Cataract Surgery in Eyes With Vitreoretinal Pathology

A primer on phacoemulsification in eyes with existing posterior segment disease.

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Phacoemulsification must be performed with particular care in two types of eyes to reduce the risk of posterior capsular tear and subsequent retinal detachment: large myopic eyes and eyes that have undergone previous pars plana vitrectomy (PPV). It is essential to perform technically uncomplicated surgery in these eyes because posterior capsular rupture and vitreous loss greatly increase the likelihood of a poor outcome.

**HIGH MYOPIA**

Myopia is a well-known risk factor for retinal detachment. Myopia of -3.00 D or greater may increase the risk of retinal detachment by tenfold. Retinal detachment has been reported to occur in 1.3% of eyes with an axial length of greater than 30 mm within 24 months after cataract surgery, and this increased to 11% in 36 months in eyes longer than 33.6 mm. Tielsch et al found that each 1-mm increase in axial length increased the risk of retinal detachment 1.2 to 1.3 times. Posterior capsular rupture in this context increased the risk 10 to 20 times. It is clear that eyes with high myopia need special consideration at all stages of cataract management.

For the high myope, the possibility of a posterior staphyloma must be considered preoperatively during biomeetry. Optical biomeetry ensures foveal fixation and removes any risk of globe compression. Most modern IOL power calculation formulas work well for the large eye; however, consideration should be given to optimizing the A-constant used for the surgeon’s particular lens and biomeetry method.

A thorough retinal examination is important to identify preexisting retinal pathology; however, the role of prophylactic retinal treatment is currently unclear. As a general rule, prophylactic laser retinopexy is indicated for horseshoe tears (flap tears), but atrophic small round holes and other lesions such as lattice or paving-stone degenerations do not need treatment. Byer found that most retinal tears occur in areas of the retina that previously looked normal; therefore, prophylactic treatment of retinal lesions such as lattice or paving-stone degenerations or small round atrophic holes is ineffective in reducing future retinal detachment risk.

The risk of retinal detachment was reduced when the preferred cataract surgical technique changed from intracapsular to extracapsular cataract extraction (ECCE). Data for retinal detachment risk in ECCE compared with phacoemulsification are not clear. In any case, phacoemulsification is now the standard surgical approach to cataract surgery in the developed world.

During surgery, a deep anterior chamber is to be expected in a large eye. This can often be addressed by lowering the bottle height. A more difficult situation can arise because of anterior chamber depth fluctuation. This can be due to reverse pupil block, whereby the irrigating fluid becomes transiently trapped in the anterior chamber, leading to depth fluctuation when flow to the posterior chamber is restored. Low aspiration settings are therefore preferred in unstable cases.

Further strategies to address reverse pupil block include lifting the pupil edge either by using a second instrument or by inserting a single iris hook to allow the irrigating fluid continuous access to the posterior chamber. Intracameral phenylephrine can also be helpful if the iris tone is poor. It is important to keep the anterior chamber stable to prevent excess strain on the zonules, which may already be weak. Newer techniques such as biaxial microincision cataract surgery (MICS) can theo-
Theoretically lead to a more stable anterior chamber, as the flow of irrigating fluid remains anterior to the iris.

The need for future peripheral retinal examination should be kept in mind. An IOL with a large diameter optic (6.0 mm or more) should be considered, together with a well-centered capsulorrhexis that overlaps the optic edge. We recommend implanting a 0.00 D or negative-powered IOL if biometry so dictates, rather than leaving the eye aphakic, as implanting an IOL can reduce the rate of posterior capsular opacification and conceptually keep the anterior segment separated from the posterior segment, reducing the risk of vitreous movement.

Postoperatively, the warning signs of a retinal tear should be emphasized to the patient. These include new floaters, flashes, or a blurred area in peripheral vision. Patients should also be aware of how to access urgent retinal evaluation should the need arise.

**THE VITRECTOMIZED EYE**

Expanding indications for PPV due to progressive refinements in vitreoretinal surgical techniques have resulted in an increase in the number of vitrectomized eyes seen by the general ophthalmologist for cataract surgery. The formation of cataract is frequent after posterior vitrectomy surgery. Age, timing of vitrectomy, and use of gas tamponade or silicone oil increases the incidence and progression of cataract in these eyes.

The vitrectomized eye has already undergone surgical intervention and is more likely to develop retinal pathology after cataract surgery for the same reasons that it developed retinal pathology beforehand. There are special considerations relating to the previous vitrectomy itself that surgeons must keep in mind.

History and examination are the basis for all medical procedures, and cataract surgery in the vitrectomized eye is no different. Surgeons must discuss with patients the potential achievable visual acuity after cataract surgery to ensure that expectations are realistic. The possibility of zonular weakness, silicone oil in the anterior chamber, intractable miosis, or occult posterior lens capsular injury should be considered when planning surgery.

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for this group of patients. Ultrasound biometric techniques have limitations in eyes filled with silicone oil due to the change in the speed of sound in this medium. It has been suggested that preoperative optical coherence tomography (OCT) may help to define the location of the photoreceptor layer relative to the reference points of different biometric techniques.6 Ultrasound biometry, which measures to the internal limiting membrane, may be a more realistic guide to the location of the photoreceptor layer in some cases.9

There are strategies available to overcome the intraoperative challenges described above. Mydriasis can be difficult due to posterior synechiae present as a result of previous surgery or inflammation. Sphincterotomy, synechiolysis with ophthalmic viscosurgical device, intracameral mydriatics, iris hooks, and pupil dilating devices such as the Malyugin Ring (MicroSurgical Technology, Inc., Redmond, Washington) have all been used.

Subconjunctival scarring from previous surgery makes a corneal incision more attractive than a scleral approach. Long exposure to silicone oil can lead to rigidity of the anterior capsule. A vitrector, microvitreoretinal blade, or retinal microscissors can be used to help complete the capsular opening if this is the case.8 Hydrodissection should be slow and gentle to reduce the risk of extending an occult posterior capsular tear. A deep anterior chamber can be dealt with by lowering the bottle height. Anterior chamber depth fluctuation can be caused by a reverse pupil block mechanism and can be addressed by the strategies described above. Stress on the zonules can be avoided by using a chopping technique and minimizing nuclear manipulation.

Late IOL decentration and dislocation are also risks in eyes after vitreoretinal surgery; Yung et al11 reported an incidence of 19% in a series of 86 patients after a mean 8.5 years. Sulcus IOL implantation or the use of capsular tension rings are options if mild phacodonesis is observed preoperatively.

Posterior capsular plaques may be encountered. Depending on the density of the opacity, intraoperative polishing of the posterior capsule, posterior capsulorrhexis, or postoperative Nd:YAG laser may be appropriate.

Nonsilicone IOLs should be preferred in vitrectomized eyes because of the possibility of a silicone IOL’s interaction with silicone oil in future surgery.6,10,11

Vitrectomized eyes have a higher rate of posterior capsular opacification postoperatively than nonvitrectomized eyes,12 and this can be managed conventionally. Patients with previous vitreoretinal surgery will most likely be aware of the symptoms of retinal detachment, but it is worth repeating this information to this patient group.

CONCLUSION
Highly myopic eyes and eyes that have undergone previous vitrectomy present challenges to the cataract surgeon. Careful attention to technique and the incorporation of special strategies as described in this article can, in the hands of experienced surgeons, result in good outcomes comparable with those achieved in eyes without these comorbidities. Patients should be made aware that visual outcomes may be limited because of underlying retinal pathology.

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