Management of Dislocated IOLs

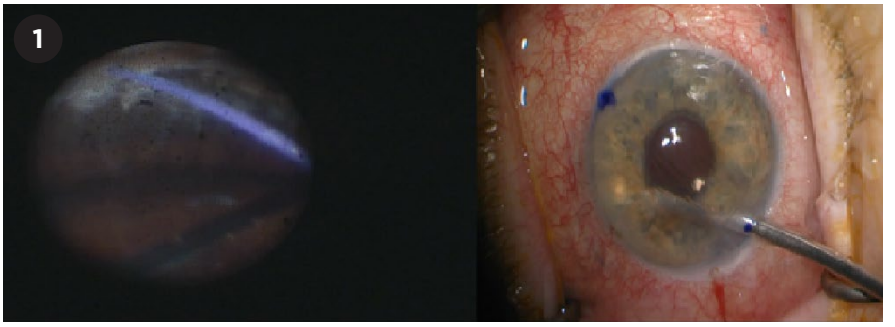
Many types of adverse events associated with intraocular lenses (IOLs) may require exchanging, removing, or repositioning an IOL. They include incorrect IOL power, malpositioned IOLs, damaged IOLs, lens optic abnormalities such as glistenings, and optical phenomena such as dysphotopsias, glare, and monocular diplopia.[1] IOL dislocation, although uncommon, has an incidence of 0.2% to 3.0%.[2]

Causes of dislocation. Early dislocation may result from zonular weakness caused by iatrogenic surgical damage or trauma.

Late dislocations, occurring more than three months after cataract surgery, are commonly caused by pseudoexfoliation,[3] trauma, connective tissue disorders (e.g., Marfan syndrome, hyperlysinemia, homocystinuria, Ehlers-Danlos syndrome), capsular contraction, surgical trauma, high myopia, and retinitis pigmentosa.[4]

Presentation

Patients with a dislocated IOL may present with visual symptoms ranging from mild glare or dysphotopsias to functional aphakia and monocular diplopia. Refractive status may be affected by astigmatism due to lens tilt or by functional aphakia, generally leading to large hyperopic shifts. Myopia may also result from anterior dislocation of lenses.



IRIS CHAFING. *Endoscopic view taken intraoperatively, at left, shows iris chafing from an IOL haptic in a patient with significant iridodonesis who underwent flanged intrascleral IOL fixation. Endoscopic camera in use, at right.*

Evaluation

If surgical intervention is anticipated, preoperative planning begins with reviewing the operative notes from previous cataract or ocular surgeries to determine if there were any complications. A thorough ophthalmic exam is crucial in guiding treatment options for secondary fixated IOLs. The integrity of the capsular bag must be carefully evaluated, looking for a curvilinear continuous anterior capsulotomy, evidence of retained lens or cortical material, and posterior capsular tears or capsulotomy. Elevated IOP, pupillary block, or angle closure from IOL dislocation should also be assessed to determine the urgency of intervention.

We recommend a complete retinal evaluation for posterior segment complications, especially in cases where lenses are significantly posteriorly dislocated. Assessment of lens position and capsular bag integrity are imperative in making the decision of whether to involve retina colleagues for a core vitrectomy or lens retrieval.

Diagnostic tools such as anterior segment OCT, ultrasound biomicroscopy, or B-scan ultrasonography may be helpful to assess the degree of IOL dislocation or the presence of retained lens fragments in cases where a detailed exam is not possible.

Types of Dislocation

IOL dislocation can be classified into three categories:

Decentration. The IOL dislocation can be a simple decentration, either in the bag or in the sulcus with an intact capsule and intact zonules. Lenses that are placed in the sulcus at the time of the original cataract surgery usually have some capsular compromise, so it is not uncommon for these IOLs to have sunset syndrome, a condition with inferior decentration in the sulcus.

Subluxation. The lens can be subluxed, with either a haptic or an optic

BY **AMBER HOANG, MD,** AND **LLOYD WILLIAMS, MS, MD, PHD.** EDITED BY BENNIE H. JENG, MD.

Lloyd Williams, MS, MD, PhD

out of the bag. Both the anterior and posterior capsules may be intact, although there may be a defect or tear causing the IOL to dislocate into the anterior or posterior chamber.

IOL–bag complex dislocation. The zonules can be profoundly weak, causing the entire IOL and capsular bag complex to dislocate into the posterior or anterior chamber.

Management

Management can generally be divided into observation, repositioning of the IOL, and IOL exchange.

Observation. In some cases, if the dislocation is mild, asymptomatic, and nonprogressive, it can be observed without surgical intervention. Observation may also be appropriate if the patient has systemic comorbidities that make surgery inadvisable. When symptomatic or causing other ocular problems such as uveitis-glaucoma-hyphema (UGH) syndrome or cystoid macular edema (CME), the IOL dislocation must be addressed.

Repositioning. The decision to reposition will depend on individual circumstances. For decentered lenses where the bag and zonules are intact and the lens is in the bag, the simplest approach is often to perform an in-the-bag IOL reposition. An intact three-piece lens can often be repositioned through sulcus placement or with iris suture or scleral fixation. A one-piece lens usually needs to be exchanged unless it is in the capsular bag and the bag can be preserved.

However, a new technique of using an intraocular punch to put a hole in the optic-haptic junction of a one-piece lens may allow scleral fixation of a one-piece IOL to the sclera without the need for IOL exchange. (For a video demonstration, go to aao.org/clinical-video/novel-iol-punch-rescue-technique-single-piece-lens.) This technique would allow the patient to retain a multifocal lens or other specialty lens.

IOL exchange. In partial zonular loss or weakness without complete posterior dislocation, a variety of capsular implants can be considered for support. However, if there is significant zonular loss, an anterior chamber IOL (AC IOL), scleral-fixated lens, or iris-fixated lens may be better options.

Surgical Considerations and Techniques

The choice of lens and the best fixation approach depend on the anatomy of the patient's eye. In patients with corneal decompensation or glaucoma, an AC IOL should be avoided. In patients with iridodonesis, an iris-fixated IOL is contraindicated, and a posteriorly placed scleral-fixated IOL may be considered to prevent complications of UGH and CME. Flanged haptic intrascleral fixation and iris fixation may be good alternatives in patients with suture erosion or breakage leading to recurrent IOL dislocation in scleral suture fixation.

IOL removal. If IOL exchange is selected, the lens must first be removed. Several techniques are available, one of which is intraocular folding. In this technique, the lens is generally bent over a cyclodialysis spatula or similar instrument using a lens folding forceps and then removed from the eye.

The IOL may also be cut into a Pac-Man shape or into multiple pieces with intraocular scissors. If the risk of dropping pieces is present, the Pac-Man technique is preferable because the lens is always being grasped. Caution must be exercised to prevent the edge of the lens from diving under the wound and causing hyphema or damaging the iris, cornea, or angle.

In-the-bag exchange. In order to dissect the IOL from the bag, a dispersive ophthalmic viscoelastic device (OVD) on a 25-gauge Atkinson needle can be used to initially lift the edge of the bag from the IOL, followed by a dispersive OVD on a cannula to complete the dissection. Caution should be taken to completely dissect along the haptics, especially haptics with a bulb on the end, to prevent zonular damage when removing the lens from the bag. A major advantage of preserving the capsular bag is the ability to implant a toric IOL in patients with significant corneal astigmatism. In partially subluxed lenses, with one haptic in the bag and one in the sulcus in an otherwise intact capsule, the bag can be opened and the haptic tucked back in the bag.

If the zonules and anterior capsule are intact but the posterior capsule is damaged, a three-piece lens placed in the sulcus with optic capture through the anterior capsulorrhexis is recommended. If the zonules and posterior capsule are intact, but the anterior capsule is not, a posterior capsulorrhexis can be made and a three-piece sulcus lens can be optic-captured through the posterior capsule. Only three-piece lenses should be placed in the sulcus, as a one-piece acrylic lens in the sulcus may cause UGH.

Capsular fixation. In subluxed lenses, IOL exchange is usually required, although sometimes a three-piece IOL can be repositioned. There are four main techniques for performing IOL exchange in cases without capsular support. The first approach is to stabilize the bag with either in-the-bag capsular tension rings (CTRs) or scleral-fixated CTRs. The rings may be fixated with sutures or with a Canabrava double-flanged technique. The benefits of preserving the bag include low risk of UGH syndrome, possibility of using toric lenses, and reduced risk of vitreous loss.

If the bag cannot be preserved, the other main options for secondary IOLs include AC IOLs, iris-fixated IOLs, and scleral-fixated IOLs. For severely subluxed and dislocated IOLs, the surgeon must be very careful to preserve the corneal endothelium when bringing the IOL into the anterior chamber for removal. Careful maintenance of the anterior chamber with OVD or an anterior chamber maintainer or posterior infusion from vitrectomy can be helpful in preventing IOL-cornea touch.

AC IOL. Anterior chamber IOLs have been used for a long time, and their placement is generally quite rapid and straightforward. These lenses can provide good vision; however, they carry the risks of endothelial damage and bullous keratopathy in addition to decentration, UGH syndrome, and CME if improperly sized. AC IOLs are oftentimes avoided because of the risk of endothelial damage, and endothelial keratoplasty after AC IOL placement can be challenging.

Iris fixation. Another technique that has been used for decades is iris fixation. Generally, haptics are fixated to the iris with a McCannel suturing technique or with Siepser knots. Some surgeons prefer 9-0 Prolene on a CTC needle to fixate a three-piece lens to the iris, especially in younger patients, as the 9-0 suture appears to have a significantly longer time to degradation in the eye and may lead to less breakage than the 10-0.[5] Possible complications include ovalization of the pupil, UGH syndrome, CME, late dislocation of the IOL, pigment dispersion, vitreous hemorrhage, and glaucoma.

Scleral fixation. Recently, scleral fixation has become more popular with the introduction of the Yamane technique for fixating three-piece IOLs to the sclera. This technique is generally quick, effective, and relatively uncomplicated compared with other methods of scleral fixation, such as sutured and glued IOLs. In addition, we have seen several cases of eroded Gore-Tex sutures from sutured IOLs that we have been able to successfully fix with Yamane-style fixated IOLs.

However, some complications are associated with the Yamane technique. Several patients with severe floppy iris developed UGH syndrome after Yamane fixation (Fig. 1). In severe iridodonesis, either more posteriorly positioned IOLs or scleral-sutured fixation may be helpful to prevent the development of UGH. Furthermore, preventing IOL tilt and achieving excellent centration can be difficult, especially for surgeons who perform the technique infrequently. Several devices are available to aid in needle placement for good positioning.

Risks associated with scleral-fixated lenses include CME, vitreous hemorrhage, endophthalmitis, conjunctival and scleral erosion, and late dislocation. Overall, studies have not demonstrated a clear winner in comparisons between AC IOLs, iris-sutured IOLs, and scleral-sutured IOLs in terms of efficacy and patient safety.[6]

Other fixation techniques. Surgeons repairing dislocated IOLs should be familiar with several different procedures, and the decision of which to use should be made based on individual patient and lens factors. Other methods of scleral fixation include glued and sutured IOLs, and various techniques have been described for each of these.

One that is commonly used at our institution is to suture an Akreos lens (Bausch + Lomb) to the sclera using Gore-Tex sutures. Care must be taken to bury knots, as the knots in these sutures can erode through conjunctiva and even scleral pockets. Haptics of a three-piece lens may also be fixated in a Hoffman pocket in the sclera using fibrin glue. New techniques are continually being developed.

Conclusion

IOL dislocations, while not common, are an important long-term complication related to cataract surgery. The field continues to develop with new emerging techniques, and careful surgical planning and techniques are required to obtain optimal outcomes.

1 Masket S et al. *Ophthalmology*. 2017;124(1):142-144.
2 Yang S et al. *PLoS ONE*. 2019;14(2):e0211489.
3 Jehan F et al. *Ophthalmology*. 2001;108(10):1727-1731.
4 Mönestam EI. *Ophthalmology*. 2009;116(12):2315-2320.
5 Buckley EG. *Trans Am Ophthalmol Soc*. 2017;105:294-311.
6 Holt DG et al. *Curr Opin Ophthalmol*. 2012;23(1):62-67.

Dr. Hoang is medical instructor, and **Dr. Williams** is assistant professor of ophthalmology. Both are at Duke University, Duke Eye Center, in Durham, N.C. *Financial disclosures: None.*

GOT PEARLS?

Interested in sharing with your colleagues the latest evidence-based information about the diagnosis and medical and/or surgical management of a specific disease entity? Write a Pearls article for *EyeNet*!

Be sure to read the writers guidelines, available at aao.org/eyenet/write-for-us. Then submit your Ophthalmic Pearls topic proposal to eyenet@aao.org.