

Posterior Capsular Tear

Staying calm is essential to handling this complication successfully.

BY ROBERT J. WEINSTOCK, MD

It does not matter if one is a third-year ophthalmology resident or has been in practice performing cataract surgery for 30 years; knowing how to handle a tear in the posterior capsule is one of the most important and crucial skills for delivering quality surgical care. The goal, regardless of where the tear is or how it happened, is always to safely extract the remaining cataract material, remove vitreous from the anterior segment, and place a PCIOL inside the eye. If these steps are executed methodically and properly, the odds are extremely high that the patient will proceed through the entire cataract experience without any significant problems and will enjoy good vision and ocular health throughout his or her life.

HOW TEARS HAPPEN

Usually, posterior capsular tears occur during phacoemulsification or I/A. Clearly, the earlier in the case that the tear happens, the more challenging the case becomes, because the cataract particles may find their way through the hole. Stopping nuclear and cortical material from falling into the vitreous cavity is usually the first and foremost challenge when a surgeon notices that there is a tear in the posterior capsule. Some clues that the posterior capsule is torn are a deepening of the eye during the cataract removal and a change in the fluid patterns and dynamics in the anterior chamber. Sometimes, it is clear that the capsule is torn, because a large quadrant of the nucleus can no longer be seen through the pupil and is viewed peripherally through the tear or in the anterior vitreous.

When a tear in the posterior capsule is suspected, the surgeon must remain calm. Panic only leads to further complications and, most likely, a worse outcome. Clearly thinking through each step is paramount to success in handling this situation. One tried-and-true

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method is to halt irrigation as soon as a posterior capsular tear is suspected or seen so that the fluid stops going into the vitreous cavity. This measure protects the capsule from being ripped farther open, stops the irrigation from blowing particles into the vitreous cavity, and prevents vitreous hydration.

USING VISCOELASTIC MATERIAL

A key tip is not to immediately take the instruments out of the eye. Doing so will likely cause the anterior chamber to collapse. The small tear in the posterior capsule will become much larger as the chamber collapses and vitreous comes forward, further complicating the situation. When possible, the surgeon should first remove the second sideport instrument while leaving the phaco handpiece in the eye without irrigation running. Next, he or she can inject an ophthalmic viscosurgical device (OVD) posteriorly behind the lenticular material to create space and a cushion for the cataract material to sit on. The OVD may even plug the hole in the posterior capsule. I prefer a cohesive agent to a dispersive one. Either way, however, the surgeon will often find that the OVD will worm its way into the vitreous cavity through the tear in the capsule, which usually has no benefit and can lead to a postoperative IOP spike.



One helpful technique is to start injecting the OVD away from the tear and to let it hit the posterior capsule to the point where the OVD starts to balloon into itself and fill up the space. Then, the surgeon starts moving the cannula toward the area of the tear. Once the pressure inside the eye has stabilized and the OVD has deepened the anterior chamber, it is okay to remove the instruments from the eye and assess the situation. If there is a large nuclear fragment near the tear, it may be gently prolapsed up into the anterior chamber or even into the angle with a Kuglen hook or a manipulator. This technique allows the surgeon to have more control of these particles and keeps them away from the tear in the posterior capsule. If vitreous is immediately noted in the anterior chamber, the staff needs to set up the anterior vitrector. They should also prepare other supplies that might be needed like Weck-Cel sponges (Beaver-Visitec International, Inc.) and a small scissors for performing a manual vitrectomy at the wound. In addition, the surgeon should have available acetylcholine chloride (Miochol-E; Bausch + Lomb) or carbachol solution 0.01% (Miostat; Alcon Laboratories, Inc.) to shrink the pupil and perhaps triamcinolone to stain the vitreous strands in the anterior chamber.

PHACOEMULSIFICATION AND VITRECTOMY

When placing the phaco handpiece back into the eye to remove the remaining cataract material, the surgeon should lower the bottle to prevent overinflation of the anterior chamber and avoid blowing the particles into the posterior segment of the eye. Very careful attention must be paid to the vitreous and incarceration of vitreous material into the phaco needle, which usually results in traction on the vitreous, in turn causing traction on the retina.

If vitreous is present in the anterior chamber, the first thing the surgeon should do is set up the vitrector and perform a limited coaxial or bimanual anterior vitrectomy to remove all of the vitreous in the anterior chamber. He or she should then slowly move the vitrectomy handpiece to the level of the tear in the posterior capsule to free up any strands of vitreous coming through the posterior capsular tear. It is often safe even to go slightly deeper than the posterior capsular tear into the anterior vitreous space and to remove the vitreous from that area. Despite an extensive vitrectomy, subincisional vitreous can still be present, and placing the vitrector through a second incision site to access the primary subincisional area can be helpful. When in doubt regarding remaining vitreous at the wound, a Weck-Cel can be used to check for its presence. Once the surgeon is convinced that there is no more vitreous anteriorly, he or she can then remove nuclear material from the anterior chamber. Continued applications of an OVD can be used to trap nuclear particles in

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the angle and in the anterior chamber to prevent them from prolapsing posteriorly. It is hoped that a low bottle level, somewhere around 60 to 80 cm, will reduce the risk of the particles' being blown posteriorly. If a nuclear particle does inadvertently drop into the posterior segment, conventional wisdom advises against retrieving that particle or even attempting to irrigate it up into the anterior chamber. Sometimes during an anterior vitrectomy, small cortical and nuclear particles will make their way up toward the vitrector, but caution should be used regarding actually chasing these particles around in the vitreous cavity.

I/A AND IOL CHOICE

When the nuclear material has been removed and there is no more vitreous in the anterior chamber, it is reasonable to switch to I/A and to attempt to remove the cortical material that has adhered to the capsule. This step is often challenging, because the entire posterior capsule may be completely torn and folding upon itself to the extent that it is difficult to access the cortical material. Therefore, gentle and careful I/A must be performed to prevent further damage to the capsule, and switching back and forth between vitrectomy and I/A is necessary.

If there is a significant tear in the anterior as well as the posterior capsule, the surgeon must decide whether to suture a PCIOL or place an ACIOL. If the entire anterior capsular rim is intact, it is advisable to implant a lens in the sulcus without suturing. The excessive use of an OVD during this part of the procedure could cause it to prolapse into the vitreous cavity. The viscoelastic will not be removed during the surgery but will eventually make its way forward and cause a postoperative IOP spike. Some find it helpful to capture the optic under the anterior rim of the capsulorhexis to ensure a centered lens and to avoid postoperative iris chafing against the edge of the implant.

A three-piece PCIOL with an overall length greater than 13 mm is best suited for the sulcus space. Currently, I use a three-piece lens (LI61AO; Bausch + Lomb) or the AQ2010V (STAAR Surgical Company). I find that both of these lenses sit very well and remain stable inside the sulcus. Depending on the injector and technique, sometimes, the leading haptic can be delivered into the sulcus

space, and the trailing haptic can be delivered into the anterior chamber. Then, a Kuglen or Sinsky hook may be used to gently rotate the lens and push the trailing haptic under the iris into the sulcus space.

If the lens is not sitting centered, a large blob of vitreous may be prolapsing through the pupillary axis around the implant and displacing the optic. In this situation, it is advisable to do further vitreous removal with the vitrector and to use a Weck-Cel sponge to ensure no vitreous strands are incarcerated in the wound. A peaked pupil is another tell-tale sign that there is vitreous in the anterior chamber and/or wound. One must remember that, if the lens is placed in the sulcus, it will be sitting in a more anterior effective lens position than if it were in the capsule. Therefore, it is advisable to decrease the lens power by an additional 0.50 D less than what the biometry suggests for in-the-bag placement.

FINISHING TOUCHES

After implanting the IOL, I find it helpful to constrict the pupil with acetylcholine chloride or carbachol solution 0.01% to keep the optic of the lens posterior to the iris. This also helps to identify any peaking of the pupil

where vitreous is still present. Some surgeons find it helpful to inject triamcinolone into the anterior chamber to stain the vitreous. Once the pupil becomes round and small and the lens is centered well in the pupillary axis, I recommend placing a suture across the wound to stabilize the eye, prevent any postoperative collapse or leakage, and avert further vitreous prolapse. Postoperatively, I increase the patient's use of steroids for at least 6 weeks and watch closely for IOP spikes. A careful retinal inspection should be performed within a couple of days of surgery to ensure that no retinal detachment or retinal tear has been induced by the vitrectomy.

With patience, caution, and meticulous attention to the details of the procedure, surgeons can successfully manage an inadvertent capsular tear, and patients can achieve a successful postoperative refractive outcome. ■

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