Improving Surgical Outcomes With the Trabectome

Pearls for enhancing the results of ab interno trabeculotomy.

BY STEVEN D. VOLD, MD

In April 2004, the FDA cleared the Trabectome system (NeoMedix Corporation, Tustin, CA) for clinical use in the United States. Since then, this surgical procedure has emerged as a viable and less invasive alternative to trabeculectomy for the treatment of open-angle glaucoma (OAG).[1-3]

This article describes the Trabectome surgical system (Figure 1) and presents tips for improving the postoperative outcomes of ab interno trabeculotomy.

INDICATIONS

I find ab interno trabeculotomy with the Trabectome to be an excellent surgical option for patients who require postoperative IOPs in the mid-to-high teens. I have used this device to treat primary open-angle, pigmentary, and pseudoexfoliative glaucoma. I have also safely performed ab interno trabeculotomy in eyes with a history of corneal transplantation (some trabecular meshwork was visible on gonioscopy) and previous filtering surgery (trabeculectomy or placement of a drainage tube). I have been especially pleased with the surgical outcomes when I combine ab interno trabeculotomy with cataract surgery.

Other potential indications for Trabectome surgery include congenital, juvenile, and uveitic glaucoma, but more research is needed to evaluate the procedure's effectiveness for these conditions.

PATIENT SELECTION

Successfully adding a new treatment modality to your practice requires achieving surgical outcomes that inspire your patients' and staff's confidence in the procedure. Proper planning, including choosing appropriate candidates, can help you to achieve positive early results and to make an accurate assessment of the procedure's efficacy.

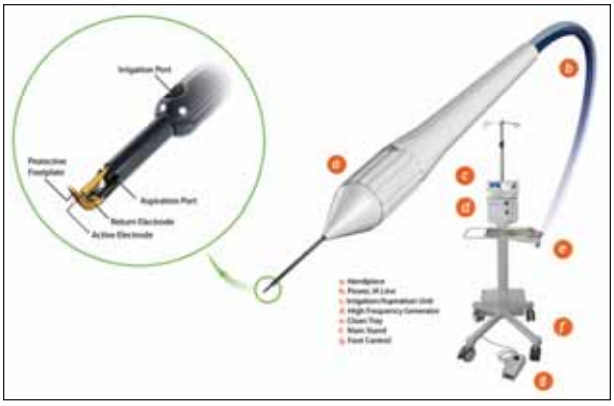

Figure 1. The Trabectome system for ab interno trabeculotomy.

I recommend performing your first Trabectome procedure on an easygoing, compliant patient who uses one to three medications to control mild-to-moderate OAG. The eye should have a deep anterior chamber (Shaffer grade IV) and an easily identifiable trabecular meshwork on clinical gonioscopy. If you are comfortable performing small-incision cataract surgery, you may desire to combine this procedure with ab interno trabeculotomy.

TECHNIQUE

Positioning the Patient

The position of the patient's eye is a crucial element for successfully completing ab interno trabeculotomy. When I use retrobulbar anesthesia, I rotate the patient's head until it is 30° away from me. In most cases, I prefer to use topical anesthesia, because it allows patients to gaze nasally until I achieve an optimal view of the structures in the anterior chamber. It is difficult to achieve a similar view by asking patients to turn their head only. In addition, I tilt the operating microscope approximately 30° toward me (Figure 2).

Figure 2. The surgeon positions the operating microscope and the patient's head to obtain an optimal view of the trabecular meshwork.

Creating the Wound

Next, I use a high-quality steel or diamond keratome to create a 1.7-mm clear corneal incision (Figure 3A). I tunnel into the eye and enlarge the inner part of the corneal wound by the same technique I use for clear corneal cataract surgery. My goals are to prevent the wound from leaking and to facilitate the handpiece's intraoperative rotation.

Visualizing the Angle

Intraoperatively, I use a modified Swan Jacobs surgical gonioscopy lens (Ocular Instruments, Bellevue, WA) to visualize the nasal part of the trabecular meshwork. Approaching the eye temporally allows me to avoid obstruction from the eyelids and the nose. The lens is available in left- and right-handed configurations. If you are right-handed, you may prefer a goniolens designed for use in the left hand because it leaves your dominant hand free to perform the procedure.

Using Ophthalmic Viscosurgical Devices

Ophthalmic viscosurgical devices (OVDs) are useful for maintaining the anterior chamber, protecting the corneal endothelium and anterior lens capsule, and improving the visualization of the trabecular meshwork during ab interno trabeculotomy (Figure 3B). In addition to promoting the reflux of blood into Schlemm's canal during Trabectome surgery, these materials are also excellent coupling agents for the goniolens.

In my experience, the creation of a high-quality wound and the efficient fluidics provided by the Trabectome's I/A unit obviate the need for an intraocular OVD in solo Trabectome cases. The I/A ports adjacent to the microsurgical electrode on the handpiece maintain the anterior chamber by continually infusing balanced salt solution into the eye (irrigation) and removing the ablated tissue (aspiration). Constant irrigation with balanced salt solution also dissipates the heat and energy created by the process of ablation.[2]

When I use an intraocular viscoelastic (eg, in eyes with shallow anterior chambers or during combined procedures), I make sure to remove all of it completely at the end of surgery. Experienced Trabectome surgeons have advocated the use of OcuCoat (Bausch & Lomb, Rochester, NY) or Provisc (Alcon Laboratories, Inc., Fort Worth, TX) to prevent IOP spikes associated with the retention of an OVD after solo ab interno trabeculotomy.

Performing Combined Procedures

When I combine Trabectome and cataract surgery, I complete the ab interno trabeculotomy before starting the phacoemulsification. This order of operation prevents the formation of phacoemulsification-related corneal edema that could impair my ability to visualize the angle structures.

Inserting the Handpiece

I do not allow my staff to remove the Trabectome's protective cap, but carefully remove it myself to minimize the risk of damaging the delicate electrosurgical unit. To insert the handpiece into the eye, I hold it parallel to the iris, place its tip against the posterior lip of the wound, and apply gentle posterior pressure to allow the handpiece to move into the eye easily. This technique allows me to maintain a watertight seal around the infusion sleeve as I slide the handpiece into the anterior chamber. Placing an OVD in the wound may also facilitate the instrument's insertion. I then advance the handpiece across the eye while using continuous irrigation to maintain the anterior chamber (Figure 3C).

Ablating the Trabecular Meshwork

While performing ab interno trabeculotomy with the Trabectome, be careful to ablate—not tear—the trabecular meshwork and the inner wall of Schlemm's canal. To avoid this complication, I insert the pointed tip of the footplate into the canal under direct visualization and gently wiggle the handpiece to ensure that the electrosurgical unit is properly seated (Figure 3D). Once I am satisfied with the footplate's position, I use the footswitch to activate the handpiece's aspiration and electrosurgical functions (set to between 0.8 and 1.0 W) and begin to rotate the instrument's tip slowly along Schlemm's canal (Figure 3E). To maximize the treated area, I initially ablate the inner wall of the canal for 90° to 120° before I rotate the footplate 180° within the anterior chamber to remove tissue from the opposite direction.

Avoid using power settings that are too low and moving the handpiece too quickly, or you may inadvertently tear the trabecular meshwork and cause tissue from the inner wall of Schlemm's canal to accumulate in the gap of the

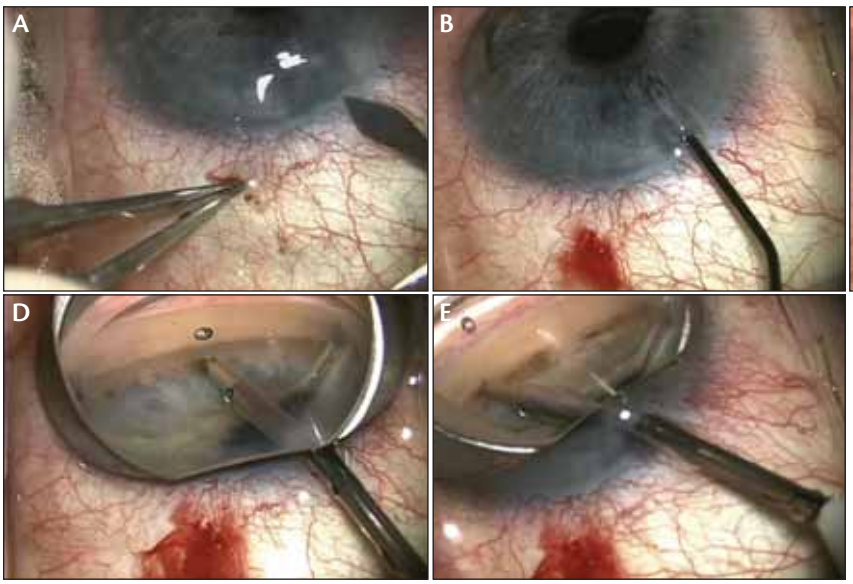

Figure 3. The surgeon begins ab interno trabeculotomy with the Trabectome by creating a clear corneal incision (A). The addition of viscoelastic expands the anterior chamber, protects the cornea and anterior lens capsule, and improves the visualization of the trabecular meshwork (B). The surgeon advances the handpiece across the anterior chamber (C), inserts the footplate into Schlemm's canal (D), and activates the handpiece's electrosurgical function to ablate the inner wall of the canal (E).

footplate. In addition, be sure that the eye does not rotate during the treatment, as this indicates that you are placing too much pressure on the posterior wall of Schlemm's canal.

POSTOPERATIVE MANAGEMENT

Antibiotics and Anti-Inflammatory Medications

Like many surgeons who perform ab interno trabeculotomy, I administer fourth-generation fluoroquinolones perioperatively to prevent infection. Patients also use a topical steroid such as prednisolone acetate1% or Lotemax (loteprednol 0.5%; Bausch & Lomb) for 1 month postoperatively. Because prednisolone acetate 1% must be tapered rapidly to avoid steroid-induced IOP spikes, many surgeons prefer to treat patients with loteprednol or even nonsteroidal anti-inflammatory medications after Trabectome surgery.

Glaucoma Medications

Many surgeons who have experience with the Trabectome advocate the use of pilocarpine 1% 1 to 2 hours before Trabectome-only surgery to improve surgical visualization of the angle and to protect the crystalline lens in phakic patients. Postoperatively, pilocarpine can enhance aqueous outflow and prevent the development of peripheral anterior synechiae. The proper dosing and concentration of the drug and the duration of its use remain unknown, but most surgeons taper it over a few weeks postoperatively.

The use of prostaglandins immediately after ab interno trabeculotomy is controversial, but patients often continue to instill other glaucoma medications during the early postoperative period. The tapering of glaucoma medications is generally undertaken approximately 1 month after surgery.

CONCLUSION

Ab interno trabeculotomy with the Trabectome appears to lower IOP effectively in patients with OAG. Early clinical experience with this technology has shown that patient selection, surgical technique, and postoperative medical management affect patients' outcomes. Although we have learned a great deal about the Trabectome over the past few years, additional research is required to maximize its effectiveness and determine the clinical role of this promising new technology. ❑

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