

Combined Trabeculectomy and Cataract Surgery

Four surgeons answer the question, one site or two?

BY BRADFORD J. SHINGLETON, MD; ALAN S. CRANDALL, MD; THOMAS E. BOURNIAS, MD;
AND LOUIS B. CANTOR, MD

BRADFORD J. SHINGLETON, MD

The decision to perform phacotrabeculectomy from one or two sites remains controversial. Although the visual outcomes achieved by the two approaches are relatively similar, there is a debate over which technique offers the best control of IOP. My colleagues and I analyzed this issue in my surgical population to see what worked best in my hands.¹ Our review included 64 eyes that underwent two-site phacotrabeculectomy surgery and 71 eyes that had single-site phacotrabeculectomy. All eyes were followed for at least 1 year, and more than two thirds of the patients received intraoperative mitomycin C (MMC). Our results revealed no significant difference in visual acuity, IOP control, or the requirement for glaucoma medication between the two groups. No intraoperative complications occurred in either group, and postoperative complications were rare. Two patients in the two-site group developed corneal decompensation, but they had known preexisting endothelial disease. We did not obtain endothelial cell counts.

The similarly excellent results in our two study groups suggest that either technique can be used to manage cataract and glaucoma simultaneously. Some ophthalmologists may prefer the one-site approach because of the shorter surgical time, fewer corneal incisions, and surgical experience from the superior aspect. Others may prefer the two-site approach due to their familiarity with temporal phacoemulsification, limited superior access, and issues of surgical ergonomics. Although the two-site approach is more time consuming than the one-site approach, I prefer it because of my comfort with temporal clear corneal phacoemulsification (Figure 1).



(Courtesy of Bradford J. Shingleton, MD.)

Figure 1. A diffuse filtration bleb is present after separate-site combined phacotrabeculectomy.

ALAN S. CRANDALL, MD

Ophthalmologists have several options when combining cataract extraction with glaucoma surgery. Both the one- and two-site approaches lower IOP similarly.² The two-site approach, however, requires more time and poses some ergonomic issues, because one must move the microscope and chair when transitioning from one site to the other. Out of concern over wound healing, surgeons should use only foldable IOLs, and I believe suturing is indicated in order to reduce the risk of endophthalmitis if hypotony occurs postoperatively.

Nevertheless, temporal surgery is technically easier for deep-set eyes. Also, due to corneal anatomy, the temporal incision has a slightly longer axis, which allows me to decrease endothelial stress. Moreover, I have the freedom to vary my glaucoma surgery. I can make a large or

TABLE 1. DR. BOURNIAS' APPROACH TO GLAUCOMA SURGERY

Type of Glaucoma	Number of Drops	Control of Disease?	Procedure
Ocular hypertension	0 to 2	Controlled	Cataract extraction and IOL implantation only
Mild	0 to 2	Controlled	Cataract extraction and IOL implantation only
Mild	0 to 3	Uncontrolled	One-site combined
Moderate	1 to 3	Controlled	One-site combined
Moderate	1 to 3	Uncontrolled	One-site combined
Advanced	1 to 3	Controlled	One- or two-site combined
Advanced*	1 to 3	Uncontrolled	Two-site combined
End-stage*	1 to 3	End-stage	Two-site combined
Uveitic*	1 to 3	Controlled/uncontrolled	Two-site combined

**Dr. Bournias might perform trabeculectomy only followed by cataract extraction and IOL implantation.*

small flap as needed. I can perform a nonpenetrating procedure such as the implantation of the AquaFlow Collagen Glaucoma Drainage Device (STAAR Surgical Company, Monrovia, CA) or canaloplasty with the iTrack microcatheter (iScience Interventional, Menlo Park, CA). I therefore find that the advantages of a two-site approach outweigh its drawbacks.

THOMAS E. BOURNIAS, MD

I prefer one-site combined phacotrabeculectomy because of its relative ease and speed. One-site surgery allows me to create a fornix-based conjunctival flap, which can be dissected posteriorly and laterally with a scissors or irrigation. The resulting bleb lies lower and is more diffuse than that produced with a two-site approach, and it therefore tends to be more comfortable for the patient. The incidence of dysesthesia and dellen formation is also lower. One-site combined procedures reduce IOP and the number of medications used as well as two-site combined procedures, and visual improvement is equivalent.¹

Fornix-based conjunctival blebs usually extend more posteriorly than limbus-based conjunctival flaps, which are often the choice for a two-site combined approach. In addition, I find it easier to suture and manipulate the scleral flap with a one-site approach. This difference is important, because the thickness of the flap and tightness of its closure are key to pressure control. Although limbus-based flaps are traditionally associated with more leak-free blebs, recent techniques with sutures and BV needles permit a similarly watertight closure. I prefer an 8-0 Vicryl suture (Ethicon Inc., Somerville, NJ).

In recent years, many patients with mild or well-con-

trolled glaucoma who use only one or two IOP-lowering drops have been treated with cataract surgery alone. Patients with more advanced or poorly controlled phakic glaucoma have often undergone trabeculectomy only. The remaining large group of patients with moderate glaucoma use two to three medications. Because most of my patients fall into this category, the majority of my combined procedures are one-site phacotrabeculectomies (Table 1). The blebs in these eyes have benefited from the use of adjunctive antimetabolites such as MMC and 5-fluorouracil.

Some investigators believe two-site combined procedures result in better IOP control.³ Most of my patients who have undergone a one-site phacotrabeculectomy, however, have a postoperative IOP in the low teens with no glaucoma medications. Because the bleb does not appear to function for quite as long with the one-site combined procedure as with the two-site or trabeculectomy-only bleb, I will favor the latter approach for uncontrolled, advanced, or uveitic glaucoma. Patients with advanced glaucoma require a consistently low IOP, and uveitic patients need a bleb that will both function for a long time and be as unlikely as possible to scar due to inflammation. Most of my patients requiring combined phacoemulsification and trabeculectomy can achieve an excellent reduction in IOP with a significant decrease in the number of medications they require through a technically easier, one-site, combined procedure.

LOUIS B. CANTOR, MD

My philosophy is to perform the best single procedures and not to create a new operation for the com-

bined surgical approach. My best glaucoma surgery is a trabeculectomy with adjunctive MMC that uses a limbus-based conjunctival flap. My best cataract surgery is temporal clear corneal phacoemulsification with the implantation of a posterior chamber IOL. I am comfortable performing both procedures while sitting at the patient's head as opposed to performing cataract surgery from the side. My combined surgery is thus simplified, and I do not need to move my chair and readjust the microscope between the cataract and glaucoma procedures.

I am also comfortable using my right or left hand to perform clear cataract surgery with a temporal incision. My standard technique, therefore, is to place a superior rectus traction suture using 4–0 black silk. I then create an incision through the conjunctiva and Tenon's capsule in the superior fornix that is anterior to the traction suture, which I extend nasally and temporally. Next, I dissect through Tenon's and the episclera to bare sclera superiorly. I then further dissect the conjunctiva and Tenon's flap to the limbus with Weck-Cel sponges (Medtronic ENT, Jacksonville, FL) and, if necessary, a No. 67 blade. I apply MMC (usually 0.2 mg/mL concentration) beneath the conjunctival flap with a Weck-Cel sponge for 2 minutes and then irrigate the surgical site with two 30-mL bottles of balanced salt solution. Next, I outline the superficial scleral trabeculectomy flap at the superior limbus and perform dissection at approximately one-half to two-thirds scleral thickness into clear cornea. At this point, I release the traction suture and turn my attention to removing the cataract.

I make a temporal clear corneal incision with a nasal stab incision. Again, I remain sitting at the patient's head and perform the cataract surgery with my right hand in right eyes and with my left hand in left eyes.

After completing cataract surgery, I re-anchor the traction suture. I then complete the trabeculectomy by performing a sclerotomy with an eye knife and scissors. I will generally perform an iridectomy, unless the anterior chamber remains extremely deep. I reposition the superficial scleral trabeculectomy flap and place two sutures at the posterior corners of the rectangular flap. Next, I inject balanced salt solution into the anterior chamber through the paracentesis track and apply light cautery to the superficial scleral trabeculectomy flap until leakage occurs. I like to see good leakage (which I define as a low IOP with a formed anterior chamber) at the time of surgery.

My next step is to deepen the anterior chamber with a high-molecular-weight viscoelastic such as Healon GV or Healon 5 (both from Advanced Medical Optics, Inc., Santa Ana, CA). I then close the conjunctiva and Tenon's

capsule in the superior fornix in a two-layered fashion with a running 8–0 Vicryl suture and remove the traction suture. I test the corneal incisions to ensure they are hydrated and watertight. Additional viscoelastic may be added to the anterior chamber if it is shallow at the conclusion of surgery. I generally like to see a bleb developing spontaneously.

In combined procedures, I will often inject 1 mL (4 mg) of Decadron (Merck & Co., Inc., Whitehouse Station, NJ) subconjunctivally into the inferior fornix. I conclude by administering an antibiotic and steroid combination ointment and placing a patch and a Fox shield. □

Thomas E. Bournias, MD, is Director of the Northwestern Ophthalmic Institute and Assistant Professor of Clinical Ophthalmology at the Northwestern University Feinberg School of Medicine, both in Chicago. He acknowledged no financial interest in the products or companies mentioned herein. Dr. Bournias may be reached at (312) 703-9990; bournias@northwestern.edu.



Louis B. Cantor, MD, is the Jay C. and Lucile L. Kahn Professor of Glaucoma Research and Education and serves as Director of Glaucoma Service for the Department of Ophthalmology at the Indiana University School of Medicine in Indianapolis. He is a consultant to Advanced Medical Optics, Inc. Dr. Cantor may be reached at (317) 274-8485; lcantor@iupui.edu.



Alan S. Crandall, MD, is Professor and Senior Vice Chair of Ophthalmology and Visual Sciences and Director of Glaucoma and Cataract for the John A. Moran Eye Center at the University of Utah in Salt Lake City. Dr. Crandall is a consultant to and member of the speakers' bureau for Alcon Laboratories, Inc., and a member of the speakers' bureaus for Allergan, Inc., and Pfizer, Inc. He is also on the advisory board of iScience Interventional Corp. Dr. Crandall may be reached at (801) 585-3071; alan.crandall@hsc.utah.edu.



Bradford J. Shingleton, MD, is Assistant Clinical Professor in Ophthalmology at the Harvard Medical School, and he is Clinical Instructor in Ophthalmology at the Tufts University School of Medicine in Boston. He acknowledged no financial interest in the products or companies mentioned herein. Dr. Shingleton may be reached at (617) 314-2614; bjshingleton@eyeboston.com.



1. Shingleton BJ, Price R, O'Donoghue MW, Goyal S. Comparison of one-site vs. two-site phacotrabeculectomy. *J Cataract Refract Surg.* 2006;32:799–802.
2. Park HJ, Weitzman M, Caprioli J. Temporal corneal phacoemulsification combined with superior trabeculectomy. *Arch Ophthalmol.* 1997;115:318–323.
3. Friedman DS, Jampel HD, Lubomski LH, et al. Surgical strategies for coexisting glaucoma and cataract. An evidence-based update. *Ophthalmology.* 2002;109:1902–1915.