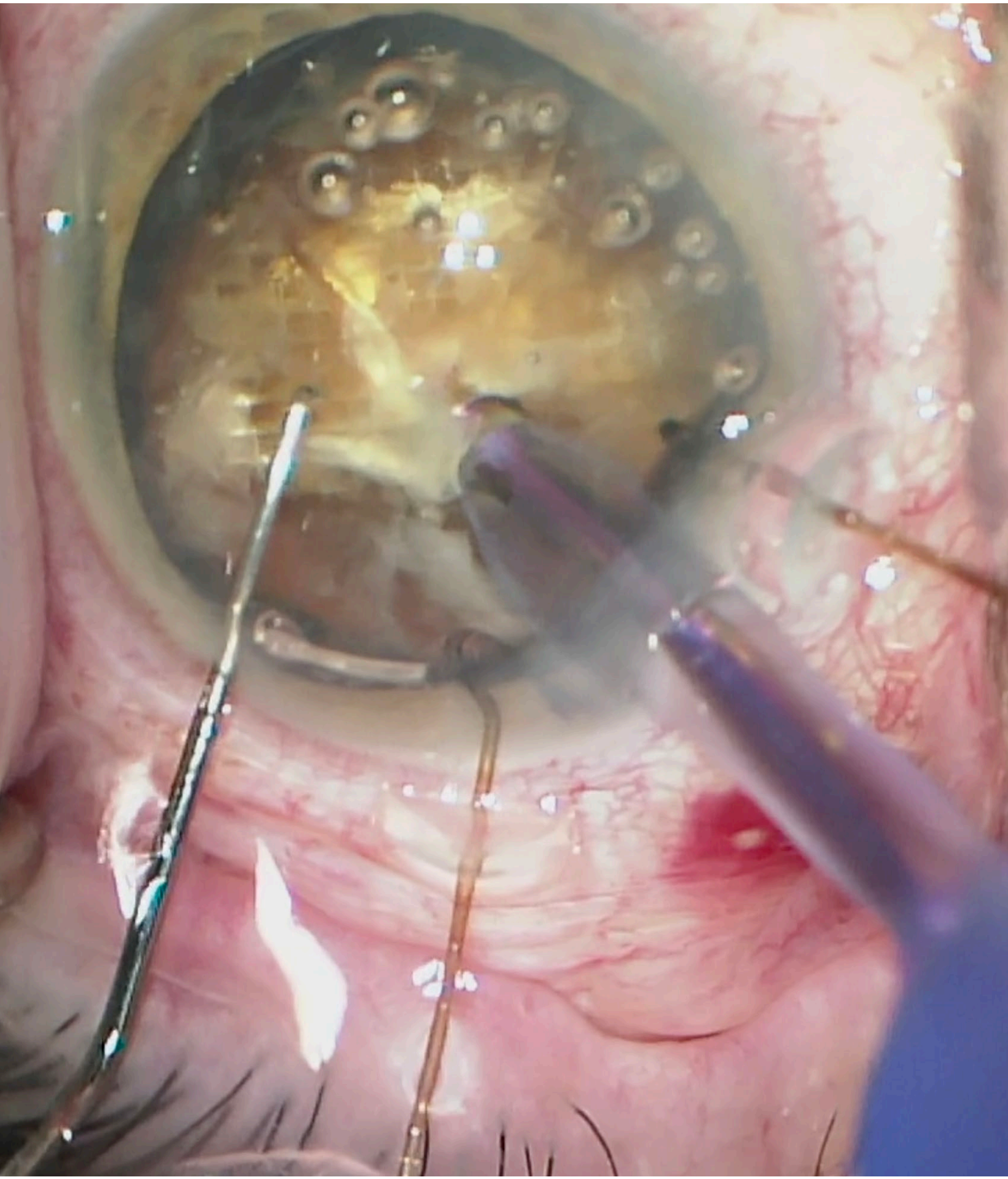
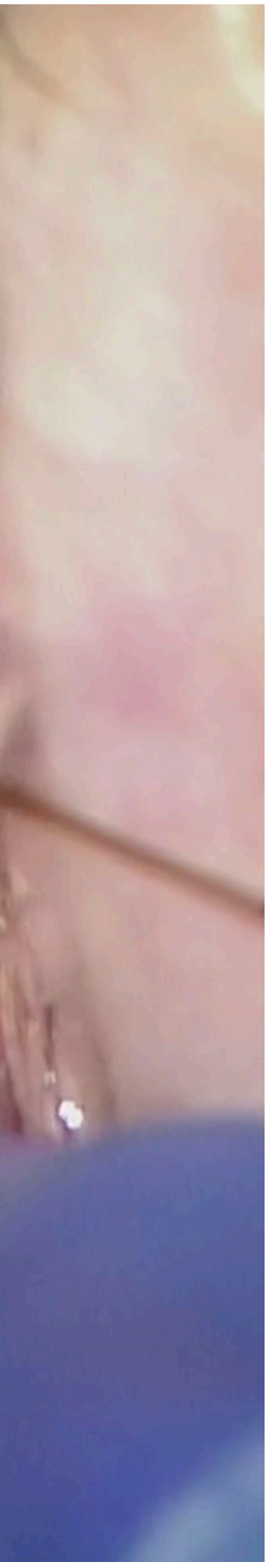




Marjan Farid, MD

Difficult Cataract Cases

Eighteen video case presentations covered the full spectrum of cataract surgical complications, from the spectacular save to the demoralizing mistake.

AT AAO 2022, THE 21ST ANNUAL SPOTLIGHT ON CATARACT Surgery Symposium was entitled "M & M Rounds: Learning From My Mistakes." Cochaired by Nicole Fram, MD, and myself, this four-hour case-based video symposium focused on cataract and IOL surgical complications.

Even the very best cataract surgeons suffer complications that challenge us to react, think, and operate under pressure. How and what we learn from our mistakes makes us better ophthalmologists. For this symposium, 18 cataract experts presented a stressful case in which something went wrong and a complication occurred that tested their skills, decision-making, and nerves. What did they learn, and what would they do differently? At critical decision points during the case, the video was paused and the attendees were asked to make clinical decisions using audience response polling. Next, two discussants (who had never viewed the case) were asked to make their own management recommendations and to comment on the audience responses before the video of the outcome was shown. The audience voted on the best teaching cases and for those surgeons who displayed the most courage, both in the OR and at the podium (see page 56).

Complications included chambers that became either too shallow or too deep; capsulorrhexis problems; nuclei that were impenetrable to chopping, the miLOOP, or the femtosecond laser; device misadventures; subluxated IOLs; iris prolapse and iatrogenic iridodialysis; aqueous misdirection; wound burn; suprachoroidal hemorrhage; capsule complications with premium IOLs; and capsules or zonules torn at virtually every stage of surgery. Liliana Werner, MD, PhD, concluded the symposium by delivering the 18th annual AAO Charles Kelman Lecture, entitled "25 Years Evaluating New IOL Technology and Complications."

This *EyeNet* article reports the results of the 34 audience response questions, along with written commentary from the symposium presenters and panelists. Because of the anonymous nature of this polling method, the audience opinions are always honest and candid and were discussed in real time during the symposium by our panelists. For instructions on viewing the videos, see page 51.

Finally, I want to especially thank our 18 video presenters. We would all prefer to showcase our best surgical triumphs instead of our complications in front of a large audience of colleagues. We appreciate their humility and generosity in sharing these cases with us, so that we might all learn important surgical lessons from them.

—David F. Chang, MD
Cataract Spotlight Program Cochairman

QUESTION 12.1. *Despite femtosecond laser segmentation, this ultrabrunescent nucleus proves too difficult to fracture with the chopper.*

Case 1: Sculpting Complication

After sculpting and emulsifying the nucleus, Jeff Pettey noted sudden deepening of the chamber with a wide central posterior capsular defect. The epinucleus remained, and the phaco handpiece was still in the anterior chamber.

Q 1.1 Upon noticing the posterior capsular rupture (PCR), how would you remove the epinucleus?

- Lower vacuum—aspirate epinucleus with phaco 0.0%
- Inject ophthalmic viscosurgical device (OVD)—then #1 ..... 95.0%
- IOL scaffold—then #1 ..... 0.0%
- Switch to irrigation and aspiration (I/A) for epinucleus 0.0%
- Triamcinolone stain before continuing 5.0%

Jeff Pettey Our case addresses the fundamental question of how to proceed when a PCR is identified. Thankfully, our Pavlovian response to first place viscoelastic guides the initial step, and 95% of the audience agreed.

Your next decision can mean the difference between an uncorrected VA of 20/25 versus a dropped lens and a return to the OR. The reader may question whether you should place vitreous stain or perform anterior vitrectomy before proceeding with epinucleus removal, and both are reasonable next steps. In this case, we identified an intact anterior hyaloid and placed dispersive OVD as a partition from the anterior chamber. During epinucleus removal, you may need to lower your aspiration, vacuum, or IOP beyond your standard low-flow epinucleus setting to maintain the viscoelastic partition. Reducing your aspiration and vacuum by 30% is a good start; you can move up from there as needed.

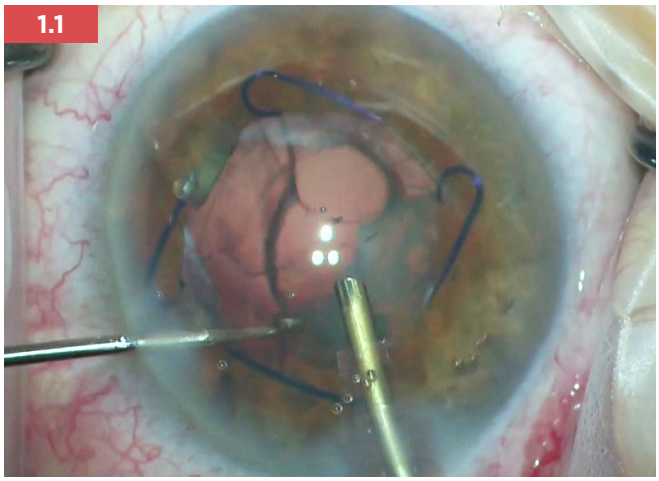
Q 1.2 How would you remove the cortex with an open posterior capsule?

- Coaxial I/A 0.0%
- Biaxial I/A 18.5%
- Biaxial using vitrectomy cutter 25.9%
- Dry aspiration with OVD 14.8%
- Triamcinolone stain before continuing 40.7%

Terry Kim The audience response to this question is varied, but the most popular response is to inject triamcinolone to stain and visualize any vitreous prolapse into the anterior chamber. This is a very reasonable initial step that can help determine the best approach for cortex removal in this scenario with an open posterior capsule. If there is evidence of vitreous prolapse, removing the vitreous from the anterior chamber prior to cortex removal would be a wise step before dealing with the cortex.

Once the vitreous is addressed, cortex removal can be performed with a variety of techniques. Biaxial I/A using a vitrectomy tip or an I/A tip are both reasonable and included in the audience response. If the vitrectomy tip is used, make sure that the vitrectomy setting on the phaco machine is set to I/A-Cut (vs. Cut-I/A) to help minimize accidental damage or trauma to the capsular bag (which is important for IOL fixation in the sulcus space). Dry aspiration (no irrigation) and OVD insertion represents another reasonable approach.

1.1



QUESTION 1.1. *Central posterior capsular defect is discovered during emulsification of the nucleus.*

Case 2: Iatrogenic Anterior Capsulotomy Puncture

After lysing posterior synechiae in an eye with a small pupil, Soosan Jacob inadvertently punctured the anterior capsule while making a paracentesis incision.

Q 2.1 How would you initiate the capsulotomy following the accidental puncture of the anterior capsule?

- Initiate continuous curvilinear capsulorrhexis (CCC) from the puncture site 45.5%
- Encircle the puncture site with a manual CCC ... 54.5%
- Make a can-opener capsulotomy 0.0%
- Bring the patient to the femtosecond laser 0.0%
- Make a Zepto (Centricity Vision) capsulotomy 0.0%

Bonnie Henderson Every cataract surgeon has inadvertently punctured the anterior capsule at some point in his or her career. If you have not, you have not done enough cataract surgery. As with most unexpected occurrences, each situation differs slightly. There is no standard best approach—it depends on the location and size of the puncture. The audience was split in its approach, with a slight preference for encircling the puncture site with a manual CCC. If the puncture site is within 3 mm of the center of the anterior capsule, then encircling the entire puncture will render it inconsequential because the weakened site of the accidental entry will be removed entirely. However, if the puncture site is too peripheral, encircling the site may be difficult and could cause an uncontrolled extension of the CCC toward the zonules.

Initiating the CCC from the puncture site depends not only on the location but also on the configuration of the puncture. If the puncture configuration is linear and oriented radially, rather than tangentially, to the CCC, the puncture

Jeff H. Pettey, MD, MBA

can act as the initial cut that simulates the cystotome nick normally used to start the CCC. If the puncture is not linear but rather star shaped, it still can be used to start the CCC; but at the conclusion of the CCC, it is better to incorporate all the radiating cuts to avoid any extensions.

If attempts to either encircle or initiate the CCC with the puncture site fail, then making additional relaxing radial cuts (i.e., the can-opener technique or simply four other cuts in each quadrant) will distribute the pressure around the diameter of the capsular opening. Attempting a femtosecond laser–or Zepto-assisted opening in the setting of a punctured anterior capsule is not recommended, as additional pressure on the lens could cause further damage to the capsule.

Q 2.2 The anterior capsular tear has now extended radially—how would you proceed?

- Use Brian Little's capsular tear rescue maneuver 35.1%
- Incise the base of the flap to create a new edge to continue tearing 21.6%
- Make a cut at the opposite edge and tear from there 29.7%
- Convert to a can-opener capsulotomy 10.8%
- Make one or two radial relaxing cut(s) in the capsulorrhexis edge 180 degrees away 2.7%

Soosan Jacob In this case, the 26-gauge needle I had used to create a paracentesis inadvertently punctured the anterior capsule when the anterior chamber shallowed. I initiated the rhexis from the opposite quadrant, planning to take the rhexis around the tear, but unfortunately, the puncture site was in the peripheral anterior capsule. The tearing margin became continuous with the needle puncture, causing a radial tear in the capsule. My thoughts coincided with the most popular option (35.1%) of the audience: I did try Brian Little's capsular tear rescue maneuver, but the peripheral tear refused to turn around and come centrally. Wary of causing further peripheral extension of the tear, I used a microscissors to make a cut at the base of the flap and continued tearing from this new edge (option 2) to successfully complete the rhexis. This gave me a rhexis with one radial tear.

I continued with slow-motion phacoemulsification, avoiding any form of capsular stretch, nuclear rotation, or any other intracapsular stress maneuvers. I also tried to avoid chamber fluctuations by injecting viscoelastic before withdrawing the phaco or I/A probe.

Most important, I had read earlier about the flap motility sign described by Om Parkash et al.,[1] and I was able to identify this in my case. This sign distinguishes a capsular tear as pre-equatorial when the two flap edges on either side of the radial tear are everted and fluttering and as retro-equatorial when the flaps edges are inverted and not fluttering. Phacoemulsification may proceed carefully in case of a pre-equatorial tear, whereas in the case of a retro-equatorial tear, it may be better to convert to extracapsular cataract extraction (ECCE).

1 Parkash RO et al. *Clin Ophthalmol.* 2107;11:1445-1451.

Case 3: Brunescent Lens in High Axial Myope

Mitch Weikert operated on an eye that had developed a brunescent lens following a pars plana vitrectomy. The chamber was unusually deep. A 4-to-5 clock-hour zonular dialysis was noted after one heminucleus was removed.

Q 3.1 Recognizing a zonular dialysis, what would you do before continuing phaco?

- Inflate the capsular bag with dispersive OVD 55.2%
- Prolapse the heminucleus and perform supracapsular phaco 3.4%
- Insert capsule retractors or capsular tension segment (CTS) 20.7%
- Insert a capsular tension ring (CTR) 6.9%
- Both #3 and #4 ..... 13.8%

Mitch Weikert I think the audience was right on the money here. In fact, any of the choices are appropriate management steps when employed at the appropriate time. Inflating the capsule with dispersive OVD will decrease the risk of contact with the phaco needle, and the capsule will be better maintained as the case proceeds. Capsular support devices can be very helpful in stabilizing the lens for the remainder of the case. Filling the capsule and anterior chamber with OVD is key to minimizing vitreous prolapse when the infusion handpiece is removed from the eye.

In this case, after filling the capsule and anterior chamber, we attempted to place capsule retractors, but the nucleus was too deep. If we had inflated the anterior chamber less after filling the capsule, we might have had an easier time inserting the retractors. Fortunately, the dispersive OVD supported the capsule enough to permit careful phacoemulsification of the remaining nucleus. Periodic refilling with OVD can be helpful in this situation, as a significant proportion may be aspirated with the nuclear material. A blunt second instrument, such as a spatula, will help protect the posterior capsule from the phaco needle as the last of the nuclear material is removed.

Insertion of a CTR before all the nuclear material is removed may help stabilize the capsule, but doing so can introduce additional risk if a capsular tear occurs during removal of the remaining lens. In our case, we placed a CTR after the nucleus was removed but ran into difficulties with its insertion due to the depth of the anterior chamber. The CTR got stuck in the anterior chamber, and intraoperative gonioscopy proved invaluable in its retrieval. After we visualized it with the gonio lens, the CTR was grasped with microforceps and externalized through a paracentesis with the aid of a Sinskey hook.

The CTR was easily reinserted into the capsule after it was filled completely with cohesive OVD, but the anterior chamber was filled just enough to maintain a workable space. By not overfilling the anterior chamber, we were able to keep the plane of the capsule more shallow and better positioned for horizontal CTR insertion.

Q 3.2 After the nucleus and cortex are removed, what method of IOL fixation would you choose, considering the 4-to-5 clock-hour zonular dialysis?

- Anterior chamber IOL (AC IOL) 2.1%
- One-piece IOL in the bag with CTR 48.9%
- Three-piece IOL in the bag (haptic aimed toward the dialysis) 19.1%
- Three-piece IOL in the ciliary sulcus 27.7%
- Scleral-sutured CTS or CTR in the bag 2.1%
- Other 0.0%

Bill Wiley In a case where there is a region of zonular dialysis, the surgeon must make decisions about what type of IOL to use and where to place it. In general, there are a few potential solutions to this problem, and the choice often depends on what lenses are available, whether a premium or toric IOL was planned, and, finally, the surgeon's comfort with the particular options.

I agree with the audience's most common answer of a one-piece IOL in the bag with CTR. The CTR stabilizes the bag by functionally bridging the area of zonular weakness. This allows one to implant an intended single-piece IOL in the bag. As all premium lenses are on one-piece platforms, and most surgeons use a one-piece lens for their monofocal of choice, this option enables the surgeon to proceed with the planned IOL.

Sulcus placement of a three-piece IOL is also a reasonable choice, particularly if the surgeon was concerned about long-term stability of the zonule-bag complex. This may be the preferred choice if there is potential for the zonules to weaken further, resulting in a subluxated bag. That being said, IOLs placed in the sulcus may not be completely secure and carry a risk of decentration or subluxation.

A three-piece IOL in the bag may be a good choice for those surgeons whose go-to monofocal IOL is a three-piece lens. This choice can be suitable because the haptics may act as a tension ring, distributing the forces across the weak area and stabilizing the zonular dialysis. The technique works for smaller, focal areas of zonular weakness but may not be sufficient for more extensive clock-hours of disruption.

A scleral-sutured CTS would certainly stabilize an area of weakness and would be an effective technique, likely providing the most stability in situations of zonular loss. However, not all surgeons have the skill set for, or comfort level with, scleral fixation. Furthermore, depending on the amount of zonular weakness, this option may be more invasive than necessary and may not be required for such a small area of zonular weakness.

Case 4: Zonulopathy Plus miLOOP Complication

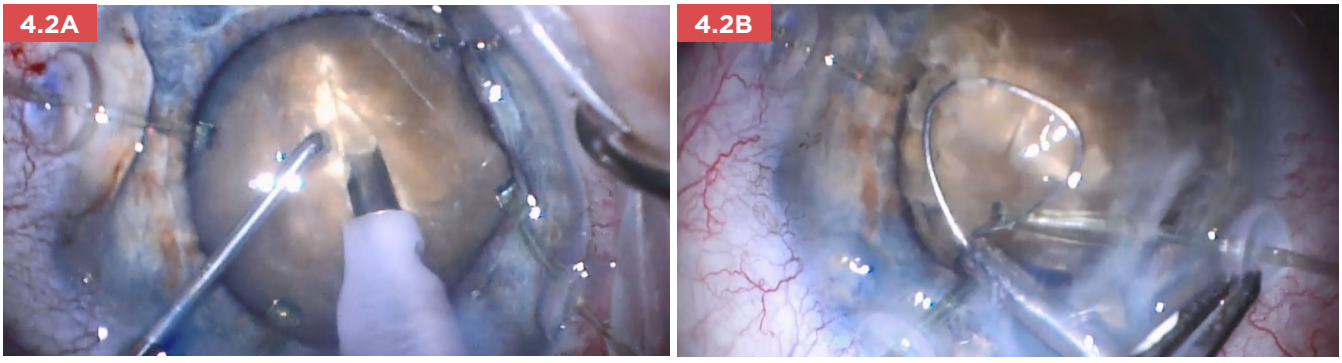
Tom Oetting presented a case with an ultrabrunescent lens where significant diffuse zonulopathy became apparent during the capsulorrhexis.

Q 4.1 Following completion of the CCC, how would you proceed?

- Cautiously commence phaco 33.3%
- Insert CTR before phaco 13.3%
- Insert capsule retractors before phaco 26.7%
- All of the above 13.3%
- Convert to a manual ECCE 13.3%

Audrey Talley Rostov It is always challenging when a zonulopathy presents itself during the capsulorrhexis. In this case, a third of the audience chose to cautiously commence with phaco, while about 27% chose to insert capsule retractors before phaco. An additional 13% selected a combination of these techniques. I would have opted for a combined approach of cautiously beginning the phaco and inserting the capsule retractors very soon after. A careful phaco of the lens can be initiated with care taken not to exert too much force when engaging the nucleus. I would have added some more dispersive viscoelastic after commencing phaco to allow for easier placement of the capsule retractors.

It is interesting that 13% of respondents would have chosen to place a CTR prior to phaco. With a dense brunescent lens, the epinucleus can be very leathery and adherent to the capsule; placement of a CTR at this early point in the case would be extremely challenging. I would not have selected this option. An additional 13% of the audience chose to convert to manual ECCE. This is another good option, especially with a very hard, brunescent cataract in the setting of zonulopathy. Placing some dispersive viscoelastic after initiating phaco, the surgeon can try to viscodissect the lens from the capsule and convert to ECCE. Converting to ECCE



Thomas A. Oetting, MD

QUESTION 4.2. *(A) The rock-hard lens could not be fragmented with chopping. (B) After attempting to bisect the nucleus with the miLOOP, the device became entangled with one of the capsule retractors.*

is a good skill to have at the beginning of a complex case with a brunescent lens, or even during the phaco, if it appears that continuing phaco could be more traumatic than prolapsing the lens out of the bag and proceeding with modified ECCE.

Q 4.2 After you placed capsule retractors and encountered difficulty bisecting the nucleus, what would you do next?

- Continue phaco (sculpt more and chop) 43.6%
- Implant a CTR 10.3%
- Employ the miLOOP (Zeiss) 12.8%
- Employ the miLOOP after first removing retractors 2.6%
- Convert to manual ECCE 30.8%

Tom Oetting For this Spotlight Session, I presented a case with a dense lens and loose zonules with an intact capsulorrhexis. I placed capsule retractors and had solid support of the lens and capsular bag. The lens density made chopping the nucleus tricky for me. The question presented several options for continuing. Most of our wise audience suggested either continuing phacoemulsification (i.e., try harder) or converting to a manual ECCE. In retrospect, these are both great ideas. Instead, I used the miLOOP to disassemble the crystalline lens into two pieces. Then I tried phacoemulsification with the two pieces after miLOOP splitting of the nucleus but continued to have trouble with the denser lens. I then made the fateful decision to try the miLOOP again to split the crystalline lens into four pieces. Unfortunately, I caught the miLOOP on one of the retractors and injured the capsule in the process. After untangling the miLOOP and the retractors, I extended the incision and brought out the pieces with a limbal manual ECCE. The IOL was placed in the sulcus, and the patient recovered slowly.

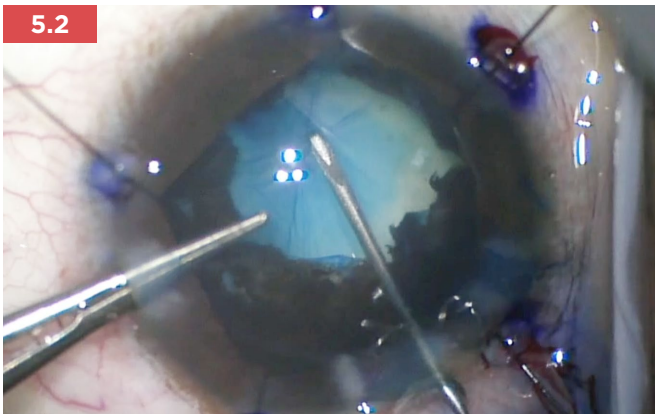
Case 5: Uveitis and Fibrotic Anterior Capsule in One-Eyed Patient

Zaina Al-Mohtaseb's case was a one-eyed patient with uveitis and a miotic fixed pupil due to posterior synechiae. After Dr. Al-Mohtaseb placed iris retractors and used trypan blue dye, the anterior capsule appeared to be a fibrotic membrane.

Q 5.1 The anterior capsule cannot be incised with the cystotome—how would you proceed?

- Incise the anterior capsule with intraocular scissors 53.5%
- Open the anterior capsule with a vitrectomy handpiece 9.3%
- Try using the femtosecond laser 2.3%
- Employ Zepto 2.3%
- Convert to ECCE using a can-opener capsulotomy 32.6%

Sumitra Khandelwal Starting the anterior capsulotomy is something we often take for granted, but it can be quite challenging in complex cases. One example is weak zonules—instead of a taut anterior capsule, one encounters a trampolining effect and difficulty starting the rhexis. Anterior capsule fibrosis is another example where the sharpness of the cystotome is not enough to cut into the scarred anterior capsule. In this case, it is important to use a tool that does not rely on the tautness of the anterior capsule.



QUESTION 5.2. *The cystotome is unable to puncture the anterior capsule in this eye with a history of uveitis.*

The audience went with the intraocular scissors—certainly, using the sharp edge downward could create a hole that one could then use to start the capsulotomy. The scissors are very helpful when the rhexis is not opening in a curvilinear fashion because of capsule pathology. However, the scissors may not be sharp enough, in which case the anterior vitrectomy handpiece can be an excellent tool and is readily available. Certainly, there is a cost associated with opening the kit, but there is also a cost for other options like femtosecond laser or Zepto, which might or might not work in these cases. Finally, ECCE could be an option, but you still need a capsulotomy. Alternatively, an intracapsular extraction may need to be performed, which can be associated with increased vitreous traction and other possible complications.

Q 5.2 The nucleus was successfully extracted. Because of diffuse zonulopathy, the lens capsule was removed with the vitrectomy handpiece. What IOL would you place in the absence of capsular fixation in this uveitic eye?

- AC IOL 13.5%
- Posterior chamber IOL (PC IOL) with intrascleral haptic fixation (ISHF; Yamane or glued) 16.2%
- Iris-suture fixation of PC IOL 2.7%
- Scleral-suture fixation of PC IOL 8.1%
- Leave aphakic 59.5%

Zaina Al-Mohtaseb A majority of the audience (59.5%) thought that after this long case, they would leave the patient aphakic, and that is what I decided to do! Although I perform many Yamane ISHF surgeries, in this case I decided to leave the patient aphakic because after removal of the cataract and the capsule, I saw a dense vitreous hemorrhage. Given the unknown visual potential and the possibility that

Zaina N. Al-Mohtaseb, MD

the patient would need retina surgery in the future, I decided to defer intrascleral fixation. In addition, it was a long case and the patient had become uncomfortable, so that was another reason to defer.

Case 6: Small Pupil, Pseudoexfoliation, and Rock-Hard Eye

Tom Samuelson's patient was an 81-year-old man with age-related macular degeneration (AMD) and pseudoexfoliation glaucoma. After placing a Malyugin ring, Dr. Samuelson removed the nucleus and implanted an IOL. The patient became agitated, and the eye became rock hard, with shallowing of the anterior chamber.

Q 6.1 What would you do, considering that the Malyugin ring is still in the eye?

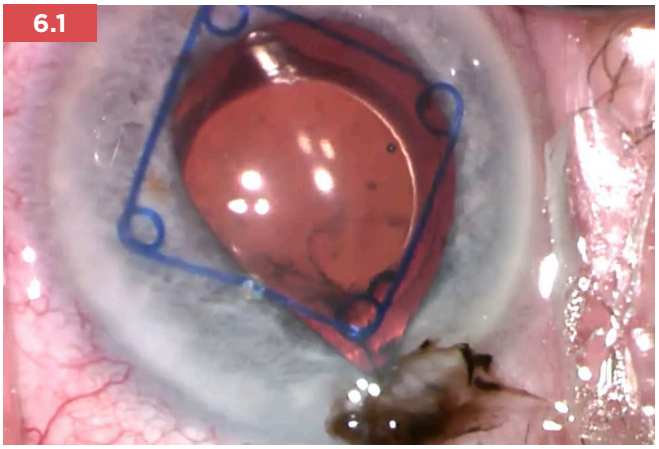
- Remove the Malyugin ring and OVD 16.1%
- Perform a pars plana tap next 16.1%
- Stop surgery and return to the OR in one hour .. 19.4%
- Abort surgery and send the patient home with acetazolamide (Diamox) 3.2%
- First suture the incision, then follow #3 or #4 ..... 41.9%
- Other 3.2%

Thomas Kohnen In this difficult case, I would be afraid of a choroidal effusion. The guiding principle for avoiding choroidal effusion during surgery in short eyes is to maintain the anterior chamber at all times. This sometimes requires the surgeon to use a viscoadaptive OVD and, when exiting the eye, to never let the anterior chamber become shallow.

In this 81-year-old patient with a small pupil and pseudoexfoliation after cataract surgery and IOL implantation, a rock-hard eye could be a sign of choroidal effusion. Therefore, I would first—and most important—suture the incision to avoid a catastrophe. Most likely, residual OVD would still be in the anterior chamber, which could cause a later pressure rise; but it would also help to prevent a flat chamber. At this point, I would stop further surgery and leave the patient controlled in the OR for 30 to 60 minutes; in addition, I would give him intravenous (IV) carbonic anhydrase inhibitors. If he has pain, I would also administer IV pain medication. If the IOP is sufficiently controlled, the Malyugin ring could be explanted on that day; alternatively, it could remain in place for some time until the pressure in the eye is completely normalized. Removing a Malyugin ring can be very difficult, and careful maneuvering is necessary to avoid any damage to the iris.

If malignant glaucoma were to occur, the choroid could be treated with a scleral window. Postoperative atropine and carbonic anhydrase inhibitors should be administered, and Nd:YAG laser treatment to the anterior hyaloid face or an iridozonulohyaloidectomy may be necessary.

Tom Samuelson This patient had poor vision with lost fixation in his fellow eye. Thus, despite advanced exfoliation-related glaucoma and moderate AMD, the surgical eye was his better eye by a wide margin. Phacoemulsification, placement of an IOL, and glaucoma microstent implantation were planned. However, immediately after the IOL was implanted, the patient became agitated, with considerable thrashing about. The eye became quite firm, and the anterior chamber shallowed substantially. An intraoperative suprachoroidal hemorrhage was strongly suspected. It was now a race to finish the case and secure the wound. The plan to place the microstent was aborted, and all efforts were directed toward removing the pupillary expansion ring and viscoelastic material as suggested by option 1. Intravenous sedation relieved the agitation. Acetazolamide and mannitol were also administered intravenously.



QUESTION 6.1. *Iris prolapse and anterior chamber shallowing occur before the Malyugin ring is removed.*

Unfortunately, repeated attempts to remove the ring with usual techniques were met with iris prolapse and further shallowing of the anterior chamber. In my opinion, a pars plana vitreous tap (option 2) was contraindicated, given the likelihood of an expanding choroidal bleed. Stopping surgery and returning to the OR in an hour (option 3) is a very reasonable alternative. If this course of action had been selected, I would have performed a fundus and portable slit-lamp examination in the recovery room an hour later; and if the anterior chamber depth and IOP were reasonable, we could return to the OR and remove the ring.

However, if the anterior chamber depth was inadequate, the eye still quite firm, or the hemorrhage large and expanding, option 4 would be a better choice. Option 5 is simply a safer version of options 3 and 4 and was the favorite response of the live audience. This, too, would have been my preferred course of action if attempts to remove the ring were unsuccessful after a reasonable amount of time.

Indeed, I was unable to remove the ring with the usual techniques. I was initially reluctant to cut the ring, fearing that the jagged margins of the cut ring would be more damaging to the endothelium than an intact ring would be in the event that the ring couldn't be removed. Ultimately, I decided to cut the portion of the ring that was outside the eye. To my relief and surprise, the entire ring followed easily out of the wound. The prolapsing iris was swept from the wound

Thomas W. Samuelson, MD

through a separate incision and reposited back into the anterior chamber, the wound was sutured, and the patient returned to the recovery room. Fundus exam in the recovery room revealed a moderate suprachoroidal hemorrhage in the temporal periphery, which had stabilized. While the IOP was difficult to control perioperatively, the eye stabilized over the next several days, with improvement over preoperative acuity.

Case 7: IOL Exchange for Bag-IOL Dislocation

Elizabeth Yeu performed an IOL exchange for a patient with a dislocated bag-IOL complex. While Dr. Yeu was making scleral flaps for ISHF of a PC IOL, one scleral flap incision perforated, with gaping exposure of the choroid.

Q 7.1 What strategy would you employ for the IOL exchange?

- Iris-suture fixation of PC IOL 12.9%
- Scleral-suture fixation of PC IOL..... 6.5%
- ISHF–glued flap fixation of PC IOL (different quadrants)..... 25.8%
- ISHF–Yamane fixation of PC IOL..... 25.8%
- Iris claw or AC IOL..... 29.0%

Rich Hoffman For most IOL-bag dislocations, I prefer to use the IOL that is present within the eye and fixate the lens haptics (through the bag) to the sclera. This can be accomplished with 9-0 Prolene in older patients and CV8 Gore-Tex if the patient has a life expectancy greater than 20 years. The fixation can be performed in scleral pockets without conjunctival dissection or through sclerotomies after the conjunctiva is opened in order to gain access to bare sclera. Newer techniques are also utilizing 6-0 Prolene with a double-flanged belt loop. When the IOL-bag complex is dislocated onto the retina, it is easiest to remove the bag and IOL and perform fixation with a new IOL.

Iris fixation is an option with the original IOL once it has been removed from the capsule; however, it is not a good option. My experience has been that iris-fixated IOLs without some capsular support or vitreous support usually result in significant pseudophakoiridodonesis, which can lead to vitreous hemorrhages, uveitis, and loss of the IOL haptic from the iris-fixation suture.

Scleral fixation of a PC IOL with sutures was the least popular audience response but is perhaps one of the easiest techniques for individuals not familiar with ISHF. The easiest, most reliable approach for suture fixation would be using a CZ70BD IOL (Alcon) and suturing with Gore-Tex through two sclerotomy sites for each haptic eyelet, parallel with the limbus. This would require a larger incision for insertion of the IOL but would also allow for removal of the IOL-bag complex without having to dissect the IOL from the capsular bag. Various foldable IOLs could also be sutured through smaller incisions.

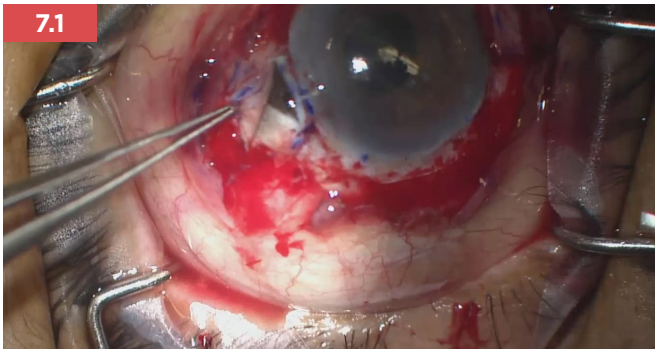
For this particular patient, repeating the ISHF–glued-IOL technique in a different quadrant might be my least likely choice. Why did the full-thickness perforation develop? Was there previous surgery at the perforation site, such as a scleral tunnel cataract procedure, or does this individual have very thin scleral tissue that might develop the same complication in flap sites 90 degrees from the first attempt? Unless you are sure of the reason for the complication, it might be best to try a different technique.

ISHF using the Yamane technique affords the best chance of a successful outcome because scleral dissection is not required. The fixation sites would also need to be rotated 90 degrees away from the perforation site, and familiarity with the technique is essential. Although the original IOL could be utilized, most surgeons performing this technique prefer the Zeiss CT Lucia three-piece IOL because of its almost indestructible polyvinylidene fluoride (PVDF) haptics. PVDF haptics will not permanently distort during the aggressive manipulation that can sometimes occur during the Yamane procedure.

Finally, 29% of the audience chose an iris claw or AC IOL. Multiple studies have shown that AC IOLs have a similar safety profile as scleral-sutured PC IOLs when they are sized correctly. In an older patient without corneal endothelial disease, glaucoma, or significant iris defects, an AC IOL is a reasonable option. It can be performed very quickly, which is an advantage after a very complicated or prolonged procedure.

Elizabeth Yeu As noted, one of the scleral flaps intended for ISHF with glue could not be utilized, as it went too deep and exposed the choroid. Thus, the patient's comorbidities (i.e., glaucoma, uveitis-glaucoma-hyphema [UGH] syndrome, etc.), any prior ocular surgeries, the surgeon's preferences for secondary IOL techniques, and the "real estate" available to perform other secondary IOL procedures will dictate the alternative secondary IOL choices. These several variables help explain why there is no really clear winner in the audience response for what IOL option to perform next. The most popular options were ISHF–glued flap fixation of PC IOL (different quadrants), ISHF–Yamane fixation of PC IOL, and iris claw or AC IOL.

In this specific patient, who started with a malfitting AC IOL that I had just explanted, a nasal-temporal intrascleral scleral flap or Yamane-fixation technique would be less



QUESTION 7.1. *A scleral flap intended for use in glued intrascleral haptic fixation went too deep, exposing the choroid.*

Elizabeth Yeu, MD

familiar and somewhat awkward to perform, as I generally perform these along the superior and inferior quadrants. Thus, I chose to proceed with what I believed would be the most definitive solution to mitigate IOL tilt or avoid returning to OR: transscleral suture fixation of a CZ70BD IOL using 8-0 Gore-Tex.

Case 8: Saving a Dislocated Multifocal IOL

Brandon Ayres presented a patient with a dislocated bag and three-piece multifocal IOL who wanted to keep the same multifocal IOL if possible.

Q 8.1 Would you refixate his multifocal IOL or perform an IOL exchange?

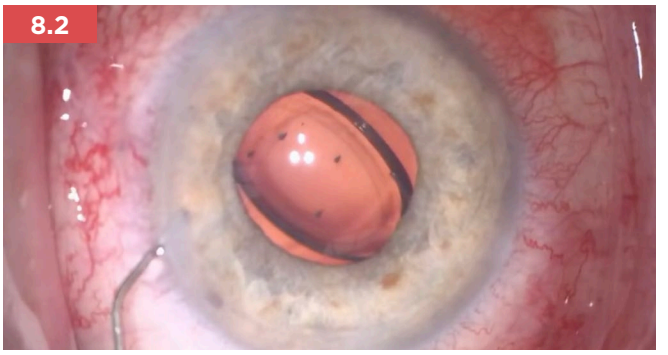
- Scleral-suture fixate the same multifocal IOL..... 56.5%
- ISHF of the same multifocal IOL..... 6.5%
- Exchange with a scleral-sutured PC IOL..... 2.2%
- Exchange with an ISHF PC IOL (e.g., Yamane)..... 4.3%
- Exchange with an AC or iris claw IOL..... 8.7%
- Refer the patient elsewhere..... 21.7%

Michael Snyder As a plano presbyope, I viscerally feel the inconveniences of lost accommodation. For a patient who has long enjoyed his multifocal IOL, the prospect of potential loss of presbyopic correction is an inevitable disappointment. In this case, the patient (an ophthalmologist himself) was adamant about retaining his subluxed IOL. Each of the six options presented here is suboptimal, highlighted by the fact that more than 1 in 5 respondents would prefer to punt this case elsewhere. Dr. Ayres was the "elsewhere," six states away from the patient's home!

Two-thirds of respondents would have retained this IOL with either suture fixation or ISHF. More than half would have attempted to suture this IOL to the scleral wall. This is a very reasonable option, especially in this case where there is capsule encasing the IOL, since the capsule reduces the likelihood that a loop suture around the haptic would slide off the end of the haptic. Loops sutures are less viable, however, when there is significant Soemmering ring material, which can impinge upon the angle. A smaller group (6.5%) chose ISHF, as did Dr. Ayres. (Spoiler alert: this failed, resulting in an early post-op tilt of almost 90 degrees, with the IOL nearly orthogonal to the iris plane, requiring a second procedure.) The biggest challenge with ISHF is exactly what vexed this case—avoiding tilt, which can occur even in the most expert of hands.

Personally, I would have favored an IOL exchange for a PMMA PC IOL using four-point suture fixation, the option chosen by only a paltry 2.2% of respondents. Although this technique takes a little more time than a smooth Yamane fixation, it is reliably reproducible, with a vanishingly small return-to-OR rate. However, in this case, the patient strong-armed Dr. Ayres away from this more tried-and-true technique (in which he is well versed).

IOL exchange with ISHF was the choice of 4.3% of the audience. This is the second procedure that Dr. Ayres executed in this eye, ultimately with a lovely result.



QUESTION 8.2. *Three days after refixation of a subluxated multifocal IOL, the patient returned with a tilted lens.*

One in 12 respondents would have chosen an AC IOL or iris claw lens. Although literature comparisons support these as viable choices, at our tertiary referral center, we see UGH syndrome not uncommonly with these implants (taking into account a selection bias).

Ultimately, an excellent outcome was achieved with the patient's desired retention of presbyopic correction, albeit requiring two procedures.

Q 8.2 Yamane ISHF of the existing ReZoom IOL was performed, and an additional Gore-Tex suture was placed around one haptic to optimize centration of the multifocal IOL. Three days later, the patient returned with tilting of the IOL. Now what?

- Exchange with a scleral-sutured PC IOL..... 37.5%
- Exchange with an ISHF PC IOL (e.g., Yamane).... 16.7%
- Exchange with an AC IOL or iris claw IOL 25.0%
- Leave it alone and refer elsewhere 20.8%
- Explant IOL and refer (aphakic)..... 0.0%

Brandon Ayres This is a challenging case where the surgeon has already worked so hard to save a subluxed three-piece IOL, only to be disappointed and confused by the postoperative outcome. The audience response shows that about 21% of the respondents would let someone else manage the complication, and about 79% would exchange the IOL again but are divided about what type of secondary IOL to place.

One-quarter of the surgeons would abandon any kind of scleral fixation technique and opt for an AC IOL. After a failed attempt at intrascleral fixation, an AC IOL is an excellent option for most patients, and most published literature shows they are just as safe and functional as scleral-fixated IOLs.

About 38% of the surgeons would go for scleral fixation again, but this time would change to a scleral-sutured IOL. A scleral-fixated IOL, especially with four-point fixation, is a fairly reliable way to place an IOL in the absence of capsular support. With our patient, an ISHF was not doing a good job keeping the IOL centered and planar, so a change in technique would be a natural choice and probably what I would have done if the patient had not been insistent that he wanted a multifocal IOL.

Brandon Ayres, MD

Apart from explanting the IOL and referring (which none of the respondents selected), the least popular audience choice was to replace the IOL with another haptic-fixated (Yamane technique) IOL. The lack of popularity is not surprising, given that the complication began with haptic fixation in the first place. However, although centration and optic tilt can be challenging with ISHF, if it is the technique a surgeon is most comfortable with, it is probably the best choice. Suture fixation of an IOL has a steep learning curve, and during management of your own complication is probably not the best time to begin learning this technique. In this case, our patient wanted placement of a three-piece diffractive presbyopia-correcting IOL, and haptic fixation was the only choice for this type of IOL (given the lack of capsular support). Luckily, replacement of the twisted IOL using a new IOL and ISHF worked out well for our patient.

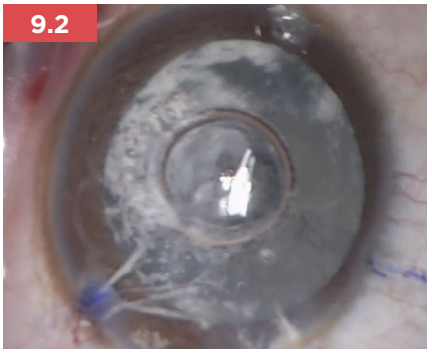
Case 9: Posterior Capsule Perforation

After creating a deeply sculpted groove, Julie Schallhorn saw a clear opening in the posterior capsule after the nucleus was manually cracked and the halves were separated.

Q 9.1 What would you do after discovering a circular posterior capsular rent?

- Rotate the nucleus and sculpt away from defect 4.9%
- Stop phaco and inject triamcinolone 9.8%
- Elevate the heminuclei into the anterior chamber with OVD 70.7%
- Continue to chop the heminuclei and elevate the fragments into the anterior chamber 12.2%
- Convert to manual ECCE 2.4%

Julie Schallhorn Early posterior capsular rents are at high risk of further complications, such as nuclear material loss into the posterior segment and vitreous loss. In this case, with two heminuclei still present and a small circular rent, the most direct route to nuclear removal is to tamponade the area of the break with a dispersive viscoelastic and elevate the heminuclei into the anterior chamber using more viscoelastic. The presence of the viscoelastic helps to keep the vitreous posterior, and careful manipulation of the nuclear pieces can prevent extension of the rent. In this case, I did not sufficiently continue to tamponade the vitreous, and after nuclear removal, there was vitreous in the main incision and paracentesis, necessitating a careful, thorough anterior vitrectomy.



QUESTION 9.2. *Triamcinolone staining reveals vitreous prolapse to the phaco and side-port incisions.*

Julie M. Schallhorn, MD

Q 9.2 After the nuclei were extracted, triamcinolone staining revealed vitreous prolapse to the phaco incision. How would you address the vitreous strands appearing at the incision?

- Weck-Cel and scissors at the incision 0.0%
- #1 and also sweep subincisionally with cyclodialysis spatula 2.0%
- Sever the prolapsed vitreous with microscissors 0.0%
- Perform an anterior vitrectomy (limbal incision) 69.4%
- Anterior vitrectomy (pars plana sclerotomy for the vitrector) 28.6%

Abhay Vasavada It is gratifying to see the experience and educational level of the participating audience. However, I believe that there are surgeons who still use Weck-Cel plus scissors and/or swipe the subincisional areas with a spatula. This is a procedure that should be resisted. Trying to remove the prolapsed vitreous out of the incisions using Weck-Cel and/or microscissors induces acute vitreoretinal traction. This can have dire consequences to the anterior as well as the posterior segment of the eye. Before we understood the efficiency and safety of using a vitrector to remove anterior vitreous from the cataract surgical field, these procedures were routinely practiced.

When vitrectomy is performed, the vitrector first cuts the vitreous and then aspirates it. This way, vitrectomy is performed in a closed chamber with a sutured or nonleaking cataract incision, thereby reducing the traction on the vitreous and vitreoretinal interface. A full 98% of respondents correctly selected one of the vitrectomy options to remove the prolapsed vitreous. The more familiar approach is bimanual vitrectomy separating the irrigation from the vitrector.

The majority of surgeons today continue performing limbal vitrectomy. Two paracentesis incisions are used, one for the irrigation handpiece and the other for the vitrector. This is quite effective in clearing the vitreous prolapsed through the posterior capsular tear. However, when the vitreous is cut and aspirated through this anterior limbal approach, very often the posterior capsular tear enlarges, making placement of the IOL in the bag extremely challenging. The extent of the tear enlargement can be reduced somewhat by placing the vitrector port posterior to the tear. Regardless of the placement of the vitrector in relation to the tear, it produces drag on the vitreous body because of the very nature of the vitreous anatomy. This increases the chance of intraoperative vitreoretinal traction and its consequences. Also, ergonomically, it becomes difficult to remove anterior vitreous adequately and symmetrically from behind the capsule. At times, this can leave behind pockets of uncut vitreous in the area behind the IOL optic, leading to IOL tilt.

Ergonomically introducing the vitrector through a

sclerotomy over the pars plana region (3.5 mm from the limbus) allows an easy access to the central and midperipheral anterior vitreous, leading to adequate and symmetrical removal from the area supporting the IOL optic. Here, as with limbal vitrectomy, the irrigation is through limbal paracentesis. This approach minimizes the enlargement of the posterior capsular tear, as the prolapsed vitreous is simply drained into the vitrector port. There is minimal drag on the vitreous body. Making a pars plana sclerotomy may appear intimidating but can easily be learned by watching videos and interacting with retina colleagues. One can use a trocar or MVR knife to fashion the sclerotomy. A sclerotomy performed with a knife would require suturing at the end of the procedure.

In summary, always stain the vitreous with preservative-free triamcinolone and perform bimanual limbal or pars plana vitrectomy rather than cutting the prolapsed vitreous using Weck-Cel plus microscissors.

Case 10: Polar Cataract and PCR

John Berdahl presented a 41-year-old woman with a posterior polar cataract with 4 D of with-the-rule cylinder who is 20/20 uncorrected in her other eye and does not ever wear spectacles.

Q 10.1 What IOL would you implant in her?

- Monofocal high-power toric IOL 87.2%
- Presbyopia-correcting toric plus limbal relaxing incision (LRI) 7.7%
- Presbyopia-correcting toric IOL plus PRK/LASIK 0.0%
- Light-adjustable lens 2.6%
- Small-aperture IOL 2.6%

John Berdahl Posterior polar cataracts are challenging to remove safely, and those challenges are only compounded when trying to simultaneously correct refractive error. In this case, a young patient with about 4 D of with-the-rule astigmatism and a posterior polar cataract was hoping to minimize the need for spectacles. The cataract was successfully removed, but upon insertion of the IOL, the posterior capsule was ruptured either from the IOL itself or from the pressure induced by additional viscoelastic used in the procedure. Regardless of the cause, now we had a high-powered toric IOL in the bag and an open capsule.

QUESTION 10.1. *A large posterior capsular defect was caused by insertion of the toric IOL.*

No vitreous was apparent on the PCR. An IOL exchange was contemplated, but the decision was made to carefully rotate the IOL to the proper axis. Thankfully, the rupture was primarily posterior and 90 degrees away from the haptic orientation. Reverse optic capture (ROC) was used to lock the IOL into position. The viscoelastic was removed, triamcinolone was injected into the anterior chamber, and no vitreous was present. The patient ended up 20/30 uncorrected and 20/20 BCVA, though hoping for better uncorrected vision.

The audience was asked which IOL would be planned in a situation with a posterior polar cataract. This case was performed before the advent of the light-adjustable lens (LAL; RxSight). Although most respondents would use a high-powered toric, I would argue that the best IOL for this situation is the LAL for two reasons. First, the accuracy of the LAL lens is higher than that of other astigmatism-correcting IOLs. Second, the LAL is a three-piece lens, which allows for sulcus placement in case of a capsular rupture in posterior polar cataracts.

Q 10.2 As the monofocal toric (T9) is implanted, a large rent is seen in the posterior capsule. What would you do now?

- Exchange with a three-piece monofocal in sulcus 35.7%
- Exchange with a one-piece monofocal in bag or ROC 2.4%
- ROC of the same toric IOL 57.1%
- Lasso-suture the toric IOL haptic to the sclera 2.4%
- Explant and leave the patient aphakic (defer IOL placement or refer) 2.4%

Oliver Findl Since the capsular rupture was noticed during implantation of the toric IOL, the situation appears rather challenging, and we see from the audience response that the majority would attempt to implant the haptics into the remains of the capsular bag and secure the optic in the rhexis opening using ROC. This would have been my personal preference, as well.

I would possibly attempt to keep the IOL in the anterior chamber in order to evaluate the degree of posterior capsule opening, identify whether vitreous has prolapsed, and assess the size of the capsulorrhexis opening. The latter is most critical when planning subsequent ROC. Since the capsular bag is filled with OVD, introduction of triamcinolone at this point is possible but could result in poorer visibility in this situation, since most of the OVD needs to be removed in order to see vitreous. Instead, I would use a spatula, swiping behind the optic and trying to identify whether vitreous is present. If it is, an anterior vitrectomy is mandatory via the paracenteses, ideally with an anterior chamber maintainer in place and a low bottle height. I would then add triamcinolone to better visualize the vitreous once most of the OVD has been removed.

If no vitreous is apparent (or if it has been removed), it is possible to position the haptics in the remnants of the bag and then to lift the optic through the anterior capsule

John P. Berdahl, MD

opening after the toric IOL has been rotated to the intended steep meridian.

More than one-third of the audience would have preferred to explant the toric IOL and implant a three-piece IOL in the sulcus. If the patient is unhappy because of the remaining astigmatism, later corneal refractive surgery to reduce astigmatism is a viable option.

Case 11: Zonular Dialysis With Anterior Chamber Shallowing

Uday Devgan unexpectedly encountered diffuse zonulopathy during the capsulorrhexis and nuclear emulsification. During cortical cleanup, shallowing of the anterior chamber was noted and, subsequently, a large temporal zonular dialysis.

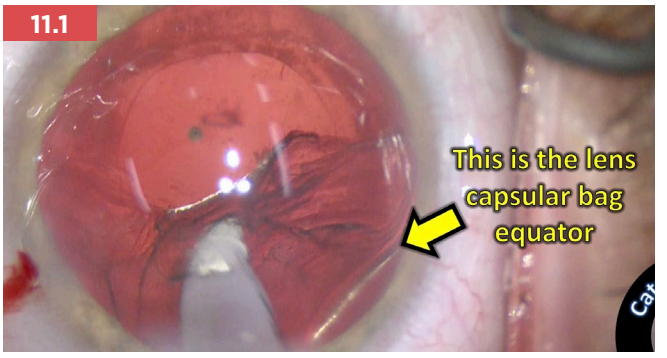
Q 11.1 Suspecting fluid misdirection through the zonular dialysis, what would you do next?

- Cautiously continue I/A of the cortex 4.4%
- Inject dispersive OVD; then resume I/A of the cortex 17.8%
- Implant capsule hooks before resuming I/A of the cortex 11.1%
- Implant a CTR before resuming I/A of the cortex 55.6%
- Implant the IOL before resuming I/A of the cortex 11.1%

Uday Devgan All of a sudden, this case has become far more challenging. The zonular dialysis is allowing misdirection of the balanced salt solution infusion, which is pooling in front of the anterior hyaloid and collapsing the capsular bag. At this point, we want to stop using the coaxial I/A probe because it is forcing more fluid through the zonular dialysis and making things worse. Using OVD to help tamponade the area of zonular loss can help, but this is a temporary measure since it will be washed away with the I/A probe. We need a way to support the capsule equator and block the flow of fluid through the gap. Using capsule hooks would work well, as would implanting a CTR. In this case, I elected to implant the CTR and also to implant the IOL at the same time, while the capsular bag was still open enough to allow access for IOL placement.

Q 11.2 After a CTR and a nondiffractive extended depth of focus (EDOF) IOL were implanted, most of the cortex was removed. However, a small amount remained immediately behind the center of the EDOF optic, and the anterior chamber is shallow—what now?

- Leave it behind and perform a YAG capsulotomy later (if needed) 11.1%
- Remove it with coaxial I/A 13.3%
- Remove it with bimanual I/A 55.6%
- Remove it with anterior vitrector 0.0%
- Remove it with dry syringe/cannula aspiration (after OVD) 20.0%



QUESTION 11.1. *Large zonular dialysis exposing the capsular bag equator during cortical cleanup.*

Ahmed Assaf In this case, with focal zonular dialysis due to trauma that evolved to aqueous misdirection syndrome, I would try to delay CTR implantation as long as possible. Capsule hooks would do an excellent job stabilizing the capsular bag in the vertical axis without trapping cortical fibers in the capsular fornix.

In this situation, where the cortical fibers are already trapped behind the CTR, I would manually aspirate these fibers by attaching a 23-gauge cannula to a 3-cc syringe after filling the anterior chamber and the capsular bag with dispersive OVD. This maneuver gives me better control to manipulate those cortical fibers from behind the CTR.

Coaxial irrigation aspiration may risk worsening the situation by allowing fluid to go back behind the capsule through the area of focal dehiscence, causing further shallowing of the anterior chamber. Bimanual I/A may be a safer option than coaxial I/A by splitting the irrigation from aspiration and keeping the irrigation tip up in the anterior chamber away from the area of focal zonular damage. However, manual aspiration is still the safest option.

I don't particularly appreciate leaving the cortex behind, especially if it obstructs the visual axis. It may affect the visual outcomes during the early days after the surgery, making the patient dissatisfied—not to mention that patients with EDOF premium lens implantation are enthusiastic about spectacle independence and expect excellent outcomes very early after the surgery. In addition, leaving the cortex behind may trigger inflammation and require putting the patient on topical steroids for a more extended period, increasing the potential for cystoid macular edema (CME).

There was no need to use a vitrectomy cutter, as no vitreous was

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Uday Devgan, MD

present in this case. However, if any vitreous band was noticed and confirmed by diluted triamcinolone staining, I would first use a vitrectomy cutter to clear the vitreous band, followed by cortical cleanup.

Case 12: Brunescent Cataract With History of Trauma

Marjan Farid presented a 75-year-old patient with a dense brunescent cataract and a history of trauma many years ago. After performing a femtosecond laser capsulotomy and nuclear softening, she had difficulty chopping the nucleus both manually and with the miLOOP.

Q 12.1 Facing diffuse zonulopathy, what would you do next?

- Continue phaco (supracapsular) 17.5%
- Add capsule retractors/CTR and continue phaco 12.5%
- Convert to ECCE (temporal incision) 17.5%
- Convert to ECCE (superior incision) 50.0%
- Abort and refer this patient 2.5%

Marjan Farid In eyes with a history of traumatic injury, cataract surgery can be unpredictable, as the status of zonular stability is unknown until the surgeon begins nuclear disassembly. In this case, the dense nuclear cataract was difficult to chop not only because of its brunescent and leathery posterior plate but also because of significant diffuse zonular laxity that made the entire lens-capsule complex mobile. As there was a high risk of losing the entire lens-bag complex into the posterior vitreous, the decision was made to convert to ECCE through enlarging the corneal wound. About two-thirds of the audience agreed with conversion to ECCE. With the addition of generous dispersive OVD to protect the cornea, the entire lens-capsule complex was removed through the enlarged temporal corneal wound. The decision was then made to scleral fixate a three-piece IOL via Yamane technique.

Q 12.2 After the nucleus is removed with a manual ECCE, there is no capsular support left. What IOL fixation method would you do?

- Iris claw or AC IOL 29.3%
- Scleral suture a PC IOL 12.2%
- Iris suture a PC IOL 7.3%
- ISHF (e.g., Yamane) PC IOL 12.2%
- Leave aphakic (do elective secondary IOL myself) 17.1%
- Leave aphakic and refer for secondary IOL 22.0%

Soon Phaik Chee In the absence of capsular support, the surgeon has the option of affixing the IOL to the iris or sclera or leaving the eye aphakic. The decision depends on what the surgeon is comfortable with and whether an IOL model of the appropriate power is available. For an elderly patient, implantation of an iris claw or AC IOL is a reasonable option, and this was the most popular audience response (29.3%). The implantation technique is simple, and the surgical time is short; these were the most likely reasons for making this selection. Personally, I would not implant an IOL in the anterior chamber because of possible long-term corneal endothelial issues. For a quick fix, I prefer clipping an iris claw IOL to the posterior iris. Although an AC IOL is easy to implant, sizing of the IOL is often an issue, as most ORs carry only one size of IOL.

Many respondents would prefer to leave the eye aphakic and refer (22%) for secondary IOL fixation or perform it electively themselves (17.1%). This is a wise decision when the appropriate IOL is not immediately available, or when the surgeon is not trained to do the fixation or is not in the right frame of mind to proceed.

Equal numbers of respondents (12.2%) would proceed to fixate an IOL to the sclera either by suturing or by using an ISHF technique. Availability of a particular IOL model appropriate for suture fixation may be an issue, and conjunctival peritomy is usually necessary. Polypropylene 9-0 or polytetrafluoroethylene 7-0 suture may be used with or without a scleral flap. When performing flapless surgery, the surgeon must rotate the knot into the eye to avoid conjunctival erosion and exposure issues.

I prefer doing ISHF using the double-flanged haptic technique in which conjunctival dissection can be avoided. Important pearls for this technique, as illustrated by the case discussed here, include keeping the eye firm with adequate infusion and carefully marking the eye to ensure that the IOL haptics are fixated diametrically opposite to avoid IOL decentration. In addition, symmetrical marking of the conjunctival/scleral needle entry points is important to avoid IOL tilt. The appropriate needle caliber that admits the haptic of the chosen IOL should be selected. I create a scleral needle passage that is circumferential to the limbus rather than one at a slant of 20 degrees, as it is easier to achieve symmetrical needle passage with the former. The IOL haptic

KELMAN AWARD. *Liliana Werner, MD, PhD, was the 2022 Charles D. Kelman Lecturer. With Dr. Werner are Nicole Fram, MD (left), and David F. Chang, MD (right).*

should be gently threaded into the needle to avoid kinking and breakage. Haptics made of PVDF are preferred over PMMA because the former material has a better shape recovery capability.

Iris-suture fixation was the least popular option. Although the technique is technically not difficult, there are challenges in ensuring a round pupil, and haptic slippage may occur as a late complication.

Case 13: Bag-IOL Dislocation in Post-Trabeculectomy Eye

Cathleen McCabe presented a post-trabeculectomy patient with a dislocated bag-IOL complex.

Q 13.1 What surgical approach would you take?

- Lasso suture the IOL haptic to sclera 41.4%
- Exchange for three-piece IOL (scleral fixation) 20.7%
- Exchange for three-piece IOL (iris-suture fixation) 3.4%
- Exchange for iris claw or AC IOL 3.4%
- Refer to anterior segment surgeon 10.3%
- Refer to vitreoretinal surgeon 20.7%

David Crandall In this case, the lens-bag complex is dislocated in the setting of a large superior filtering bleb. One of the goals in this situation is to minimize disruption of the conjunctiva and the functioning filtering bleb. More than 40% of the respondents opted to lasso the IOL haptic to the sclera. This would be my first plan also, since the patient had been seeing well with this lens previously, and everything can be done with small incisions with minimal tissue disruption and, thus, minimal inflammation. Both the McCabe belt loop technique with 6-0 polypropylene and a Hoffman pocket would create only small needle tracks in the conjunctiva.

More traditional lasso techniques with polypropylene would also likely be successful for centering the lens, but the peritomies and conjunctival dissection would have a greater risk of altering the bleb architecture, potentially leading to either bleb failure or a bleb leak. I also have concerns about using Gore-Tex sutures in this situation, with an abnormal conjunctiva that has already been exposed to antimetabolites, putting it at greater risk of late suture exposure.

Almost 30% of the respondents would plan on a lens exchange. Even with planned IOL repositioning, I always have a lens available for exchange in case the lens cannot be repositioned to my satisfaction. About 21% would plan on scleral fixation of a three-piece IOL. The question did not differentiate whether this would be with a Yamane approach, glued approach, or cow-hitch. My preference among these would be Yamane, since that would cause the least disruption of the conjunctiva.

Iris fixation of a three-piece IOL also is reasonable and would completely avoid impact on the conjunctiva, although with pseudophacodonesis there is greater potential for UGH syndrome and inflammation. Only 3.4% chose this option. This likely reflects the greater comfort with scleral suturing and Yamane and glued haptic fixation, which have become more widespread.

Although AC IOLs can have excellent visual results, I prefer to avoid them in eyes with advanced glaucoma and a filtering bleb because of the potential for progressive peripheral anterior synechiae, inflammation, and corneal issues in an already sick eye. An iris claw lens is a reasonable option, but none is available in the United States at this time.

More than 30% of the respondents would refer the patient out. This is a complicated case, and referral is absolutely appropriate if there is doubt; 10% would refer to an anterior segment surgeon and 20% to a retina surgeon. This likely reflects local referral patterns. With a bleb this large, it can be tricky for retina surgeons to get all the trocars in ideal positions, making surgery more difficult. Since the lens is still anterior, I feel it is reasonable for either posterior or anterior segment surgeons to deal with it.

Q 13.2 After you perform a belt loop scleral suture around the single-piece haptic, the IOL is not centered—now what?

- Replace the Prolene suture belt loop to recenter the IOL 43.8%
- Perform anterior vitrectomy, then #1 ..... 31.3%
- Exchange for a PC IOL 6.3%
- Exchange for an AC IOL (or iris claw) 9.4%
- Abort surgery and refer 9.4%

Cathleen McCabe When fixating an IOL to the sclera, one of the most common complications can be decentration and tilt. This can happen with any of the techniques that have been described, including ISHF by the glued (Agarwal) or flange (Yamane) techniques, or by lassoing the haptic with Gore-Tex suture or with polypropylene suture, with either tied or flange (belt loop) techniques. In these cases, the limbus is marked 180 degrees apart to help ensure proper centration. After placing the suture or externalizing the haptic through sclera posterior to the limbus, the surgeon carefully and gradually tightens the sutures (or haptics) while monitoring to ensure that the optic remains centered, at the proper distance posterior to the iris, and planar. Most often, lack of centration is caused by one of three things: 1) The marks were not made exactly 180 degrees apart, 2) the fixation points were not created equidistant from the limbus, or 3) the tunnel through sclera was longer on one side than the other. Depending on the technique used for fixation, small adjustments such as trimming a haptic may allow for improved centration, but most often the solution lies in correcting one of the three errors listed above by re-marking and repeating the steps for fixation on the side determined to be most affected.

The audience response to the question of what to do with decentration when fixating a dislocated IOL to the sclera is in line with the most frequent causes of decentration listed above. Most often, replacing a poorly placed suture or haptic would improve centration and solve the problem. An anterior vitrectomy can sometimes be necessary prior to refixating the

lens, especially if vitreous is noted in the anterior chamber or in front of the IOL, or if prolapsing vitreous around the optic margin is suspected as a contributor to decentration or tilt.

The case presented here was a bit surprising. Further inspection of the orientation of the loop of 6-0 polypropylene suture around one haptic showed that the loop was flipped over and impeding centration. I was able to relax tension on the loop by pushing the suture further into the sclera, grasping it with intraocular microforceps, and then flipping the loop over 180 degrees. Slowly externalizing the polypropylene suture and tightening the loops on both haptics allowed for excellent centration and a planar lens position.

Case 14: PC IOL Placed in Anterior Chamber Following PCR

Amar Agarwal presented the case of a patient who had a PCR, and the surgeon implanted a PMMA posterior chamber IOL in the AC.

Q 14.1 What would you recommend?

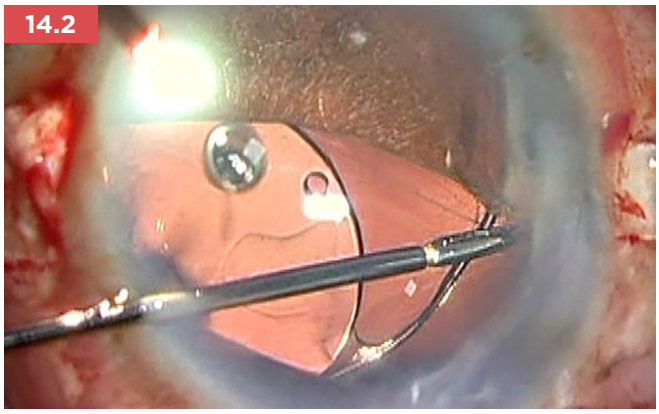
- Observe longer because of the high surgical risk of explantation 3.8%
- Explant and leave aphakic (e.g., try an aphakic soft contact lens) 3.8%
- Exchange for a scleral-fixated PC IOL 34.6%
- Exchange for an iris claw or AC IOL 0.0%
- Reposition the same IOL in the posterior chamber (e.g., using ISHF-glued flaps) 57.7%

Nick Mamalis This is a case in which a patient had a PCR, and the surgeon chose to implant a PMMA PC IOL in the anterior chamber.

PC IOLs are designed to go into the posterior chamber and not into the anterior chamber. A PMMA PC IOL left in the anterior chamber can cause significant complications. These complications include UGH syndrome due to chafing of the iris by the IOL and breakdown of the blood-aqueous barrier, as well as effects on the anterior chamber angle and trabecular meshwork. In addition, a PC IOL in the anterior chamber can cause damage to the corneal endothelium and lead to pseudophakic bullous keratopathy. Fortunately, the vast majority of the audience recommended exchange for a scleral-fixated PC IOL or repositioning of the same IOL in the posterior chamber with ISHF.

Q 14.2 While the surgeon was trying to rotate the IOL in the AC, the PMMA haptic became stuck—now what?

- Abort surgery—too risky to explant 0.0%
- Employ a two-handed approach to slide the haptic out 25.0%
- Dissect the haptic free using intraocular microscissors 29.2%
- Externalize the optic through a limbal incision to allow maneuvering the haptic out 4.2%
- Cut the PMMA haptic to free up and explant the IOL 41.7%



QUESTION 14.2. *The haptic of this PC IOL placed in the AC is firmly adherent to the iris.*

Amar Agarwal This patient had a one-piece nonfoldable PC IOL implanted in the AC. The game plan was to try to shift the IOL from the anterior chamber to the posterior chamber and then to glue the IOL by externalizing the haptics. The problem was the PMMA haptic was stuck to the iris. The audience response was excellent, as the largest percentage suggested that we cut the haptic and explant the IOL.

We made an entry into the anterior chamber with a knife, which inadvertently cut the haptic. So in the end we did what the audience suggested. But we were stuck with a very damaged iris once the IOL was explanted and a new three-piece PC IOL was glued in place.

To address the iris defect, we performed single-pass, four-throw pupilloplasty. The iridodialysis that we had created was treated with the trocar-assisted iridodialysis repair technique. Finally, we could repair the iris by using the combination of these two techniques for iris repair, which is the twofold technique. The aim was to see that the Purkinje image was at the center of the pupil, as that would reduce the chord length mu for the patient and help his vision.

Case 15: Phaco Wound Burn

Lisa Arbisser presented a case in which she was using a new phaco tip that had no aspiration bypass system (ABS) hole. After completing nuclear emulsification, she noted an incision burn. The IOL was implanted.

Q 15.1 How would you close this corneal incision with whitened edges and slight gaping?

- Stromal hydration plus patch or soft contact lens (SCL) 8.1%
- Seal with tissue glue plus SCL 5.4%
- Approximate edges with radial suture(s) 51.4%
- #3 after first making a scleral relaxing incision 10.8%
- Horizontal mattress suture(s) trying to approximate the edges 16.2%
- Other 8.1%

Lisa Arbisser When stromal thermal damage occurs, as in

Amar Agarwal, MD

this case, there is coagulation of tissue resulting in shrinkage, which renders direct edge-to-edge closure with interrupted vertical sutures ineffective.

Stromal hydration will fail to adequately plump tissue, sealing roof to floor. Glue will not hold reliably in the presence of active leak, nor can a bandage contact lens be depended upon to avoid hypotony and potential ingress of infectious organisms.

Allowing the lips of the incision to remain in their new native position while using horizontal mattress sutures (10-0 nylon), extending from just beyond the affected tissue on both sides with some overlap, collapses the gape most effectively. Prior placement of low-viscosity cohesive OVD in the anterior chamber to form the globe, making it normotensive just before suture placement, helps to provide the correct shape and tension, thus minimizing the induced astigmatism that always accompanies a wound burn. The OVD is then removed through two paracenteses with bimanual I/A, the eye rendered normotensive, and the incision tested for a dry gutter.

For belt-and-suspenders assurance, I created a fornix-based conjunctival flap, roughed the bed with a cellulose sponge to help fixation, and sutured the flap with 8-0 Vicryl to cover the limbus, as one would for a trabeculectomy. All knots were, of course, buried.

The postoperative result was a normotensive formed chamber that was both Seidel negative and blebless on day one post-op and beyond.

Q 15.2 Have you personally ever had a significant wound burn?

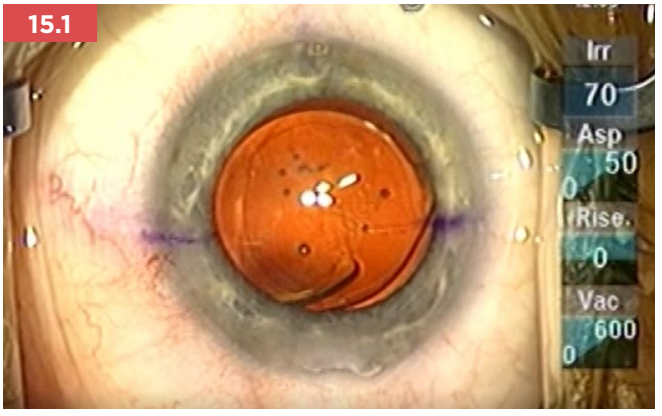
- Never 31.6%
- 1 or 2 times 44.7%
- 3 or 4 times 13.2%
- >4 times 10.5%

Kendall Donaldson We are very fortunate that thanks to advances in modern technology and the efforts of physician-industry collaboration, our phacoemulsification handpiece is uniquely designed to protect the incision from a wound burn. In the case described, the phaco tip did not have an ABS hole, and this prevented the passage of fluid that should be flowing around the handpiece to provide the cooling necessary to avoid such a burn. The ABS hole typically allows fluid to be drawn through the opening when the phaco tip is occluded by nuclear material, allowing safer use of higher vacuum and ultrasound while improving chamber stability.

In the rare cases that the temperature of the tissue exceeds 60 degrees Celsius/140 degrees Fahrenheit, a wound burn will occur. This causes contracture of the collagen bundles adjacent to the incision and can make the incision gape and leak. Closure of such an incision can be challenging and can even result in a wound leak, increasing the risk of infection.

With modern advances in fluidics and ultrasound, we are able to limit the incidence of wound burns. Wound burns are most common in cases involving dense cataracts requiring high levels of ultrasound energy during phacoemulsification. The surgeon can limit ultrasound use and make it more efficient by employing chop techniques and altering the duty cycle by using pulse or burst modes (increasing the amount of "off time"). Basically, optimizing ultrasound parameters to make phacoemulsification more efficient is a key mechanism for reducing the incidence of wound burns. A burn can also occur if the phaco tip is occluded with OVD or if the silicone sleeve on the phaco tip is too tight, blocking egress of fluid to cool the wound.

If a wound burn is recognized, the surgeon should stop immediately and identify the source of the problem before further damage occurs. Once the cataract has been removed, wound closure will be challenging and several modalities may be needed to ensure adequate sealing of the wound; these include suturing, tissue adhesives, bandage contact lenses, and in extremely severe cases, potentially even a corneal patch graft. The corneal mattress suture is a very helpful tool for managing wound closure in such situations. These wounds are associated with prolonged healing times and result in irregular corneal astigmatism that slowly improves over time.



QUESTION 15.1. *Gaping clear corneal incision due to a phaco wound burn.*

Lisa B. Arbisser, MD

Case 16: Anterior Chamber Shallowing With Positive Pressure

Deepinder Dhaliwal noted positive pressure and chamber shallowing in a 92-year-old man immediately after the cortical cleanup and removal of the I/A handpiece. Fluid misdirection is suspected.

Q 16.1 The anterior chamber did not deepen with additional OVD. What would you do next?

- Deepen the anterior chamber with a more retentive OVD, such as Healon GV (Johnson & Johnson) 10.3%
- Give IV mannitol and wait a few minutes 24.1%
- Pars plana tap to remove fluid/vitreous 27.6%
- Abort surgery—return to OR in one hour 31.0%
- Abort surgery—send the patient home with oral acetazolamide (Diamox) 6.9%

Dick Lindstrom Intraoperative positive posterior pressure with anterior chamber shallowing after lens and cortex removal during cataract surgery is a common surgical challenge. One significant advantage of modern small-incision cataract surgery is that we have time to respond in a thoughtful manner, as an expulsive hemorrhage will not occur. I first look for any cause of external pressure on the eye, usually from the lid speculum or drapes. In Dr. Dhaliwal's 92-year-old patient there was no external pressure.

A second cause is excessive wound leakage from an incision. In this situation, the eye is soft and easily reconstituted with any viscoelastic agent. This was also not the diagnosis. The core differential diagnosis is now fluid misdirection, choroidal effusion, or choroidal hemorrhage.

In a 92-year-old patient, I would be more concerned about blood vessel fragility and a choroidal hemorrhage than in a younger individual. Usually, some iris prolapse and pain, especially in a case under topical anesthesia, are prominent findings in a choroidal hemorrhage. Both were absent.

For me, the next step would be to try to re-form the anterior chamber with a high–molecular-weight cohesive OVD. About 10% of the audience agrees with this plan. If I am unable to easily re-form the anterior chamber with OVD, I next close the primary incision with a suture. Now we have control of the eye and can take our time making the diagnosis and formulating a treatment plan.

An intraoperative examination of the posterior segment with an indirect ophthalmoscope or Osher lens may reveal a choroidal effusion or hemorrhage, but it is easy to miss this diagnosis while in the OR. If a choroidal effusion or hemorrhage is found, the case is best aborted, and one can return days or weeks later for IOL implantation. In such a case I leave the viscoelastic in the eye and manage the expected postoperative pressure spike with topical and oral antihypertensive agents. I check the patient's IOP before discharge and have them return four to six hours later for another IOP check.

In this patient, no choroidal effusion or hemorrhage was seen when the posterior segment was examined in the OR with an Osher lens. This suggests a diagnosis of aqueous misdirection. I find that returning the patient to the waiting room for one hour universally resolves aqueous misdirection spontaneously, allowing me to safely bring the patient back to the OR that same day to complete the case. The audience also supports this approach, with 31% recommending it. Intravenous mannitol can be helpful in positive pressure cases, as noted by 24.1% of the audience, and I prefer the 50 mL vials of 25% mannitol, which can be given slowly over one to two minutes.

Some respondents suggested a pars plana tap, but I do not favor this approach later in a cataract surgery case when a choroidal effusion or hemorrhage remains a concern. I will do a pars plana minivitrectomy as a first step in an eye with a crowded anterior segment, but not for late positive posterior pressure with chamber shallowing. In this patient, IV mannitol allowed the IOL to be implanted, followed by further positive pressure. The wound was sutured, viscoelastic retained, the expected post-op IOP spike managed, and a limited choroidal hemorrhage noted on post-op day one.

Aborting the case prior to IOL implantation and returning the patient to the recovery area might have allowed the diagnosis of a choroidal hemorrhage to be made by means of a more complete examination with an indirect ophthalmoscope. In addition, if the IOP remained elevated and the anterior chamber shallow, completion of the case that day could be aborted and the patient returned home with an eye at low risk for permanent damage. An important lesson is that not every case must be completed during the first operation.

Q 16.2 Using an Osher lens, the surgeon sees that the disc is perfused. After IV mannitol, a one-piece PC IOL is implanted in the bag and the OVD is removed with I/A. At this point, the AC shallows, the eye becomes firm, and the IOL is tilted forward—now what?

- Do nothing further—leave as is 22.7%
- Inject air, then leave as is 4.5%
- Suture incision—nothing more 13.6%
- Both #2 and #3 ..... 45.5%
- Inject and leave OVD in AC—burp out postoperatively at the slit lamp 13.6%

Deepinder Dhaliwal It is important to avoid anterior chamber shallowing and hypotony during phacoemulsification, especially with this 92-year-old hypertensive man in whom positive pressure and anterior chamber shallowing had developed earlier in the case. When the phacoemulsifi-

SPECIAL AWARDS

After every three cases, the audience voted on who should receive a special award.

Cases 1 to 3: Windy City Award. *For the teaching case that was so good, it blew me away!*
Mitch Weikert, Case 3

Cases 4 to 6: Chicago Blues Award. *For the case that was the most depressing to watch.*
Tom Samuelson, Case 6

Cases 7 to 9: "Does Anybody Really Know What Time It Is?" Award. *Based on Chicago's hit song, for the case requiring the most endurance by the surgeon.*
Brandon Ayres, Case 8

Cases 10 to 12: Second City Award. *For the surgeon who did the best job of improvisation.*
John Berdahl, Case 10

Cases 13 to 15: Prohibition Award. *For the surgeon who "did the most things that I would never do."*
Amar Agarwal, Case 14

Cases 16 to 18: Al Capone Award. *For the best example of a surgeon who committed a crime but got away with it!*
Bob Osher, Case 17

cation handpiece is removed, OVD can be injected through the paracentesis prior to cortical removal. When the I/A handpiece is removed after viscoelastic removal at the conclusion of the case, balanced salt solution can be instilled through the paracentesis, but it will egress much faster than air (especially if the main wound has not been hydrated). An air bubble could be instilled in any case where the anterior chamber must remain formed.

At this point in the case, the anterior chamber is shallow, the eye is firm, and the IOL is tilted. First, the optic nerve should be visualized to confirm that it remains perfused. The Osher lens is a nice lens that can be used to visualize the posterior pole with the operating microscope. Second, the peripheral retina should be examined to rule out suprachoroidal hemorrhage. In cases of intrinsic intraoperative positive pressure, it is important to visualize the peripheral retina. In this case, we assumed the etiology of positive pressure was intraoperative aqueous misdirection; but, in fact, the cause was a limited suprachoroidal hemorrhage, even though our patient did not experience pain during the case, nor did we see a "dark shadow."

At this point, an air bubble saved the day and allowed the IOL to resume a proper position. The eye became less firm with instillation of aqueous suppressants, atropine drops, and time. The wounds were tested and found to be watertight. A suture was not placed because sudden shallowing of the anterior chamber could occur during this step and make the situation worse.

Injecting OVD in the anterior chamber could have made control of IOP challenging postoperatively (even with attempted burping at the slit lamp). Almost one-quarter of the audience felt that nothing further was necessary. However, we did not want to risk iris capture of the IOL if the lens tilt was not corrected or corneal endothelial compromise with the shallow anterior chamber.

Case 17: Posterior Polar Cataract With PCR and Planned Trifocal IOL

Bob Osher planned on implanting a toric trifocal IOL in a 22-year-old woman with axial myopia and a posterior polar cataract.

Q 17.1 After cortical cleanup, a small central posterior capsular defect is noted. What IOL would you implant?

- Multifocal (MTF) toric IOL in bag 60.0%
- MTF nontoric IOL in bag plus astigmatic keratotomy (AK) 4.0%
- MTF toric IOL using ROC 12.0%
- MTF nontoric IOL using ROC plus AK 0.0%
- Three-piece MTF IOL in sulcus plus AK 8.0%
- Three-piece monofocal in the sulcus 16.0%

Kevin Miller This is one of those situations in which an honest discussion with the patient is necessary, especially if the patient has posterior polar cataracts in both eyes, or if the second eye has a posterior polar cataract and the first eye is already implanted with a multifocal IOL.

Patients with posterior polar cataracts should be informed that there is a chance that a hole is present in the posterior capsule or that one will develop during surgery. They should be informed further that multifocal IOLs need to be implanted inside the capsular bag for best results. Very few multifocal lenses are designed for the sulcus, and the ones that are don't generally center very well.

I won't go into the details of how to manage posterior polar cataracts. They are well described. But what if a central hole is encountered or one develops during surgery, as happened in this case? Then you will want to do everything in your power to limit its extension and make it stable. You should never pull a phacoemulsification probe or an I/A probe out of an eye with a capsular tear without first pressurizing the eye with OVD. Pulling out the probe will cause vitreous to prolapse forward and enlarge the tear. Next, try to convert any small linear tears into curvilinear tears that will resist extension when the lens is injected into the capsular bag.

If a large tear develops during first-eye surgery, it's no big deal. A vitrectomy can be performed and a monofocal lens can be implanted in the sulcus, or it can be placed in either the remnant bag or the ciliary sulcus with appropriate optic capture. In this scenario, the second eye also receives a monofocal IOL when it's time for surgery, and the patient wears reading glasses afterward.

The pressure is on when the first eye is already implanted with a multifocal IOL and the second eye has a posterior polar cataract. In this scenario, you, the surgeon, absolutely want to implant another multifocal toric in the bag. This was the overwhelming choice of the audience. If this is not possible, tamponade the vitreous with dispersive OVD, inject the lens gently into the bag, deploy the haptics, and reverse capture the optic if the capsulorrhexis is centered and of an appropriate diameter. This was the choice of 12% of respondents. Never place the haptics of a current-generation one-piece acrylic lens in the ciliary sulcus and perform a standard optic capture. This is a recipe for late UGH syndrome.

If the above two options are unavailable for whatever reason, it's always reasonable to implant a sulcus-appropriate monofocal IOL, consider simultaneous or subsequent relaxing incisions or subsequent laser refractive surgery, and inform the patient they will need reading glasses. Sixteen percent of the audience would have taken this approach.

Q 17.2 The toric IOL is implanted in the bag and the small posterior capsule defect splits open. The lens is successfully fixated using ROC. However, the patient cannot read postoperatively, and Dr. Osher realizes that a toric monofocal IOL was inadvertently implanted instead of the toric trifocal lens. What would you do next?

- Accept the need for readers 30.4%
- Use a MTF contact lens 52.2%
- Try topical miotic drops 4.3%
- Exchange with MTF IOL 0.0%
- Piggyback secondary MTF IOL (refer outside United States) 13.0%

Bob Osher First of all, I traced my steps backward to understand how the error was made. Knowing that the posterior capsule was open, I was so preoccupied preparing for the safe removal of this posterior polar cataract in a young adult that I neglected to confirm the IOL in the OR. Without encountering vitreous, in the heat of the moment, I oriented the toric IOL and confirmed its alignment without realizing that it was a monofocal rather than a multifocal lens. The error was only discovered when the patient complained that she was unable to read despite crystal-clear vision at distance.

I had a candid conversation with a patient and her mother, admitting fault and taking full responsibility for the error. I offered to exchange the toric lens for a multifocal toric lens at no charge. But given her contact lens success in the fellow eye and recognizing the added risk in a young high axial myope with an open capsule, she selected the conservative option of a multifocal contact lens rather than risk her uncorrected 20/20 distance vision. I paid for her contact lens fitting, which was the right thing to do, and learned a difficult lesson that I will never forget.

Case 18: Rock-Hard Lens in Out-of-Town Patient

Naveen Rao presented a 70-year-old man with a 4+ brunescent cataract and a history of possible trauma, who lives four hours away.

Q 18.1 What is your preference for this rock-hard lens?

Divide-and-conquer phaco	31.0%
Phaco chop	24.1%
Pre-chop (with miLOOP or femtosecond laser) plus phaco	20.7%
Large-incision manual ECCE	13.8%
Manual small-incision ECCE	10.3%

Susan MacDonald When a cataract surgeon chooses their approach to cataract surgery, several factors influence the final surgical plan. These include potential access to different technologies, including the type of phaco machine, miLOOP, and femtosecond laser. It will also include the surgeon's expertise in different techniques, such as femto laser, small-incision cataract surgery (SICS), miLOOP, and other phacoemulsification disassembly techniques.

As surgeons, we make our decisions to use a technology based on how familiar and confident we are with our abilities. Lifelong learning and adoption of new skills will provide us with the best options and backup plans.

In the case of a truly rock-hard cataract, I have found SICS to be a superior technique. I say this with the wisdom of years of practice. For several years my greatest skill was phacoemulsification, and I chose this technique because in my hands, it was the best. But with outreach surgery, I have developed as a SICS surgeon; and now, at this point, I feel my skills are expert in both techniques. And with that being equal, I believe SICS is a superior technique. It is efficient, and it does not stress the endothelium or the zonules. I recommend that every cataract surgeon consider adding SICS to their skill set. It is a great rescue technique as well as a fine choice for complex surgery.

Q 18.2 After phaco was initiated, a large posterior capsule defect was discovered, and the remaining nucleus was manually extracted through an enlarged phaco incision with a lens loop. Vitreous prolapsed to the incision and an anterior vitrectomy was performed. There is no residual capsular support. What IOL would you implant?

AC IOL	39.1%
Iris-sutured PC IOL	0.0%
Scleral-sutured PC IOL	17.4%
ISHF of a PC IOL (e.g., Yamane)	21.7%
Leave the eye aphakic	21.7%

Naveen Rao The largest percentage of respondents (39.1%) would opt to place an AC IOL. Although this is a reasonable approach, it has several disadvantages. These include:

- the need for a large incision, with resulting chamber instability,
- irregular astigmatism due to the large incision and the numerous sutures needed to close the wound,
- the risk of haptic malposition, particularly when the surgeon has limited experience placing an AC IOL,
- corneal endothelial decompensation and difficulty performing endothelial keratoplasty because of the crowded anterior chamber,
- secondary glaucoma due to compression of the trabecular meshwork by the AC IOL haptics, and
- CME caused by iris traction from the AC IOL haptics.

The remainder of respondents were split between sutured scleral fixation, sutureless scleral fixation (Yamane technique), and leaving the eye aphakic with the intention to return to the OR at a later date or refer for secondary IOL placement.

I believe that PC IOL placement is a safer long-term option than AC IOL placement. Sutured scleral fixation and sutureless scleral fixation are equally good strategies, but both options typically require specific IOL models that might not be readily available at most surgery centers and may need to be specially ordered.

Leaving the patient aphakic and returning to the OR at a later date is an excellent option. There is absolutely no shame in doing this—in fact, this is my suggestion at the end of a long, complex, and stressful surgery. Discretion is the better part of valor. It is so much easier to place a scleral-fixated IOL in an aphakic patient with a quiet eye rather than having to exchange a malpositioned AC IOL through an edematous cornea. If the anterior and posterior capsule are badly damaged and if sulcus IOL placement is not possible, be sure to perform a thorough anterior vitrectomy and feel free to leave the eye aphakic. You can come back to fight another day when the corneal edema clears, or you can refer the patient to a colleague experienced in scleral-fixation techniques. It will be much better for the patient and the surgeon alike.

Financial Disclosures See disclosure key, page 8.

Amar Agarwal, MD: STAAR Surgical: C. **Zaina N. Al-Mohtaseb, MD:** Alcon: C; Bausch + Lomb: C; Carl Zeiss: C; CorneaGen: C; Tarsus: C; Visus: C. **Lisa B. Arbisser, MD:** Centricity Vision: PS; NovaBay: US; Retinogenics: US; Virtual Field: PS. **Ahmed Assaf, MD:** None. **Brandon Ayres, MD:** Alcon: C,L; Allergan: C,L; Bausch + Lomb: L; Carl Zeiss: C; CorneaGen: C; Dompé: C,L; Glaukos: C; New World Medical: C; Novartis, Alcon: C; Rayner Intraocular Lenses: C; Sun Ophthalmics: C,L. **John P. Berdahl, MD:** Abbvie: C,L; Aerie: C; Aerpio: C; Alcon: C; Aldeyra: C; Aurion Biotech: C; Bausch + Lomb: C; Carl Zeiss: C; Elios Vision: C; Equinox Ophthalmic: EO,C,EE,PS,P; Expert Opinion MD: C,EO,EE; Glaukos: C,L; Gore: C; Iacta Pharmaceuticals: C; Imprimis: C,P; iRenix: C; Johnson & Johnson: C; Kala Pharmaceuticals: C; Kedalion: C; MELT Pharmaceuticals: C; MicroOptx: C; New World Medical: C; Ocular Surgical Data: C,EO; Ocular Therapeutix: C; Omega Ophthalmic: C,PS; Orasis: C; Oyster Point: C; RxSight: C; Sight Sciences: C; Surface: C,PS; Tarsus: C; Tear Clear: C; Verana Health: PS; Versea Biologics: C; Vertex Ventures: C; ViaLase: C; Visionary Ventures: C; Visus: C; Vittamed: C. **Soon-Phaik Chee, MD:** AbbVie: C,S; Alcon: C,L,S; Allergan: S; Bausch + Lomb Surgical: C,S; Carl Zeiss: C,L,S; Gilead Sciences: C; HOYA Medical Singapore: C,L; Johnson & Johnson Vision: C,L,S; Leica Microsystems: C,S; Santen Pharmaceutical Asia: S; Ziemer Ophthalmics: C,S. **David A. Crandall, MD:** Alcon: C. **Uday Devgan, MD:** Advanced Euclidean Solutions IOLcalc.com: EO; CataractCoach.com: EO; Centricity: C; LensGen: SO,C. **Deepinder K. Dhaliwal, MD:** Allergan: C; Glaukos: S; Haag-Streit Group: C; Johnson & Johnson: C; Kowa American Corporation: S; Lenz Therapeutics: C; Novartis: C,S; Noveome: S; Ocular Therapeutix: C,L; OysterPoint: C; STAAR Surgical: C; TearSolutions: C; Trefoil: C. **Kendall E. Donaldson, MD:** Alcon: C,L; Allergan: C; Avellino Labs: C; Carl Zeiss: C; Dompé: C; Eyevance: C; Johnson & Johnson Vision: C; Kala Pharmaceuticals: C; LENSAR: C; Lumenis Vision: C; Novartis: C; Omeros: C; ScienceBased Health: C; Shire: C; SUN: C; Tissue Tech: C. **Marjan Farid, MD:** Alderya Therapeutics: C; Allergan: C; Bausch + Lomb: C; Bio-Tissue: C; CorneaGen: C; Dompé: C; Johnson & Johnson Vision: C; Kala Pharmaceuticals: C; Novartis, Alcon: C; Orasis: C; Sun Ophthalmics: C; Tarsus: C; Zeiss: C. **Oliver Findl, MD:** Alcon: C; Beaver-Visitec International: C; Carl Zeiss Meditec: C; Croma Pharma: C; Johnson & Johnson Vision: C. **Bonnie An Henderson, MD:** Alcon: C; Allergan: C; Horizon: C. **Richard S. Hoffman, MD:** MicroSurgical Technology: C. **Soosan Jacob, MBBS, FRCS:** Madhu Instruments: P. **Sumitra S. Khandelwal, MD:** Alcon: C; Bausch + Lomb: C; Carl Zeiss Meditec: C; Dompé: C; Kala Pharmaceuticals: C; Ocular Therapeutix: C. **Terry Kim, MD:** Aerie: C; Alcon/Novartis: C; Allergan/Actavis: C; Avellino Labs: C,US; Azura Ophthalmics: C; Bausch + Lomb/Valeant: C; CorneaGen: C,US; Dompé: C; Eyenovia: C,US; Glaukos: C; HTL Biotech: C; Johnson & Johnson Vision: C; Kala Pharmaceuticals: C,US; LENZ Therapeutics: C,US; Novartis: C; Ocular Therapeutix : C,US; Oculis: C; Omeros: C,US; Palatin Technologies: C; Santen: C; Sight Sciences: C; Simple Contacts: C,US; Surface: C,US; Visionology: C; Zeiss: C. **Thomas Kohnen, MD, PhD, FEBO:** Allergan: C; Avedro: C; Bausch + Lomb: C; Dompé: C; Geuder: C; Johnson & Johnson Vision: C,S; LensGen: C; MedUpdate: C; Nevarkar: C; Novartis (Alcon): C,S; Oculentis: C,S; Oculus Optikgeräte: C,S; Presbia: C,S; Santen: C; SCHWIND eye-tech-solutions: C,S; STAAR Surgical: C; TearLab Corp: C; Thieme Compliance: C; Zeiss: C,S; Ziemer: C. **Richard L. Lindstrom, MD:** Acquea: SO,C; AcuFocus: PS,C; Alcon: C; Allergan: C; Aurion Biotechnology: SO,C; Avellino: SO,C; Bausch + Lomb: C,P; Belkin Vision: SO,C; Bio-Tissue: PS; CorneaGen: SO,C; Encore: SO,US; Equinix: SO,Ca; Flying L Partners: PS,C; Foresight #6: SO,C; Glaukos: C; Harrow Health: US,C; IanTrek: PS; ImprimisRx: C; iOR: SO,C; Iveena: PS,C,SO; Johnson & Johnson: C; LayerBio: SO,C; LeGrande: SO,C,PS; LENSAR: US,C; LenTechs: PS,C; LightField Medical: SO,C; Nacuity: SO,C; NASA-Vision for Mars Program: C; Novartis: C; OcuDoc Mobile: SO,C; *Ocular Surgery News*/Slack: C; Ocular Therapeutics: US,C; Ocusense: SO,C; Ocuterra: SO; Orasis: SO,C; PRN Physician Recommended Nutriceuticals: SO; ReVana: SO; SightPath: SO; Silk Tech: SO,C; Silk Technologies: SO,C; SLACK: C; Stroma: SO; Surface Ophthalmic: P,SO,C,PS; Sydnexis: SO,C; TearClear: PS,C; TearLab Corporation: SO,C; TearOptix: SO; TLC Vision: PS; Tracey Technologies: PS; Visant: SO,C; Visionary Ventures: PS,C; Zeiss: C. **Susan MacDonald, MD:** None. **Nick Mamalis, MD:** Alcon: S; Anew Optics: C,S; Atia Vision: S; ClarVista: S; Cristalens Industrie: S; HOYA: S; LensGen: S; Long Bridge Medical: S; Medicontur: S; Merck: S; Ocumetrics: S; PerfectLens: C,S; Spyglass: S; Zeiss: S. **Cathleen M. McCabe, MD:** Abbvie: C; Alcon: C,L,S; Allergan: C,S,L; Bausch + Lomb: C,L; Dompé: C; Engage Technologies: C,PS; EyePoint: C,L,S; Glaukos: L,S; Imprimis: C; iStar Medical: C; Ivantis: C,L,S; Johnson & Johnson Vision: S; LENSAR: C,L; Novartis: C,L; Ocular Therapeutix: C,L,S; Omeros: C,L; Quidel: C; ScienceBased Health: C; Sight Sciences, Inc: C,L; Sun Ophthalmics: C; Surface Pharma: S; Tarsus: C,L; Visus: C; Zeiss: C,L. **Kevin M. Miller, MD:** Alcon: C; Johnson & Johnson Vision: C,S; Oculus: C. **Thomas A. Oetting, MD:** None. **Robert H. Osher, MD:** Bausch + Lomb Surgical: C; Carl Zeiss Meditec: C; MicroSurgical Technology: C; *Video Journal of Cataract & Refractive Surgery:* EO; **Jeff H. Pettey, MD, MBA:** Alderya Therapeutics: C; LENSAR: C; Oertli Instrumente: C. **Naveen K. Rao, MD:** Calyx: C; Tarsus: C; W.L. Gore Corporation: C. **Thomas W. Samuelson, MD:** Aerie: C; Alcon Surgical: C; Allergan: C; Avellino Labs: C; Bausch + Lomb/Valeant: C; Belkin Vision: C,SO; Elios: C,SO; Expert Opinion: C; Glaukos: C; Imprimis: C; Johnson & Johnson Vision: C; MicroOptx: C; New World Medical: C; Ocuphire: C,US; PolyActiva: C; Ripple Therapeutics: C; Santen: C; Sight Science: C,US; Tear Clear: C,SO; Vialase: C,SO; Zeiss Meditec: C. **Julie M. Schallhorn, MD:** Carl Zeiss Meditec: C; Long Bridge: PS; Octavia: PS; Vanda: C. **Michael E. Snyder, MD:** Alcon: S; Alnivo: C; Glaukos: S; Haag-Streit USA: C; HumanOptics: C,P; Johnson & Johnson Vision: S; Rayner Intraocular Lenses: S; Trefoil: S; VEO Ophthalmics: PS; W. L. Gore: C. **Audrey R. Talley Rostov, MD:** Alcon: C; Allergan: C,L; Bausch + Lomb: C; CorneaGen: L; Eyevance: C; Glaukos: C; Johnson & Johnson: C; Kala Pharmaceuticals: C; LENSAR: C; MicroSurgical Technology: C; Sightlife: C,S; SUN: C; Tarsus: C; Trefoil: C; Visus: C; Zeiss: C. **Abhay Raghukant Vasavada, MBBS, FRCS:** Alcon: S. **Mitchell P. Weikert, MD:** Alcon: C; Avellino Labs: C; Carl Zeiss Meditec: C. **William F. Wiley, MD:** Alcon: C,L; Allergan: C; Bausch + Lomb: C,S; CorneaGen: C; Glaukos: C; IMPRIMIS: C,P; Johnson & Johnson Vision: C; New World Medical: C; RxSight: L,S; Sight Sciences: C; STAAR Surgical: C,L,S; Zeiss: C. **Elizabeth Yeu, MD:** Advanced Vision Group: C; Alcon: C,L; Allergan: C,L; Aurion: C; Bausch + Lomb: C; Bio-Tissue: C,L; BlephEX: C; Bruder Healthcare Company: C; BVI: C; Carl Zeiss Meditec: C,L; CorneaGen: C; Dompé: C; Expert Opinion: C; Glaukos: C,L; Johnson & Johnson Vision: C,L; Kala Pharmaceuticals: C,S; Katena: C; LENSAR: C; MELT Pharmaceuticals: C; Novartis: C; OCuSOFT: C; ScienceBased Health: C; Sight Sciences: C; STAAR Surgical: C; Surface: C; Tarsus: C,S; THEA: C; TissueTech: C,L; Topcon Medical Systems: S; Visus: C.