7756G (Ethicon, Inc). I find suturing much easier while the globe is firm, prior to creation of the sclerostomy. This timing also minimizes how long an eye may be hypotonous. If the collapse of the globe is a concern (eg, an aphakic vitrectomized eye), the surgeon may use an anterior chamber (AC) maintainer.

Needle tracks are made in a partial-thickness fashion through the scleral flap. Full-thickness bites may result in "cheese wiring" of the suture tracks, which can lead to hypotony.

SCLEROSTOMY AND PERIPHERAL IRIDECTOMY

After cutting into the AC beneath the scleral flap in clear cornea, I use a Kelley 0.75-mm Descemet punch to make a small, full-thickness opening into the AC. To minimize bleeding and inflammation, I am careful not to punch posterior to the scleral spur. Usually, I perform the peripheral iridectomy with Vannas scissors. Under topical anesthesia, the patient may experience discomfort and should be warned of the possibility of brief pain. Several drops of lidocaine hydrochloride solution (Xylocaine MPF 1%; AstraZeneca LP) can also be instilled prior to the peripheral iridectomy.

CLOSURE OF THE SCLERAL FLAP

I prefer to tie slipknots in the preplaced nylon sutures. Then, by instilling balanced salt solution into the AC, I can adjust the sutures until flow is adequate. With experience, surgeons may be able to judge the IOP and out-

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flow by applanating the cornea with a cannula. Knots are then locked, and if necessary, the surgeon can perform laser suture lysis in the office to increase outflow.

CONJUNCTIVAL CLOSURE

I use a modified Wise closure technique⁷ with a 9-0 polyglactin suture on a small, tapered vascular needle (V402; Ethicon, Inc.). To ensure that all incisions are watertight, I check them with fluorescein strips and verify that the AC is formed and the IOP is not excessive. A combined steroid-antibiotic drop is administered, followed by the placement of a clear plastic shield without patching.

POSTOPERATIVE CARE

I see most patients 1 day postoperatively and then weekly for several visits, after which observation is extended as appropriate. If a patient has end-stage glaucoma and is at high risk of IOP-related vision loss, I may see him or her several hours after surgery to measure the IOP. Patients resume using fluoroquinolone drops q.i.d. along with prednisolone acetate 1% every 2 to 3 hours and an NSAID b.i.d. to q.i.d., depending on the chosen agent. Antibiotics are discontinued at 1 week, and the steroid and NSAID are tapered beginning at 6 weeks. If the IOP is high, laser suture lysis is an option but should be delayed for at least 2 weeks after surgery to avoid hypotony.

CONCLUSION

Most glaucoma surgeons have different ways of approaching all of the steps outlined in this article. I have enjoyed a high rate of success with the presented technique, however, as well as a very low rate of complications. ■

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