Vitrectomy and Pars Plana Baerveldt Implant for Neovascular Glaucoma

Treating complicated glaucoma from the posterior segment perspective.

BY ROBERT L. AVERY, MD

In this issue of Retina Today, *Robert L. Avery, MD, provides surgical pearls for combined vitrectomy and pars plana shunt implants for neovascular glaucoma.*

We extend an invitation to readers to submit pearls for publication in Retina Today. *Please send submissions for consideration to Ingrid U. Scott, MD, MPH (iscott@psu.edu); or Dean Eliott, MD (dean_eliott@meei.harvard.edu). We look forward to hearing from you.*

—Ingrid U. Scott, MD, MPH; and Dean Eliott, MD

Neovascular glaucoma (NVG) is often caused by posterior segment disease, primarily diabetic retinopathy, central retinal vein occlusion, or carotid occlusive disease. Surgical options in NVG include trabeculectomy, trabeculectomy with mitomycin-C, cyclodestruction, and tube stent implants. An anterior segment approach to stent placement in patients with NVG may help to control their intraocular pressure (IOP), but the underlying retinal disease often remains untreated or inadequately treated. Combining vitrectomy with pars plana tube implantation ensures that the causative retinal disease can be addressed fully. This article describes surgical pearls for performing combined vitrectomy and pars plana tube implantation in NVG with a ripcord technique.

VITRECTOMY FOR NEOVASCULAR GLAUCOMA

In the setting of NVG, vitrectomy clears the ocular media for laser application, facilitating a more complete laser procedure. In eyes with a cloudy cornea, hyphema, or cataract, better visualization can be achieved with endoillumination and endolaser. Vitrectomy also increases oxygenation, permits treatment out to the ora serrata with scleral depression and wide-angle viewing, and, ultimately, allows the surgeon to address the underlying cause of the NVG. Bevacizumab (Avastin, Genentech) and other anti-vascular endothelial growth factor (VEGF) agents can quiet eyes with NVG, but VEGF inhibition is not usually a long-term cure.

VITRECTOMY WITH PARS PLANA TUBE IMPLANTS

Tube implants are a mainstay of treatment for glaucoma, including NVG. The Ahmed Glaucoma Valve (New World Medical, Inc., Rancho Cucamonga, CA) and the Baerveldt implant (Abbott Medical Optics, Inc., Irvine, CA) are currently the most popular implants in the United States.

The Baerveldt BG-102 pars plana implant is designed with a right-angle bend for easy placement during pars plana vitrectomy (Figure 1). In my experience, the right-angle bend reduces the incidence of obstruction compared with placing a straight tube behind the iris. The Baerveldt, which has a large surface area and can be implanted in a single quadrant, has been shown to provide long-term IOP control,[1,2] and the recent Ahmed vs

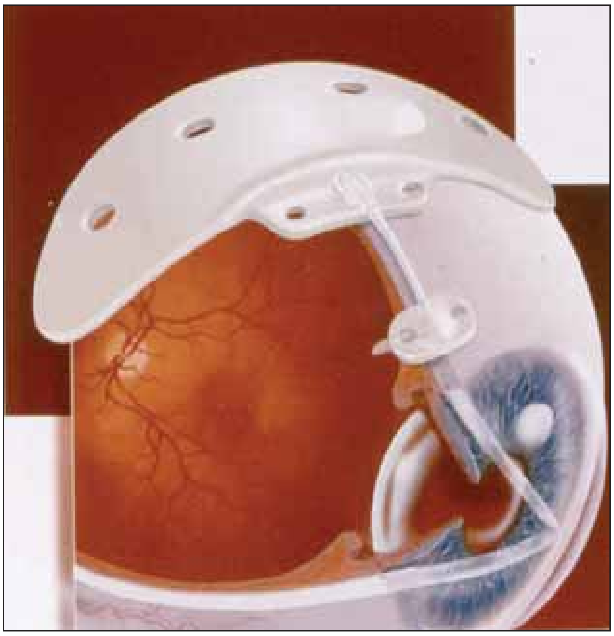


Figure 1. Placement of a Baerveldt pars plana glaucoma implant.

Baerveldt implant trial showed better IOP-lowering for the Baerveldt but with a higher risk of complications.[3] As patients with NVG often have impaired outflow and high IOPs, the Baerveldt implant is a natural choice if the complications can be minimized.

When vitrectomy is combined with pars plana tube implantation, patients with NVG undergo only one operation, which reduces the risks associated with anesthesia and provides more rapid treatment. In the combined procedure, the media are cleared to allow evaluation and treatment of the posterior pathology, and placing the tube into the eye 4 mm posterior to the limbus may lower the risk of tube erosion. By avoiding the anterior chamber, hyphema can be avoided, and some studies have reported a reduction in corneal transplant failure with pars plana tubes when compared with anterior chamber tubes.[4] The posterior approach also carries potential disadvantages; complications can include retinal detachment, vitreous hemorrhage, choroidal detachment, tube obstruction by vitreous, cataract development, and hypotony.

TECHNIQUES TO AVOID HYPOTONY

Several surgical techniques can be used to avoid early postoperative hypotony. In the past, many surgeons used a two-stage procedure, in which a ligation suture is tied around the tube at the time of surgery and then, at a later time, the flap is lifted and the suture is untied. Currently, an absorbable tie—a short-acting dissolvable suture—is used more frequently. Often this technique is combined with fenestrations made in the tube with a fine needle to allow early fluid egress and help control early postoperative IOP until the suture dissolves and opens the tube. Unfortunately, the time it takes for the suture to dissolve can be variable.

Pneumatically stented Baerveldt implants have also been shown to reduce IOP effectively.[5] In this approach, the stent is placed after vitrectomy and air-gas exchange with an expansile gas. The stent may be partially ligated. The procedure allows good early pressure control, but it has been associated with a perceived higher rate of choroidal elevation.

In our practice, we have now adopted a ripcord technique, in which a suture is placed into the lumen of the tube to occlude it, and then it is passed out the conjunctiva at a distant site – to be removed in the office at a later date once the bleb has formed around the implant. One advantage of this technique is that the surgeon can adjust the timing of opening the tube by accelerating or delaying when the ripcord is removed depending upon the postoperative IOP. Fenestrations in the tube can still be used to allow earlier pressure control. Watertight conjunctival closure is not critical as it is for pneumatically stented tubes because one can allow the bleb to form before the tube is opened. This appears to lower the risk of choroidal detachment.

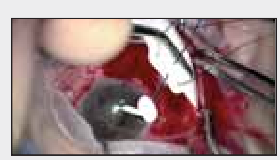
SURGICAL TECHNIQUE

The Baerveldt implant is typically placed before the vitrectomy. After incising the superotemporal conjunctiva at the limbus and making radial relaxing incisions, the superior and lateral rectus muscles are hooked and the Baerveldt implant is slipped under the muscles and sutured to the sclera 12 mm posterior to the limbus. A 4-0 nylon suture is placed into the distal end of the tube where it opens just above the plate. A 7-0-vicryl suture is tied around the outside of the tube that contains the 4-0 nylon ripcord within it. This suture should be tight enough to prevent fluid flow as long as the ripcord is within the lumen. A small-gauge vitrectomy is then performed, and extensive laser is applied

WATCH IT NOW ON THE RETINA SURGERY CHANNEL AT WWW.EYETUBE.NET!

Combined Vitrectomy and Pars Plana Shunt Implants for Neovascular Glaucoma

By Robert L. Avery, MD



eyetube Ophthalmic Video Resource

Direct Link:
http://www.eyetube.net/video/combined-vitrectomy-and-pars-plana-shunt-implants-for-neovascular-glaucoma/

to reduce ischemia. The superotemporal cannula is removed, and a 20-gauge microvitreoretinal blade is used to enlarge this sclerotomy, which is 4 mm posterior to the limbus. The right-angle Baerveldt tube is then inserted into the sclerotomy and anchored in place using eyelets. A patch graft is then sutured over the tube. The distal end of the 4-0 nylon ripcord is passed inferiorly under the conjunctiva as far away from the implant as possible and then outside the conjunctiva. The tip of the ripcord can be buried into the conjunctivae by taking an additional small bite of conjunctiva and then cutting the needle off. The ripcord is typically removed several weeks later in the office.

CONCLUSION

In NVG, anterior chamber placement of a drainage tube can control the patient's IOP, but this approach does not address the underlying retinal disease. In these cases, therefore, it makes sense to perform a combined pars plana shunt placement and panretinal laser treatment. The ripcord technique allows better control of postoperative IOP and may thereby minimize postoperative complications. This surgical technique is effective in the treatment of glaucoma combined with retinal, vitreal, or corneal disease. ■

Robert L. Avery, MD, is the founder of California Retina Consultants in Santa Barbara. He is Associate Medical Editor of Retina Today. *Dr. Avery reports that he is a paid consultant to Genentech and Alcon. He may be reached at avery1@jhu.edu.*

Ingrid U. Scott, MD, MPH, is a Professor of Ophthalmology and Public Health Sciences, Penn State College of Medicine, Department of Ophthalmology, and is a Retina Today *Editorial Board member. She may be reached by phone: +1717 531 8783; fax: +1 717 531 8783; or via e-mail at iscott@psu.edu.*

Dean Eliott, MD, is Associate Director of the Retina Service, Massachusetts Eye and Ear Infirmary, Harvard Medical School, and is a Retina Today *EditorialBoard member. He may be reached by phone: +1 617 573-3736; fax: +1 617 573-3698; or via e-mail at dean_eliott@meei.harvard.edu.*

1. Lloyd MA, Baerveldt G, Fellenbaum PS, et al. Intermediate-term results of a randomized clinical trial of the 350 - versus the 500 mm2 Baerveldt implant. *Ophthalmology*. 1994;101(8):1456-1464.
2. Fellenbaum PS, Sidoti P, Heuer DK, Minckler DS, Baerveldt G, Lee PP. Experience with the Baerveldt implant in young patients with complicated glaucomas. *J Glaucoma*. 1995;4(2):91-97.
3. Budenz DL, Barton K, Feuer WJ, et al.Treatment outcomes in the Ahmed Baerveldt comparison study after 1 year of follow-up. *Ophthalmology*. 2011;118(3):443-452.
4. Arroyave CP, Scott IU, Fantes FE, Feuer WJ, Murray TG. Corneal graft survival and intraocular pressure control after penetrating keratoplasty and glaucoma drainage device implantation. *Ophthalmology*. 2001;108(11):1978-1985.
5. Luttrull JK, Avery RL, Baerveldt G, Easley KA. Initial experience with pneumatically stented Baerveldt implant modified for pars plana insertion for complicated glaucoma. *Ophthalmology*. 2000;107(1):143-149.