

# Traumatic Cataract

**A comprehensive approach will minimize the risk of an unwanted outcome.**

By Randall J. Olson, MD



Although the loss of vision due to a cataract is the most obvious problem that a patient faces, I like to consider all the possibilities in regard to my surgical approach. This article therefore focuses on the patient who has a traumatic cataract without obvious zonular dialysis or iris trauma.

## GENERAL CONSIDERATIONS

Any blow to the eye that is severe enough to cause a traumatic cataract is bound to cause a loss of endothelial cells so that the cornea is no longer normal and is likely to cause some element of zonular, as well as trabecular, damage with the risk of glaucoma. Furthermore, there is always the risk of retinal pathology. During the preoperative evaluation, I like to assess each of these factors and grade the likelihood that they will become a problem in regard to surgical treatment. I also think it is important to express to the patient that, in spite of all the surgeon does, problems may occur, including an imperfect visual result.

## THE INITIAL EXAMINATION

I am particularly interested in the difference in the anterior chamber depth between the patient's two eyes, because subtle differences often represent either zonular damage or angle recession. All such eyes, therefore,

also deserve gonioscopy. Although the angle may appear normal, glaucoma in the early postoperative period or later on is a common problem and something worth trying to prevent at the time of surgery. I also check zonular strength by having patients rapidly move their eyes back and forth 10 times and stopping suddenly by focusing on the slit lamp's light, which is almost centered. I look for any signs of iridodonesis or phacodonesis.

With the dilated fundus examination, I carefully look for any retinal pathology, especially peripheral tears, as well as a posterior vitreous detachment. If there is any question, I have my retinal colleagues also repeat the examination.



**Figure 1.** A traumatic cataract is rapidly progressing to hypermaturity with partial iridoplegia. The author would expect a broken capsule with marked damage to the zonule and trabecular meshwork. Traumatic maculopathy is also likely, so he would prepare the patient for a potentially poor outcome even if the surgery is successful.

## SURGICAL CONSIDERATIONS

At the time of surgery, I feel that the endothelium deserves special protection. Even if the zonules appear completely normal, I also approach zonular integrity in a different way than usual. I feel that dispersive viscoelastics (Viscoat, DisCoVisc, or Healon D [the first two from Alcon Laboratories, Inc. (Fort Worth, TX), and the third from Abbott Medical Optics Inc. (Santa Ana, CA)]) are extremely important and generally use a soft shell-type technique. If I have any doubt, I reinject the dispersive viscoelastic to protect the cornea.

I also enter the eye with flow set very low and carefully watch what happens to the lens. Due to reverse pupillary block, before raising the bottle, I think it is important to have a second instrument ready to lift the iris so that I am only looking at zonular laxity. Then, as the bottle starts moving to its normal position, any unusual deepening of the chamber is a clear sign of difficulties with zonular integrity that I need to take into consideration. I will place a capsular tension ring as early in the case as necessary if I am concerned about zonular integrity, but I prefer to wait as long as possible to ease cortical removal.

An additional indication of zonular laxity occurs during the capsulorhexis. If the lens is obviously mobile as I attempt to tear the capsule, then zonular integrity is so poor as to warrant not only consideration of a capsular tension ring, but perhaps also some form of artificial zonular support.

## SURGICAL APPROACH

I prefer phaco chop and like to work no higher than the iris plane to protect the corneal endothelium. I also feel that phaco chop, if appropriately executed, is particularly easy on the zonules, so all forces are between the second instrument and the phaco tip. Technologies such as Whitestar (ultrapulse or hyperpulse; Abbott Medical Optics Inc.), Ellips Transversal Ultrasound (Abbott Medical Optics Inc.), and the Ozil Torsional handpiece (Alcon Laboratories, Inc.) also help by minimizing chatter and increasing efficiency, which can further protect the corneal endothelium.<sup>1</sup>

## POSTOPERATIVE IOP SPIKES

In eyes with a traumatic cataract, I anticipate that the IOP will spike early in the postoperative period. I therefore spend extra time aspirating viscoelastic from the anterior chamber and behind the lens. I also regularly instill intraocular carbachol to ameliorate the elevation in IOP. If I am particularly concerned, I will have patients take oral acetazolamide during the early postoperative period.

Surgeons' attention to a few details can minimize the

surprises and help lead to uneventful outcomes in eyes with a traumatic cataract.

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## Tips for stabilizing the capsule during phacoemulsification in the presence of zonular dialysis.

By Michael E. Snyder, MD

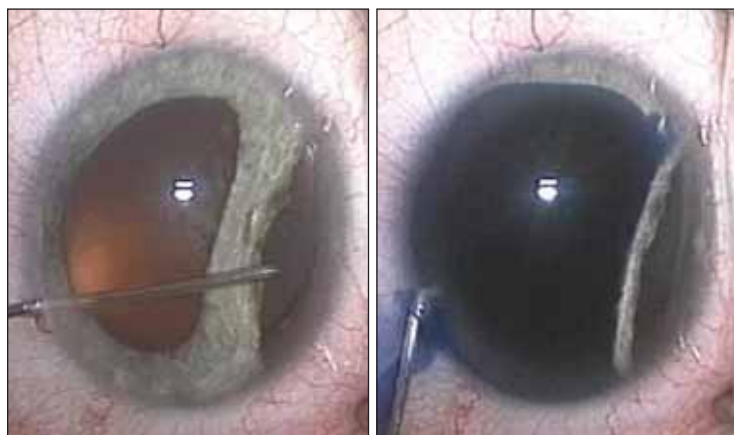


Removing a cataract from a previously traumatized eye presents several intra- and post-operative challenges. Zonular damage is one of the more common—and difficult—problems to manage, especially if the dialysis is not readily apparent during the preoperative examination. Occasionally, patients recall the past trauma only after I have encountered zonular deficiencies in the OR, and they subsequently query family members and childhood friends.

Ophthalmologists who encounter zonular damage and a highly mobile crystalline lens can simplify cataract surgery in several ways. If the eye has marked zonular damage, sometimes the only viable option is a pars plana lensectomy with vitrectomy. If the eye retains a few clock hours of normal zonules, however, the surgeon may be able to preserve the capsular bag's ability to support an IOL's fixation. This article describes some of the strategies I use to manage zonular dialysis in my patients.

## INTRAOPERATIVE STRATEGIES

When dialysis is obvious at the outset of a case, I take additional steps to prepare for surgery. First, I often introduce a vital dye such as trypan blue into the anterior chamber so I can easily detect any unexpected movement of the capsular bag. In this setting, I “plug” the exposed zonular defect with a dispersive ophthalmic viscosurgical device (OVD) before instilling the



**Figure 1.** The surgeon places DisCoVisc (Alcon Laboratories, Inc., Fort Worth, TX) on the hyaloid face to prevent trypan blue from migrating into the posterior chamber.

blue dye (Figure 1). This step prevents the stain from migrating into the posterior segment and obscuring the red reflex for the remainder of the case, which could make it difficult for me to complete subsequent maneuvers.

The most crucial step in removing a cataract from an eye with loose zonules is the safe completion of the continuous curvilinear capsulorhexis. If the patient's lens is markedly decentered, I try to position the capsulorhexis on the lens' geometric center rather than on the pupillary or corneal center. Sometimes, I stabilize the lens with a hook held in my nondominant hand as I complete the capsulorhexis.

Complete hydrodissection facilitates the manipulation of the nuclear fragments during phacoemulsification while minimizing unnecessary forces on the remaining intact portions of the zonular apparatus. I find the best way to ensure the nucleus is mobile is to perform several waves of dissection in multiple sectors.

Although the nucleus should be completely mobile within the capsular bag during phacoemulsification, the actual bag should be as stable as possible. In eyes with significant dialysis and poor zonules, I may temporarily support the capsular bag by engaging the margin of the capsulorhexis with one or more flexible iris retractors inserted into the eye through small limbal incisions. Many companies make iris retractors that work well for this purpose. A few vendors sell disposable sets specifically for this indication. Some reusable titanium capsule supports are also available for purchase.

When using any of these devices, one should remember that they are best for stabilizing the bag. Any attempt to recenter the bag with these instruments may rupture the capsulorhexis and make it

impossible to place a capsular tension ring (CTR) inside the bag.

#### TIMING THE CTR'S INSERTION

Some surgeons advocate inserting a CTR into the bag prior to performing phacoemulsification. A recent study suggests, however, that placing the ring in the capsule early during surgery places more stress on the remaining zonular fibers than inserting the device into an evacuated capsule.<sup>1</sup>

One option for stabilizing and/or recentering the capsular complex prior to phacoemulsification is to insert an Ahmed capsular tension segment (Morcher GmbH, Stuttgart, Germany) in the bag and secure it with a stitch or a hook. Alternatively, surgeons can secure an unstable bag by hooking the small clip of the Capsular

Anchor (Hanita Lenses, Kibbutz Hanita, Israel) to the edge of the capsulorhexis and affixing the device to the sclera with a small suture.<sup>2</sup> Neither of these devices is currently available in the United States.

#### PHACO TECHNIQUE

To minimize zonular stress during phacoemulsification, I break up the nucleus with a chopping technique. I maintain the depth of the anterior chamber by periodically adding a dispersive OVD. I am careful to inject an extra tamponade over the hyaloid face to re-expand the capsular fornix and to reduce the risk of inadvertently aspirating the equatorial portion of the bag into the phaco or I/A handpiece. I find that maintaining a higher pressure in the anterior versus the posterior chamber prevents vitreous from prolapsing anteriorly during phacoemulsification.

I often use the technique of dry cortical aspiration developed by Robert Osher, MD, to remove lenticular cortex from eyes with weak zonules. While maintaining the anterior chamber with an OVD, I use a 27-gauge cannula to aspirate cortex manually from the anterior chamber. This technique provides an extraordinary degree of control without producing turbulence. I do not recommend using overly aggressive measures to remove every strand of cortex, because the risk posed by leaving a small cortical wisp is superceded by the need to maintain normal zonulocapsular anatomy.

Some patients who sustain ocular trauma prior to cataract surgery may have vitreous in their anterior chamber. In these cases, I remove the prolapsed vitreous through a one-port pars plana vitrectomy (by employing anterior irrigation through a paracentesis). This approach creates an anteroposterior pressure gradient that efficiently removes the offending vitreous gel from the anterior chamber with-

out disrupting other ocular structures. At the end of the procedure, I tamponade the zonular break with an OVD to limit the risk of further prolapse.

I usually avoid performing an overly complete vitrectomy while treating patients with vitreous prolapse, because the gel can buoy the lens and limit its posterior movement when I apply irrigation to the anterior chamber. Removing too much vitreous may actually make it more difficult for me to perform phacoemulsification in eyes with weak or missing zonules. Sometimes, I use a technique developed by Scott Burk, MD, PhD, in which I instill triamcinolone into the anterior chamber before vitrectomy to improve visualization.<sup>3</sup>

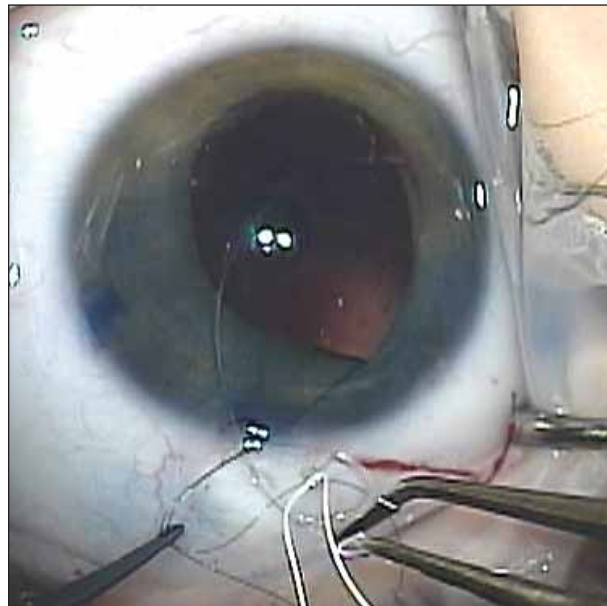
If the capsule is still intact after I remove all the lenticular material and I note more than 1 clock hour of zonular weakness, I place a CTR in the bag. If the dialysis spans more than 4 clock hours or if the capsular complex is decentered, I usually implant a Cionni Modified CTR (Morcher GmbH, Stuttgart, Germany; distributed in the United States by FCI Ophthalmics, Inc., Marshfield Hills, MA). Outside the United States, the surgeon can insert an Ahmed capsular tension segment or a Capsular Anchor with or without a standard CTR.

## INSERTING THE CTR

To facilitate the insertion of a CTR into the capsular bag, I place a traction suture through the eyelet of the ring's leading element. Traction on the suture bends the ring more tightly during insertion so that the "elbow" of the ring glides gently along the fornix of the capsular bag. Inserting or injecting a CTR without a traction suture tends to place more focal pressure on the equator of the bag, which can cause the ring's leading edge to perforate the capsule's fornix or to place undue tension on the opposing zonules.

Surgeons have not yet established the ideal suture for fixing a Cionni modified CTR. Some prefer to use 9-0 versus 10-0 polypropylene sutures, because the former are thicker and may last longer than the latter. Both types of sutures tend to break after several years, however, and therefore may not be the best material for anchoring CTRs. I occasionally use Gore-Tex sutures (off-label for ophthalmic use; W.L. Gore & Associates, Inc., Newark, DE) to secure CTRs, because this material may be more resistant to hydrolysis or mechanical breakage than polypropylene.

To secure the Cionni ring to the scleral wall, I apply just enough tension to the suture to center the ring. I prefer to pass the two ends of a double-armed suture 3 to 4 mm apart so I can gently slide the eyelet along the suspending suture and fine-tune the ring's centration. Depending on the surgeon's preference, he can



**Figure 2.** Placing tension on a nylon suture threaded through the leading eyelet of a CTR minimizes the forces exerted on the remaining zonules as the ring is inserted into the bag. The 10-0 Gore-Tex suture is visible passing through the eyelet on the fixation element.

pass the suture ab externo or ab interno. I finish by rotating the knot internal to the scleral wall to prevent it from eroding through the tissue (Figure 2).

Once I am satisfied that I have successfully inserted the CTR, I place an IOL in the capsular bag. I prefer to use highly flexible, one-piece acrylic lenses when a CTR is present.

## CONCLUSION

By paying meticulous attention to technique and carefully inserting CTRs, surgeons can safely remove cataracts from and implant well-centered IOLs in eyes that have traumatic zonular dialysis. ■

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