

Placing a Tube Shunt After Descemet Stripping Endothelial Keratoplasty

BY NATHAN M. RADCLIFFE, MD

As the section editor of *Glaucoma Today's* "Inside Eyetube.net" column, I have been thankful that my colleagues have generously uploaded videos of their unique surgical approaches. In this month's edition, I have for the first time reviewed one of my own videos. In it, I demonstrate a procedure that I have changed significantly since completing my glaucoma fellowship 5 years ago. I firmly believe that watching the surgical videos of others is a fantastic way to learn, and I am sharing this video as a way of "giving back" to the Eyetube.net community that has taught me a lot.

BACKGROUND

My video describes the placement of an Ahmed Glaucoma Valve (New World Medical, Inc.) in the eye of a patient who had previously undergone Descemet stripping endothelial keratoplasty. In eyes with corneal endothelial disease, or in any pseudophakic eye, I prefer to place the tube in the iridociliary sulcus, behind the iris and in front of the IOL. I learned this technique from Celso Tello, MD, of the New York Eye and Ear Infirmary. He has published excellent results in such patients. After 3 years of follow-up, 82% of his patients had controlled IOP and no net decrease in visual acuity, and there were no cases of corneal decompensation.¹

I believe additional evidence supports the use of this technique. In 2000, Burgoyne and colleagues presented the effects on corneal health of placing multiple glaucoma tube shunts. After a mean follow-up period of 34 months, 45% of patients had new or worsening corneal edema, and 27% required penetrating keratoplasty.² Just 10 years later, Prata and colleagues published a similar study with corneal decompensation rates of 16.3% after 36 months

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of follow-up.³ The difference? In the latter study, 48.8% of second tubes were placed in the vitreous cavity of a vitrectomized eye or the iridociliary sulcus of a pseudophakic eye. To me, these data mean (1) that corneal preservation should be top of mind from the time surgeons implant the first glaucoma tube and (2) that placement in the iridociliary sulcus may be a nice way to protect the cornea. I know colleagues who prefer to place the tube deep in the anterior chamber, right next to the iris, and who achieve excellent results without the rare complications of sulcus placement. Nevertheless, I have come to place the tube in the posterior chamber. In my experience, the most significant early (and fortunately transient) complication is hemorrhage in either the sulcus or, less frequently, in the vitreous cavity.

CHOICE OF DEVICE

Because the patient in my video was 65 years of age, protecting the health of his corneal endothelium for many years was critical. I was trained during residency and fellowship to place Baerveldt glaucoma implants (Abbott Medical Optics Inc.) to achieve the lowest



Figure. A 23-gauge needle creates the track for placement of the tube in the sulcus. Note that the needle has traveled from behind the proximal iris to in front of the IOL to extend anteriorly to the distal iris.

possible IOPs in the long term. Since that time, however, I have encountered many patients with greatly elevated preoperative IOPs who do not require such a low target pressure. In these individuals, I find that the Ahmed Glaucoma Valve reduces pressure quickly and with a lower risk of hypotony. In the two prospective randomized trials comparing the two devices, the data show a slight edge for Baerveldt shunts in terms of IOP-lowering efficacy but with a seemingly proportionally higher risk of complications.^{4,5} This finding indicates to me that both drainage devices should be used depending on the severity of the patient's disease, the baseline IOP, his or her need for immediate IOP reduction, and safety concerns.

In this case, I placed the model A4 Ahmed Glaucoma Valve. Although similar to the FP-7, the A4 features a porous polyethylene shell, which is intended to allow for soft tissue-device integration in hopes of limiting encapsulation and the hypertensive phase. The porous surface slightly increased the device's resistance to placement in the superotemporal quadrant, but a coating of Healon (Abbott Medical Optics Inc.) made the shunt's implantation easy. The porous surface of the valve then held it to the sclera, so suturing the plate to the sclera was not necessary.

WHY NOT SUTURE THE PLATE TO THE SCLERA?

Suturing the plate to the sclera is undesirable for several reasons. First, this step may be the most difficult aspect of the surgery, and in order to obtain visualization and access, the conjunctival dissection may require enlargement. Second, the placement of

scleral sutures comes with a (low) risk of scleral perforation and additional bleeding. In my experience, however, the most compelling reason not to suture the plate is that doing so may encourage the surgeon to place the plate more anteriorly, which should be avoided in order to prevent erosion.

Having avoided these sutures in many cases, I have not observed any plate migration. Instead, my surgeries have been quicker and less painful for the patient. They have also involved less bleeding and have resulted in excellent posterior placement of the scleral plate. The key to getting the plate to remain in position without sutures is to position it

so that it rests comfortably within the orbit and to rotate the globe to ensure that the plate does not move.

IMPLANTING THE DEVICE

I find it helpful to inflate the ciliary sulcus with viscoelastic prior to implanting the tube. Typically, however, I only use viscoelastic with Ahmed Glaucoma Valves, for which the immediate risk of postoperative IOP elevation is lower than with Baerveldt implants. To create the scleral tunnel, I enter the sclera 3 mm posterior to the limbus with a 23-gauge needle, my aim just anterior to the center of the IOL (Figure). During the needle's advance, I visualize its passage behind the proximal iris, over the IOL (in this case, a three-piece sulcus-fixated lens), and anterior to the distal iris, which ensures that the tube has access to the aqueous humor in the anterior chamber.

Interestingly in this case, although the needle was placed ideally in the sulcus, when I inserted the tube, it landed behind the IOL. That is a risk of placing the tube in the sulcus when the eye has a sulcus-fixated IOL. Fortunately, I was able simply to reposition the IOL well behind the tube to achieve appropriate placement of the tube in the sulcus.

In my experience, gonioscopy is probably the best way to visualize the tube's tip postoperatively, particularly when the tube is only 2 or 3 mm inside the globe. My only suturing of the sclera in these cases is to anchor the tube behind the site of its entry. When I am not suturing the plate itself to the sclera, I place a second stitch.



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I have found that properly positioning the corneal or pericardial graft tissue where it sits comfortably allows me to avoid suturing the tissue to the sclera. Because the patch graft will be sandwiched between Tenon capsule and the sclera, it typically does not move, particularly if I suture the conjunctiva to the limbus directly anterior to the patch graft.

CONCLUSION

Research such as the Ahmed Versus Baerveldt (AVB) study and the Ahmed Versus Baerveldt Comparison (ABC) Study has provided valuable information on glaucoma device surgery.^{4,5} As with any change in surgical technique, the minor modifications I have presented should be validated by a prospective randomized study. Until that type of data is available, I encourage readers to consider what value each step of the tube shunt procedure provides to the patient and to balance that against the costs and potential risk of that step. I have found that the lack of pain and bleeding achieved

by avoiding four scleral sutures of the plate and the patch graft has been an excellent trade, considering that the postoperative results have been clinically indistinguishable. ■



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