

# Cataract After Retinal Procedures

BY ALICE T. EPITROPOULOS, MD; MARK PACKER, MD, CPI; P. DEE G. STEPHENSON, MD; AND ABHAY R. VASAVADA, MS, FRCS(ENGLAND)

## CASE PRESENTATION

A 62-year-old woman presents for a cataract evaluation of her right eye. She had two retinal detachment repairs on this eye in 2010, and she has undergone vitrectomy with silicone oil and scleral buckle procedures. The patient also has a history of glaucoma.

Her visual acuity is light perception with projection in her right eye and 20/25 OS with a refraction of  $-3.75 +1.00 \times 70$ . An examination reveals exotropia in the patient's right eye. A slit-lamp examination finds a clear cornea, a small pupil with synechiae, multiple transillumination defects, and a large peripheral iridectomy at the 5-o'clock position. There is a dense white cataract and no view of the posterior pole (Figure). B-scan ultrasound shows an attached retina and a well-positioned scleral buckle.

How would you approach this case? Which IOL would be your first choice? If it were not possible to place an IOL in the bag, what other options would you consider?

—Case prepared by Audrey R. Talley Rostov, MD.

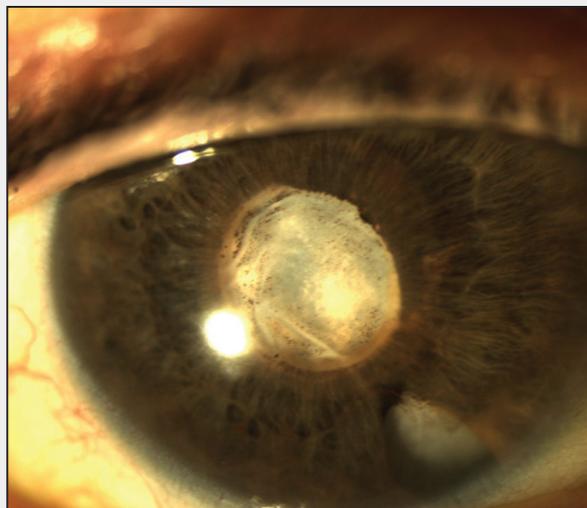


Figure. A dense white cataract, small pupil, and peripheral iridectomy.

### ALICE T. EPITROPOULOS, MD

Cataract formation occurs in up to 80% of eyes within 2 years after pars plana vitrectomy. Cataract surgery in the vitrectomized eye presents special challenges, including the loss of vitreous support, unstable posterior capsules, and weakened zonules.<sup>1</sup>

When measuring axial length preoperatively, I would select “silicone filled eye” to compensate for the higher index of refraction of silicone oil in the vitreous cavity. Because an advanced (especially hypermature) cataract and small pupil often preclude a view of the fundus details, I agree with obtaining B-scan echography preoperatively to ensure that the retina is attached.

With respect to cataract surgery, careful management of the sequelae of the patient's previous detachments, glaucoma, and resulting inflammation is needed. Posterior synechiolysis could be performed with a highly viscous

ophthalmic viscosurgical device (OVD) to free the adhesions from the anterior lens capsule. If the pupil did not dilate after the adhesions were broken, the surgeon could consider placing iris retraction hooks or a Malyugin Ring (MicroSurgical Technology [MST]) to improve exposure of the cataract. I prefer the latter device. I find that the ring is easy to use and generally preserves the physiologic anatomy of the iris sphincter, allowing the pupil to resume its natural shape, size, and function after surgery.

Visualization of the anterior capsule is often a problem with highly dense white cataracts. At this point, the viscoelastic could be removed and trypan blue dye instilled under an air bubble to stain the capsule. This step should facilitate visualization, allowing the surgeon to perform the capsulorhexis with greater safety and confidence.

Even with the surgeon's greatest care, the capsule and supporting structures in an eye with a dense, mature cat-

aract can become compromised during the procedure. I recommend having capsular tension rings (CTRs) and capsular hooks available.

The surgeon might consider repairing the large-sector iridotomy—particularly if the visual prognosis is promising—by means of a single McCannel suture to prevent disabling glare and photophobia.

Extra care is needed when selecting an IOL for a patient with a history of retinal detachment with silicone oil. Silicone IOLs can be problematic if the eye has silicone oil or may need it in the future, because the interface becomes very difficult to see through. A single-piece hydrophobic acrylic IOL can be used or a three-piece acrylic (or possibly PMMA) lens if the capsule is compromised.

The best approach to complex cases is for surgeons to be prepared and take their time. It is also essential to ensure that the patient has realistic expectations.

### **MARK PACKER, MD, CPI**

First, I would ask the patient or her retina surgeon, “How soon after the vitrectomy did the cataract develop?” Whereas the more typical postvitrectomy cataract demonstrates nuclear sclerosis, the rapid onset of an opaque white lens suggests damage to the posterior capsule. If damage occurred, hydrodissection is contraindicated. With a large iridectomy and posterior synechiae, there may also be zonular damage without obvious phacodonesis. A CTR improves the outcome in eyes with zonular damage but an intact capsule.<sup>2</sup> The visual potential of this eye is likely limited, so I would probably recommend a refractive target of around -3.00 D to match the refraction of the patient’s fellow eye.

No silicone oil is visible in the anterior chamber, but it may have contributed to the inflammation and glaucoma. Using a mode adapted for silicone oil in the vitreous, immersion ultrasound will be necessary for axial length measurement. Silicone oil has a large impact (about +6.00 D with a biconvex lens) on IOL power calculation due to its refractive index (1.405).<sup>3</sup> Silicone IOLs are to be avoided in this situation due to the adherence of oil to the lens material, particularly after a YAG capsulotomy. Hydrophobic acrylic IOLs appear to suffer the least from this problem. A single-piece hydrophobic acrylic IOL in the bag would be my first choice. A three-piece IOL with a round anterior edge would be a backup for possible placement in the sulcus with optic capture. My last choice would be an anterior chamber IOL.

I would begin with standard biaxial temporal incisions, each 1.4 mm. After instilling nonpreserved lidocaine and trypan blue under air to stain the capsule, I would use a dispersive OVD to lyse the synechiae. Upon maximally

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“Extra care is needed when selecting an IOL for a patient with a history of retinal detachment with silicone oil.”

—Alice T. Eptropoulos, MD

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deepening the chamber, I would construct a 2.4-mm temporal clear corneal incision and introduce a Malyugin Ring. To minimize the risk of an Argentinean flag sign, I would puncture the anterior capsule centrally with a 27-gauge needle and remove the milky white fluid from the anterior chamber by instilling additional dispersive OVD in the distal angle.

Using microforceps, I would construct a small capsulorhexis with a diameter of 4.5 to 5 mm to reduce the chance of a capsular tear and facilitate the optic capture of an IOL in the sulcus, if needed. During the capsulorhexis, capsular wrinkling might indicate the localized absence of zonular attachments. The lens capsule could be further decompressed with rotation of the endonucleus and biaxial I/A (MST) prior to the introduction of a CTR under an OVD. I would use a vertical chopping technique with biaxial phacoemulsification to extract the endonucleus and exchange the phaco handpiece for an aspiration handpiece to complete capsular cleanup, if needed.

If the posterior capsule ruptured, an attempt could be made to convert the tear into a posterior capsulorhexis under either irrigation or an OVD. Anterior chamber pressure would need to be maintained continuously to prevent the prolapse of silicone oil. Any beads of oil that rise should be aspirated. If a posterior capsulorhexis could not be completed, the haptics of a three-piece IOL with a round anterior edge could be placed in the sulcus and the optic pushed posteriorly so that it was captured in the capsulorhexis, thus maintaining centration and a bicameral eye.

### **P. DEE G. STEPHENSON, MD**

Doing cataract surgery on compromised eyes can be very challenging. Fundamentals in this case are to maintain a closed, controlled system; to compartmentalize ocular structures; and to maintain a high margin of safety. Based on the patient’s history, the eye is stable, but intraoperatively, the surgeon may find the contrary. After filling the eye with an OVD, I would try to release the synechiae at the pupillary margin, either with viscodissection or a

cystotome. Fibrosis, however, is likely extreme. A pair of micrograspers could be used to start the dissection, but an angled pair of microscissors will probably be needed to carefully remove the fibrotic membrane without violating the anterior capsule.

I would instill more viscoelastic to enlarge the pupil. If that were inadequate, I might create small partial sphincteromies with a small scissors (MST). Because of the transillumination defects, I would use iris hooks or a Malyugin Ring with caution. Once the pupil enlarges, staining of the anterior capsule will be needed. I would then pierce the anterior capsule; if no liquid were released, I would proceed with the capsulotomy. Because the patient has had a vitrectomy, the lens and bag have more room to move posteriorly and place stress on the zonules. I would therefore change the parameters on the phaco machine prior to entering the eye with the phaco tip. After removing the cataract, I would place a CTR to improve stability.

My first choice would be to implant a fourth-generation aspheric monofocal silicone IOL (which I find is not really affected by silicone oil) in the bag if possible. If not, I would sulcus fixate the haptics and capture the optic. I would not use an anterior chamber IOL because of the patient's glaucoma. Nor would I sew in a posterior chamber IOL. In light of the patient's exotropia and limited visual outcome, I would not use a premium lens.

#### **ABHAY R. VASAVADA, MS, FRCS(ENGLAND)**

Preoperatively, it would be important to explain to the patient

- the possibility of a poor outcome or residual refractive error because of the limitations of IOL power calculations
- the potential need for an early Nd:YAG capsulotomy because of the silicone plaque probably on the posterior capsule
- the possibility of capsular rupture and zonulolysis, exaggerated postoperative inflammation, a worsening of preexisting glaucoma, aphakia, and secondary IOL implantation

Owing to the dense plaque, I would measure the axial length with A-scan immersion. Because of the silicone oil, I would change the velocity of the ultrasound from 1,532 m/s to 1,000 m/s. After a consultation with a retina specialist, if the plan were to remove the oil after some time, I would inform the patient about a temporary period of postoperative hypermetropia. If the retina surgeon did not expect to remove the silicone oil for awhile, then I would target an emmetropic result.

If the patient is using a prostaglandin analogue, I would have her discontinue its use 2 days prior to surgery and substitute either a  $\beta$ -blocker or a carbonic anhydrase inhibitor.

I would begin surgery by making two 1-mm corneal paracenteses. Next, I would perform a synechiolysis with stretch pupilloplasty. Because the iris is probably atrophic and the patient has already had an iridectomy, I would avoid using mechanical dilating devices as much as possible. The instillation of Healon5 (Abbott Medical Optics) should enlarge the pupil somewhat while keeping a potentially floppy iris from prolapsing. Staining of the anterior capsule with trypan blue dye would be invaluable in this case.

Using a microcapsulorhexis forceps (or scissors if necessary), I would perform an anterior capsulorhexis through the small paracentesis incisions. My aim would be to create a capsulorhexis that was just larger than the pupil. At this point, I would make the main 2.2-mm temporal corneal incision.

I would avoid hydrodissection because of the questionable integrity of the posterior capsule. I would try to avoid surge by using an aspiration flow rate and bottle height that were as low as was comfortable. Typically, I would use an aspiration flow rate of approximately 16 mL/min and a bottle height of 60 to 70 cm. With the Centurion Vision System (Alcon) with active fluidics, I would preset the IOP to only about 40 mm Hg.

Whatever the technique of nuclear division, the surgeon should take care to perform most maneuvers within the pupillary aperture. I find the step-by-step chop in situ and lateral separation technique useful,<sup>4</sup> because it permits creation of a central space as well as chopping within the capsulorhexis margin. All the while, I maintain a closed chamber by using only the minimum incision size compatible with the phaco tip and sleeve and by injecting an OVD before removing any instrument from the eye. I prefer bimanual I/A, which allows me easy access to cortex and avoids opening or distorting the temporal incision during subincisional cortical removal.

Posterior capsular plaque is likely. I would avoid aggressive peeling and polishing, because the capsule may be fragile. Plaque can be dealt with later using an Nd:YAG laser.

My first choice would be to implant a hydrophobic single-piece acrylic IOL in the capsular bag. If posterior capsular support were inadequate, I would implant a three-piece lens in the sulcus, either with optic capture through the anterior continuous curvilinear capsulorhexis or scleral fixation. Because the patient has glaucoma, placing the IOL entirely in the sulcus would be like setting a time bomb.

Postoperatively, glaucoma will be the primary concern. The patient will require stringent monitoring for disease progression and inflammation, and a peripheral retinal evaluation is a must, because two detachment surgeries were already performed. ■

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- Haller J, Kerrison J. Cataract extraction after retinal detachment. *Curr Opin Ophthalmol*. 1997;8:39-43.
- Oner HE, Durak I, Saatci OA. Phacoemulsification and foldable intraocular lens implantation in eyes filled with silicone oil. *Ophthalmic Surg Lasers Imaging*. 2003;34(5):358-362.
- Chakrabarti A. Phacoemulsification in the vitrectomized eye. *Cataract & Refractive Surgery Today Europe*. July/August 2013;8(7):40-46. <http://bmctoday.net/crstodayeurope/2013/08/article.asp?f=phacoemulsification-in-the-vitrectomized-eye>. Accessed October 27, 2014.
- Vasavada AR, Singh R. Phacoemulsification of brunescent and black cataracts. *J Cataract Refract Surg*. 2001;27:1762-1769.