

Point/Counterpoint: Should anterior segment surgeons perform pars plana vitrectomy?

Yes, this approach may save time and minimize complications.

BY LOUIS D. "SKIP" NICHAMIN, MD

The single most significant complication today's phaco surgeon faces is a ruptured posterior capsule with vitreous loss. Fortunately, in the setting of small-incision surgery, by adhering to certain fundamental principles and employing proper instrumentation and surgical technique, the ophthalmologist can generally achieve an outcome that differs little from that of an uncomplicated case. I believe that adopting a pars plana approach for the vitrectomy is paramount to achieving such results.

GUIDING PRINCIPLES

The guiding principles for managing a posterior capsular tear with vitreous loss include quickly recognizing the problem, avoiding hypotony, and maintaining a truly closed-chamber environment. Because watertight incisions are therefore essential, the surgeon may employ a much lower flow rate and volume of infusion to reduce intraocular turbulence. To further enhance control of the intraocular environment and reduce vitreoretinal traction, the surgeon should perform a separated or bimanual vitrectomy. This technique displaces the location and vector force of the infusion from the point where he attempts to delicately remove vitreous. Although a reasonable approach is to place both instruments through limbal incisions (Figure 1), I submit that a much more efficient and potentially safer approach is to perform the vitrectomy through a pars plana incision (Figure 2). This technique allows the surgeon to pull down prolapsed vitreous from the anterior chamber

and thereby markedly reduce the amount of vitreous that he removes from the eye. Because working from the limbus to raise vitreous makes finding an endpoint much more difficult, the surgeon often unintentionally
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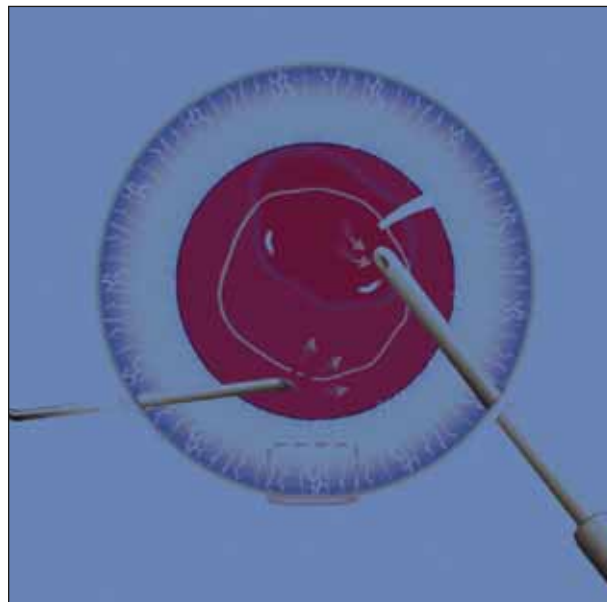


Figure 1. The author performs bimanual vitrectomy through limbal incisions. (Reprinted with permission from Chang DF. *Phaco Chop: Mastering Techniques, Optimizing Technology, and Avoiding Complications*. Thorofare, NJ: Slack Incorporated; 2004.)

Can anterior segment surgeons perform anterior vitrectomy?

No, they likely lack the necessary training and/or equipment.

BY J. MICHAEL JUMPER, MD

With the proper training and equipment, anterior segment surgeons are clearly capable of performing pars plana anterior vitrectomy. Why they should not relates to several important aspects of safe vitreous surgery: proper viewing, minimized traction, and a careful inspection of the peripheral retina to identify and treat retinal breaks.

VISUALIZATION

Whereas anterior segment surgery uses coaxial illumination, vitreoretinal surgery mainly employs endoillumination. Intraocular lighting is required because a nonaxial light is often the only way for the surgeon to see the translucent vitreous. Also, coaxial light from the microscope does not penetrate well beyond the iris plane in the best of circumstances, and it is less effective with corneal edema, pupillary miosis, or intraocular hemorrhage—all of which may be encountered in complicated cataract cases. Techniques such as the intracameral injection of triamcinolone acetonide and the use of a fiber-optic light pipe held near the limbus can help the surgeon identify vitreous in the anterior chamber, but these methods are inferior to intraocular illumination.

Also, during pars plana vitrectomy surgery, the surgeon should observe the retina with a contact or noncontact lens system in order to assess and react to the collapse of the eye, a potential problem when aspiration overcomes infusion. Most anterior segment surgeons have little experience with such handheld or microscope-mounted retinal viewing systems.

TRACTION AND INSPECTION

When vitreous is lost during cataract surgery, a retinal tear and detachment may result from increased traction on the retina with the forward movement of the vitreous. This traction can be exacerbated by maneuvers of any kind within the vitreous that are not associated with cutting. Thus, phacoemulsifying lenticular fragments attached to the vitreous and inserting instruments into the vitreous to lift lenticular fragments increase traction as well as the risk of a retinal tear.

The incidence of retinal detachment after vitrectomy (by vitreoretinal surgeons) for retained lenticular fragments is between 6% and 16%.¹ In my experience, large tears can occur with seemingly minimal traction on the vitreous base. Conversely, maneuvers that I would expect to cause a retinal tear often do not. As a result, I routinely inspect the entire retina with indirect ophthalmoscopy and scleral depression in order to identify retinal tears or dialyses. If I identify a retinal break, I treat the surrounding attached retina with a laser or cryotherapy. The early identification of a retinal break is critical to preventing retinal detachment and vision loss. If retinal detachment surrounds the retinal break, further vitrectomy, retinopexy, and fluid-gas exchange with or without scleral buckling are necessary. I feel that anyone who performs a pars plana vitrectomy should at least be able to identify and treat retinal breaks. ORs used by anterior segment surgeons may not have the necessary equipment.

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ONE SURGEON'S PARS PLANA APPROACH

By Uday Devgan, MD, FACS

The most common reason for an anterior segment surgeon to perform a vitrectomy is the inadvertent, unexpected rupture of the posterior capsule during cataract surgery. The improper management of this complication can negatively affect the patient's vision, and an anterior vitrectomy via the phaco incision is generally not a well-suited approach to this scenario.

After listening to Louis "Skip" Nichamin, MD, of Brookville, Pennsylvania, describe performing an anterior vitrectomy via the pars plana approach, I decided to make the switch in my own private practice and when teaching cases with residents at the UCLA Jules Stein Eye Institute in Los Angeles. My results with the pars plana anterior vitrectomy have been far superior to those with the conventional method through the phaco wound.

My first step is to float any nuclear pieces and reform the anterior chamber with viscoelastic. Next, I suture shut the phaco incision and administer irrigation through the paracentesis into the anterior chamber so that it helps the vitreous flow posteriorly, away from the anterior segment incisions. I then insert the vitreous cutter via the pars plana and bring it into view within the pupil. The vitreous cutter actively draws the vitreous posteriorly where it belongs and keeps the anterior segment free of vitreous strands. This closed system provides far better fluidics, a

more natural flow of the vitreous, less loss of vitreous, and quicker postoperative recovery than the conventional method.

The hesitation that most surgeons have with the pars plana approach is that, with a conventional 20-gauge system, they must make a conjunctival peritomy, use a microvitrectomy blade to make the pars plana incision, and then suture the sclera and conjunctiva at the end of the case. A 25-gauge system such as the Millennium Transconjunctival Sutureless Vitrectomy (TSV25) System (Bausch & Lomb, Rochester, NY), where the trochar is placed through the conjunctiva and sclera, does not require a peritomy, a microvitrectomy blade, or even sutures. Because the goal of the anterior vitrectomy is to free the anterior segment of vitreous and release any traction as atraumatically as possible, I find that the 25-gauge vitrectomy system is an excellent option and a welcome addition to the anterior segment surgeon's toolbox (Figure 1).

Uday Devgan, MD, FACS, is Assistant Clinical Professor at the Jules Stein Eye Institute at the UCLA School of Medicine in Los Angeles, and he is in private practice in Sun Valley, California. He states that he does not hold any financial interest in the company or product mentioned herein and that he does not accept funds or honoraria for ophthalmic industry consulting. Dr. Devgan may be reached at (818) 768-3000; devgan@ucla.edu.

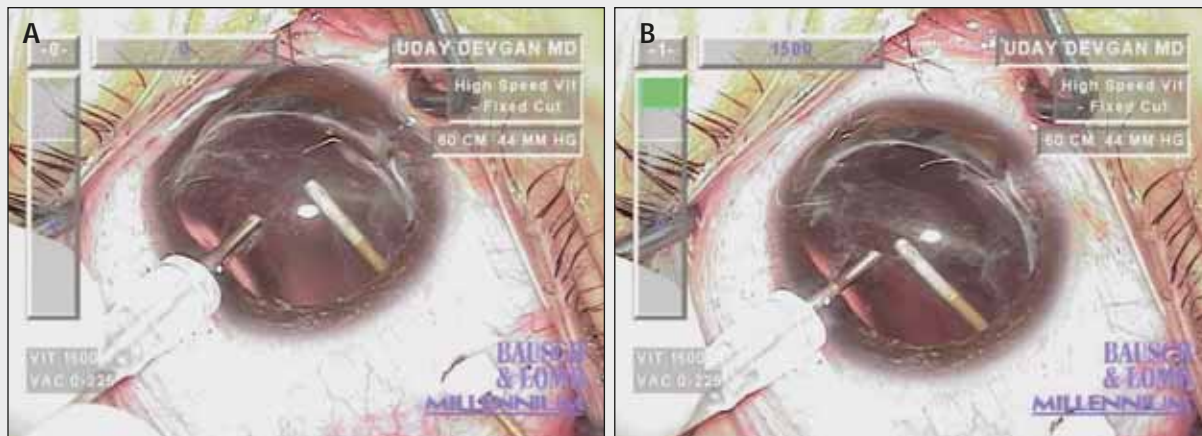


Figure 1. Dr. Devgan performs a pars plana vitrectomy using the Millennium TSV25 System (A and B).

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removes a considerable portion of the vitreous body and must then deal with a hypotonous eye.

Another significant advantage to working through a pars plana incision is the enhanced access it offers to residual lenticular material. Cortex, epinucleus, and even nuclei of medium density may be removed with the vitrectomy instrument by gradually increasing vacuum and reducing the cutting rate. When addressing vitreous, the surgeon uses the highest cutting rate with the lowest possible vacuum rate that permits tissue removal. This approach achieves more complete cleaning and reduces secondary complications such as increased IOP, inflammation, and cystoid macular edema.

MINIMAL LEARNING CURVE

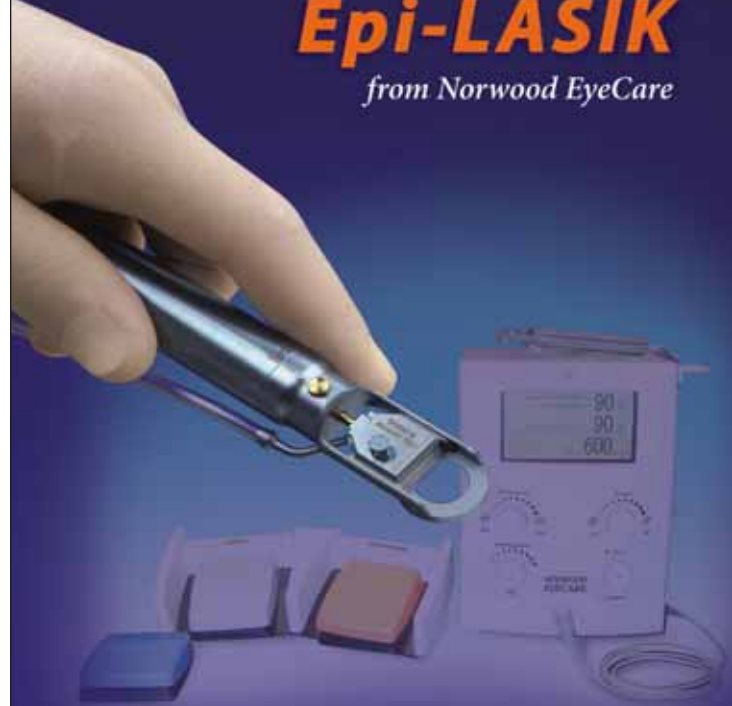
Obviously, the surgeon must exercise care and effort when learning any new surgical technique, but the pars plana approach is actually quite straightforward. Typically, the surgeon first incises the conjunctiva and applies light cautery at the site of the intended sclerotomy (although some surgeons will incise directly through the conjunctiva). He should avoid the cardinal meridians due to their increased vascularity. Given that the posterior capsule is open, the surgeon may place the infusion through a limbal paracentesis or a second incision in the pars plana. He should select the clock hour of the vitrectomy incision that offers the best access to the remaining lenticular material.

TECHNICAL PARTICULARS

The pars plana is anatomically located 3 to 4mm posterior to the limbus, so the surgeon usually places the incision 3.5mm from the limbus, although he may make an adjustment for unusual axial lengths. Depending upon his preference, he creates wounds to accommodate either 19- or 20-gauge instruments. The surgeon should use dedicated, disposable microvitrectoretinal blades to create properly sized and therefore watertight incisions for both pars plana and limbal incisions. To create the pars plana incision, the ophthalmologist holds the microvitrectoretinal blade perpendicular to the scleral surface and usually orients it in a nonradial fashion. He directs the blade toward the center of the globe with a simple in-and-out motion.

In general, when removing vitreous, the surgeon should use the highest possible cutting rate along with the lowest possible vacuum setting. He may increase vacuum and lower the cutting rate in order to remove remaining lenticular material. The infusion should be

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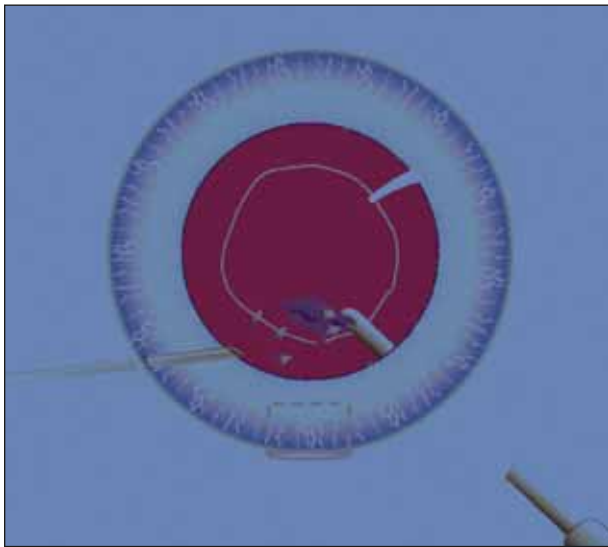


Figure 2. The author performs bimanual vitrectomy with a vitreous cutter placed through the pars plana incision. (Reprinted with permission from Chang DF. *Phaco Chop: Mastering Techniques, Optimizing Technology, and Avoiding Complications*. Thorofare, NJ: Slack Incorporated; 2004.)

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minimal, just enough to maintain an adequate volume of the globe.

The surgeon should carefully clean and close the pars plana incision with either 9-0 nylon or 8-0 Vicryl (Ethicon Inc., Somerville, NJ) sutures. Recently, 25-gauge instrumentation has become available that, in some settings, may allow for sutureless surgery. Normal insertion, however, requires a firm globe. Although the surgeon could use these instruments in a complicated setting by creating small incisions with a sharp blade—as opposed to the usual trochar system—they lack tensile rigidity and therefore compromise the ophthalmologist's ability to manipulate the position of the globe.

PRACTICE MAKES PERFECT

Prudence dictates that a surgeon not first perform a pars plana vitrectomy when under duress but rather after carefully studying the technique and practicing it in the laboratory. In this way, he may obtain the most propitious outcome from a daunting complication of cataract surgery. ■

Louis "Skip" D. Nichamin, MD, is Medical Director of Laurel Eye Clinic in Brookville, Pennsylvania. He states that he holds no financial interest in any product or company mentioned herein. Dr. Nichamin may be reached at (814) 849-8344; nichamin@laureleye.com.



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TECHNICAL MODIFICATIONS

Instead of the pars plana approach, I was taught as a resident to perform an anterior vitrectomy by placing the vitreous cutter with its infusing sleeve through the cataract wound and to cut until I no longer saw peaking of the pupil. I now realize that this technique is inefficient and ineffective. First, the infusion sleeve on the cutter makes the instrument's diameter quite large, and the location of the infusion can reduce the cutter's ability to engage vitreous. Second, placing the infusion/cutter through the leaking cataract wound allows more vitreous to flow out of the wound and increases the risk of vitreous incarceration. Third, indirect evidence of vitreous removal (observing the pupil) is no substitute for directly seeing the vitreous.

Separating the infusion from the cutting results in a more effective anterior vitrectomy. One technique is to attach the infusion line to a bent needle, which is inserted into the anterior chamber through the limbus. This approach allows the smaller, sleeveless cutter to enter through a watertight limbal or pars plana incision. The recently developed 25-gauge vitreous cutter has been used for anterior vitrectomy.² This potentially important application of the technology may become popular if more phaco machines include 25-gauge vitrectors.

CONCLUSION

Cataract surgery is extremely successful, and the rates of vitreous loss are correspondingly low (1% to 3%).³ In the 10 to 20 times per year that the busiest anterior segment surgeon would be expected to perform an anterior vitrectomy, he should choose the simplest and safest technique. Although it makes sense to place the vitrectomy cutter through the pars plana, a limbal approach may be equally effective in most cases. The questions, however, that all anterior segment surgeons need to ask themselves are (1) whether they have the training and equipment to do the job safely and effectively and (2) more importantly, do they possess the expertise to identify and treat the retinal breaks that will inevitably occur? ■

J. Michael Jumper, MD, is Director of the Retina Unit at California Pacific Medical Center in San Francisco. He may be reached at (415) 441-0906; jmjumper@westcoastretina.com.



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