

Posterior Capsular Rupture

A well-planned approach can minimize further intraoperative and postoperative problems.

BY LISA BROTHERS ARBISSER, MD

Intraoperative complications can be divided into three categories: (1) a broken capsule or loss of zonular integrity with an intact anterior hyaloid face, (2) vitreous prolapse, defined as vitreous within the confines of the anterior chamber, and (3) vitreous loss through the incision. Retained lenticular material further complicates these scenarios. Because the aforementioned complications significantly increase the likelihood of postoperative sequelae, it is important to recognize and limit damage at the earliest stage.

This article shares my strategy for managing a ruptured posterior capsule. I base my recommendations on my knowledge of the literature as well as my experience with both routine and complex cataracts, anterior segment reconstruction, and laboratory exploration.

FIRST STEPS

Upon recognizing a problem intraoperatively, go to foot position zero in order to maintain the anterior chamber but do not remove the phaco tip, or vitreous will follow. Remove from the paracentesis the instrument in your non-dominant hand. Then, inject a dispersive ophthalmic viscosurgical device (OVD) between the posterior capsule and any remaining lenticular fragments to sequester the capsular break. Continue instilling the OVD until the anterior chamber is of normal depth; only then can you withdraw the phaco tip from the eye without causing the anterior chamber to collapse and vitreous to prolapse. If the chamber collapses in the presence of a torn capsule, vitreous pressure will extend the tear and result in progression from capsular rupture to vitreous prolapse or from prolapse to vitreous loss. Vitreous always follows the path of lowest pressure.

NUCLEAR REMOVAL

Raise the remaining nuclear fragments above the iris plane into the anterior chamber. You must strive to

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maintain the integrity of the continuous curvilinear capsulorhexis for the IOL's implantation, but enlarge the capsulorhexis if it restricts a large fragment from forward movement. In such cases, make a tangential cut under OVD control and use a forceps to enlarge the continuous tear to the minimum effective size.

Next, employ maneuvers to dial, lift, cantilever, or float with an OVD any nuclear fragment to make it accessible for removal. You can insert a lens glide into the eye to form a pseudo-posterior capsule over the pupil. Only in the absence of an admixture of lenticular material and vitreous can you continue phacoemulsification using a low-flow technique. Because ultrasound will not cut vitreous and traction will result, without reliable compartmentalization, it is advisable to convert the case to an extracapsular cataract extraction. Anterior segment surgeons continue to debate the use of viscoevacuation to remove a lenticular fragment that is located below the posterior capsule and has descended into the posterior segment. Vitreoretinal surgeons, however, are unanimous that such fragments should be left in place for later removal with a full three-port pars plana vitrectomy and fragmenter as needed.

VITRECTOMY

Vitreous forward of the posterior capsule must be removed. I strongly recommend that your vitrectomy settings always use the highest cutting rate available on



Figure 1. The surgeon creates a separate paracentesis to fit the bare vitrector needle instead of using the larger cataract incision. The original sideport can be used for irrigation with this biaxial approach.

your phaco machine. Although some manufacturers set the default at linear vacuum up to 200 mm Hg, I prefer panel settings for vacuum, which allow me to put the pedal to the metal without needing to control linearity in foot position three. My scrub nurse raises the vacuum by increments of 50 from the 150-mm Hg setting until I observe the vitreous moving. The bottle is low by default and must be raised as the vitrectomy progresses to balance the vacuum, maintain a normotensive globe, and prevent hypotony. The aspiration flow rate is usually panel set at 20 mL/min. I prefer a biaxial vitrectomy approach, which will not displace the vitreous with irrigation. The sleeve may be removed from the vitrector probe and attached to a chamber maintainer so that irrigation is delivered through the original paracentesis.

If you favor an anterior approach (Figure 1), create a new paracentesis to make a tight fit for the bare vitrector probe; vitreous will flow around a larger incision. A pars plana incision technique 3.5 mm back from the limbus is well worth learning, because it is by far the most efficient approach (Figure 2). The repeated presentation of vitreous above the capsule during subsequent maneuvers, such as the IOL's implantation, is less likely to occur after a pars plana approach. That is because the pressure is then lower in the posterior segment after drawing vitreous back rather than encouraging it forward, as a limbal approach does. A pars plana vitrectomy is the most effective method for amputating any vitreous that has exited the incision at the pupillary margin. This technique obviates the need to create traction with Weck-Cel sponges (Medtronic ENT, Jacksonville, FL) or by sweeping the incision while vitreous is

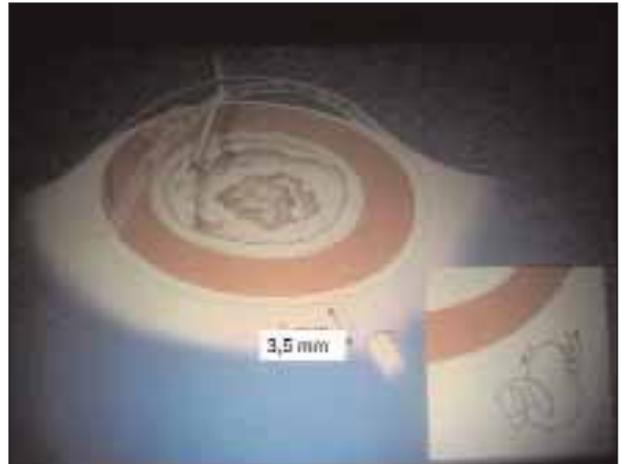


Figure 2. A pars plana vitrectomy is the most efficient approach to the extensive presentation of vitreous humor. The original sideport is used for irrigation, and a sclerotomy 3.5 mm back from the limbus in a quadrant permits the entry of the sleeveless vitrector.

present, which causes intraoperative traction. You may use triamcinolone acetate to identify any remaining prolapsed vitreous. Thus visualizing the endpoint of removal allows incisions to seal and avoids postoperative traction.

All phaco machines should default to the irrigation-cut-aspiration mode for vitrectomy. Another available mode reverses the foot pedal so that irrigation-aspiration-cut occur in that order. It is crucial that you never use this setting to remove vitreous, but it can be useful thereafter for promoting safe followability for cortical removal, making a neat peripheral iridectomy if indicated, and removing viscoelastic at the conclusion of the case. Evacuate cortex while in foot position 2 (aspiration) and use foot position 3 to amputate any vitreous strands that present. "Dry" cortical removal under an OVD is the best method in terms of surgical control, because irrigation can promote the repeat presentation of vitreous. Complicated cases demand meticulous cortical removal for the best outcome.

THE IOL'S IMPLANTATION

Place a foldable IOL in the bag only if you converted the posterior capsular tear to a truly continuous capsulorhexis or there are less than 3 hours of zonulolysis without a capsular tension ring. Orient the haptic to support any area of zonulolysis. In an eye without a converted posterior capsular tear and an intact anterior continuous curvilinear capsulorhexis, place the haptics of a three-piece foldable lens in the sulcus and capture the optic through the capsulorhexis into the bag.

For cases without an intact continuous curvilinear cap-

sulorhexis or posterior continuous curvilinear capsulorhexis, the traditional approach is to place a sulcus-style IOL entirely in the sulcus, but I often find that the lens is not stable and requires suture fixation. Avoid plate haptic, square-edged, or single-piece acrylic lenses, because these lenses are not intended for placement in the sulcus.

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POSTOPERATIVE COURSE

For eyes that suffered a posterior capsular rupture, you may wish to provide more elaborate antibiotic prophylaxis. Possibilities include a subconjunctival injection of antibiotics or, my preference, in patients without a systemic contraindication, an oral fourth-generation fluoroquinolone, which crosses the blood/retina barrier with well-defined aqueous and vitreous therapeutic levels.

In cases of retained lenticular fragments, a timely referral to a retinal surgeon is advisable. All patients whose posterior capsule ruptured should undergo a careful, peripheral, indented retinal examination within 2 to 4 weeks of cataract surgery.

Finally, frankly and completely discuss the surgical complication with the patient. The purpose is not only to explain all of the steps you have taken and planned to minimize the risk of problems but also to prompt the patient's vigilance for symptoms of complications in the future. ■

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Further Reading

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