

# Lens Tilt Induced by Zonular Dialysis

BY LISA BROTHERS ARBISSER, MD; DAVID F. CHANG, MD; AND MICHAEL E. SNYDER, MD

*Zonular weakness or absence from undetected conditions such as pseudo-exfoliation or undocumented eye trauma can present the cataract surgeon with unexpected lens tilt, even at the beginning of nuclear removal. Having a plan to handle such a surprise can result in a positive visual outcome. Three experts explain their methods for how to provide the best possible result for the following scenario.*

*At the beginning of performing phacoemulsification on a 60-year-old patient with a 3+ nuclear sclerotic cataract, significant lens tilt into the vitreous cavity with approximately 60% of zonular weakness is noted. What do you do now?*

—Topic prepared by R. Bruce Wallace III, MD.

## LISA BROTHERS ARBISSER, MD

I exchange my chopper for a dispersive viscoelastic to stabilize the anterior chamber. If needed for visualization of the capsulorhexis' edge, I paint Trypan blue to facilitate the placement of capsular expansion hooks, preferably those by MicroSurgical Technology (MST), to support and raise the capsular bag (assuming it is still intact). I perform phacoemulsification with low-flow settings followed by automated I/A. I use a Cionni Modified Capsular Tension Ring (model 1G; FCI Ophthalmics, Inc.) sutured to the sclera with 8-0 GoreTex sutures (W. L. Gore & Associates, Inc.) (off label) to support the clean, intact capsular bag. Next, I

implant a single-piece IOL, leading to a routine result.

If the problem is a broken capsule with a descending nucleus, I would stabilize the anterior chamber with an ophthalmic viscosurgical device (OVD) and then create another paracentesis 180° from the original one to deploy opposing forces with Arbisser Nuclear Spears (Epsilon Ophthalmic Instruments). The spears skewer and raise the nucleus out of the bag above the iris plane. Replacing one spear with an OVD cannula to trap the nucleus forward, I would induce miosis by instilling Miochol-E (Bausch + Lomb) behind the nucleus. If vitreous is compartmentalized away from lens fragments, I perform slow-motion phacoemulsification over the iris. If vitreous is mixed with lenticular material, I employ extracapsular conversion to eliminate the nucleus. Intracameral preservative-free epinephrine restores mydriasis to permit definitive cleanup with a pars plana anterior vitrectomy to avoid traction. I complete the case with sulcus implantation of a three-piece IOL with optic capture through the anterior capsulorhexis.

## DAVID F. CHANG, MD

With any significant zonular dialysis or phacodonesis, I would use capsular retractors to support the capsular bag during phacoemulsification. This requires successful completion of the capsulorhexis, and to ensure this, I would tend to keep the diameter on the smaller side. My current preference is the MST retractors because of their elongated, double-stranded configuration. Capsular retractors provide numerous advantages. They support the capsular bag in the anterior-posterior direction, provide rotational stability, and they restrain the dehiscence area of the capsular bag from being aspirated into the phaco tip. These devices should ideally be inserted prior to the hydrosteps, and they will provide enough counterfixation to manually rotate the nucleus. Capsular retractors will not impede cortical aspiration, and I would delay insertion of a capsular tension ring until the cortex has been removed.

Long-term IOL fixation is a separate but important dilemma when faced with a zonular dialysis large enough to induce lens tilting. An excellent option would be scleral suture fixation of an Ahmed Capsular Tension Segment (FCI Ophthalmics, Inc.), which can be positioned in the area of the zonular dialysis. A Cionni Ring is more difficult to implant but offers similar advantages. Most surgeons, however, have neither access to nor experience with these devices. One underutilized option with extensive zonular weakness is to place a three-piece foldable IOL in the sulcus. The STAAR AQ2010V IOL (STAAR Surgical Company) has an overall length of 13.5 mm, and most importantly, has a rounded anterior optic edge, which is less likely to cause posterior iris chafe compared to sharp-edged optics. With a quadrant-sized zonular dialysis, I would capture the optic with a continuous curvilinear capsulorhexis (CCC) to prevent late rotation of a haptic toward and through the zonular defect. In this case, with a much more extensive dialysis, however, I would orient the IOL with one haptic overlying the most stable area of the capsular bag. I would then suture fixate the opposite haptic (facing the zonular dialysis) to the iris using a 10-0 Prolene McCannel suture (Ethicon Inc.) and a Siepser sliding slipknot. This would support the haptic and prevent late rotation or subluxation of the IOL. With sulcus IOL placement without optic-CCC capture, a capsular tension ring is still necessary to avoid excessive capsular bag contracture and capsulophimosis.

### MICHAEL E. SNYDER, MD

Upon noticing lens tilt and significant zonulopathy during phacoemulsification, I feel reassured when I confirm that my capsulorhexis remains intact. My goals at this point are to (1) prevent vitreous prolapse, (2) safely complete phacoemulsification, and (3) preserve the capsular bag for PCIOL fixation. My first step would be to immediately pressurize the anterior chamber with an OVD before removing the phaco tip and its irrigation sleeve. I would then make three small posterior limbal openings distributed evenly across the area of zonular dialysis, through which I would place either three capsular retractors (MST) or three flexible iris retractors, depending upon availability, and engage the retractors around the capsulorhexis' margin. The capsular retractors stabilize the equator of the bag, while the iris retractors support the margin of the CCC. My goal is to stabilize the capsular bag without making the retractors too tight. Phacoemulsification can then be completed in the near-standard approach, replenishing the lost volume in the capsular bag's periphery with

dispersive OVD throughout the case, especially if iris retractors were selected. This bag-refilling maneuver will reduce the risk of inadvertent aspiration of the capsular bag's equator. With this degree of zonular loss, a suture-fixated Cionni Ring or Ahmed Capsular Tension Segments would be required to preserve the bag. I prefer GoreTex sutures for this use (off label) and prefer to pull the blunt suture end through the scleral wall using 25-gauge microforceps. After the retractors are removed, and once the IOL is in the capsular bag, I adjust the suture's tension to center the IOL, rotating the knot internal to the wall of the eye. Intraocular carbochol (Miostat; Alcon Laboratories, Inc.) can reduce the risk of postoperative IOP spikes from retained OVD under the iris or in the anterior vitreous cavity. ■

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