Navigating the Options for the Treatment of Intraocular Lens Malposition

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There has been a wave of new and innovative techniques for vitreoretinal surgeons in the management of aphakia as well as subluxed or dislocated intraocular lenses (IOLs). Several of these techniques are quite elegant and fun to perform, but most incur a learning curve to master. Having a number of these options available is crucial to maximizing patient outcomes when presented with varying clinical scenarios.

Our anterior segment colleagues are often extremely grateful for our assistance with these cases, for example when rescuing a “premium IOL” from the retinal surface. Retina surgeons also possess several advantages over our anterior segment colleagues in secondary IOL cases due to our flexibility to work in both the anterior and posterior segments of the eye.

Dimosthenis Mantopoulos, MD, PhD, and Jonathan Prenner, MD, from New Jersey Retina and the Rutgers — University of Medicine and Dentistry of New Jersey provide a comprehensive overview for a number of modern IOL techniques. They highlight for what specific circumstances each technique is most useful, as well as provide surgical tips and tricks to shorten the learning curve. Lastly, I encourage readers to visit www.Healio.com/OSLIRetina, as the surgical videos provided there to accompany this article beautifully illustrate these very elegant techniques.

Thanks to the introduction of small-incision phacoemulsification surgery, the safety, efficacy, and visual outcomes of cataract surgery have dramatically improved. Currently, 15 million cataract surgeries are performed globally on an annual basis. However, complications do occur, including postoperative intraocular lens (IOL) subluxation and dislocation. In these situations, the subsequent surgical management may become complex given the numerous variables that need to be considered to achieve an optimal result, including the type of IOL present (one-piece or three-piece), the status of the bag capsule (presence or absence of capsular support), and specifics of any particular patient’s ocular history (eg, glaucoma, corneal statue, history of trauma, visual expectations, etc.) Surgeons have recently developed a number of novel surgical techniques that, when employed in a patient-specific way, may lead to optimal outcomes. Direct comparisons of these techniques are limited in terms of evidence-based studies. This is highlighted by the American Academy of Ophthalmology Ophthalmic Technology Assessment, which found that open loop anterior chamber IOLs (ACIOLs), scleral-sutured posterior chamber IOLs (PCIOLs), and iris-fixated PCIOLs were equally safe and effective in cases of inadequate capsular support. Here, we review a number of the novel techniques that we employ routinely and highlight the scenarios in which we find them most useful.

MODIFIED YAMANE TECHNIQUE: INTRASCLERAL FIXATION USING A 30-GAUGE NEEDLE

Various transconjunctival sutureless scleral-fixated IOL approaches are minimally invasive and very efficient in eyes that require a secondary IOL or an IOL exchange. For these situations, we prefer to utilize a modified version of the Yamane approach, which allows the procedure to be more reliable and easier to perform.

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perform. In this approach, we utilize a 30-gauge, thin-walled TSK needle (TSK Laboratory, Oisterwijk, The Netherlands) to achieve intrascleral fixation of an Aaren Scientific EC-3 PAL lens (Carl Zeiss Meditec, Jena, Germany) (Supplemental Video available at www.healio.com/OSLIRetina). In this approach, we secure the leading haptic in the intrascleral tunnel immediately after needle docking by removing the 30-gauge needle and thermally deforming the tip of the haptic prior to repeating the process on the trailing haptic (Figure 1). In that way, the first 30-gauge needle will not slip out of the intrascleral tunnel while docking the second. In addition, we utilize a chandelier for visualization while docking the second haptic. This allows for docking to be performed in the mid-vitreous cavity instead of in the more restricted space of the anterior chamber, which enables increased freedom of movement and makes the needle docking of the second haptic less challenging (Figure 2). We utilize the EC-3 PAL IOL, as the polyvinylidene fluoride haptics are particularly resistant to breaking even when significantly manipulated.

**CZ70BD IOL USING GORE-TEX SUTURE**

In cases where significant iridodonesis and traumatic mydriasis is present, we prefer to use an IOL with a larger optic and fixate the lens with suture. In this surgical approach, we prefer to use an Alcon CZ70BD IOL (Fort Worth, TX) and scleral fixate the lens 2 mm posterior to the limbus using Gore-Tex (W. L. Gore & Associates, Newark, DE) suture and a cow-hitch knot (Figure 3). The IOL optic has a 7-mm diameter and provides significant stability, reducing iris mobility when in place. The utilization of the cow-hitch knot and two scleral fixation sclerotomies allows for creation of de facto four-point fixation (Supplemental Video available at www.healio.com/OSLIRetina). In addition, the large optic size reduces high order aberrations and dysphotopsias in cases with mydriasis. Gore-Tex suture has high tensile strength, reducing the chance of intraoperative or postoperative suture rupture compared with Prolene suture (Ethicon, Somerville, NJ).

**REPOSITIONING OF SINGLE-PIECE IOL CAUSING UVEITIS-GLAUCOMA-HYPHAEMA DUE TO INADVERTENT PLACEMENT IN SULCUS**

Uveitis-Glaucoma-Hyphema (UGH) syndrome has been reported in eyes with ACIOLs as well as others where the IOLs were placed in the ciliary sulcus and the capsular bag.  Recurrent vitreous hemorrhage is another clinical feature of UGH that is perhaps under-recognized. This is frequently referred to as “UGH-plus.” In eyes with UGH-plus due to a

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**Figure 1.** The tip of the leading haptic is externalized and thermally deformed before the intrascleral fixation of the trailing haptic, a step that increases the safety of this surgical modification.
Figure 2. We used a chandelier to work in the vitreous cavity and fixate the trailing haptic in the 30-gauge needle.

Figure 3. A cow-hitch knot is created over the haptic islet using a Gore-Tex suture.
malpositioned single-piece IOL in the sulcus, a key diagnostic finding is the presence of an arcuate iris transillumination defects. The presence of these defects helps to secure the UGH diagnosis.

A common surgical approach for this scenario is to perform an IOL exchange. We have recently reported good outcomes with vitrectomy and repositioning of the existing IOL into the capsular bag (Figure 4) (Supplemental Video available at www.healio.com/OSLIRetina). In some cases, enlargement of the bag is required to allow the capsular opening to be slightly smaller than the diameter of the optic. This approach of capsular capture and vitrectomy to treat UGH-plus is effective, transconjunctival, and does not require IOL exchange.

**SCLERAL FIXATION WITH HOFFMAN POCKETS**

The surgical approach is effective in eyes with in the bag IOL subluxation or dislocation (Supplemental Video available at www.healio.com/OSLIRetina). Surgery begins with placement of a three-port vitrectomy setup using 25-gauge trochars. A guarded blade is used to create a 2.5-mm-long, partial-thickness, clear corneal incision at the limbus and a crescent blade is used to dissect posteriorly at 50% scleral depth and extended posteriorly for 3.5 mm. A matching pocket is created at the 9 o’clock position. A paracentesis is then created one clock hour superior to each pocket with a super sharp blade. After vitrectomy and placement of the lens bag complex on the surface of the retina, a 25-gauge forceps or soft-tipped cannula is used to engage the IOL bag complex at the haptic-optic junction and elevate it to the iris plane.

A needle-docking technique is then used to fixate the lens. A 25-gauge needle is passed 2 mm from the limbus directly through the body of the pocket present opposite the instrument holding the lens-bag complex. The needle is passed between the haptic and optic of the lens, near the apex of the haptic. A double-armed 9-0-prolene suture is then passed back-
ward through the opposite paracentesis and is docked in 25-gauge needle and removed. The 25-gauge needle is then passed through the same pocket, now 1.5 mm from the limbus, and positioned in front of the lens-bag complex. The second needle from the same Prolene suture is passed backward through the same paracentesis and is docked again in the 25-gauge needle, which is then removed. This effectively lassos one-half of the lens bag complex. The process is then repeated on the opposite side.

Suture ends are externalized through pocket openings at the limbus while remaining covered by the scleral roof of the pockets and tied. Once the lens is perfectly centered, the knots are locked with two 1-1 throws on each side before trimming the sutures. Trochars are then removed.9

**CONCLUSION**

Multiple options are available for the management of malpositioned IOLs in the modern era. Although ACIOL placement is usually an acceptable option, we have found that tailoring the approach to each patient leads to optimal outcomes. These techniques take some practice, but typically can be mastered with a few attempts. With some repetition, they can become effective and efficient and widen the armamentarium with which the surgeon can approach these common scenarios.

**REFERENCES**


**Disclosures:** Dr. Mantopoulos reports no relevant financial disclosures. Dr. Fine is a consultant and/or speaker for Allergan, Genentech, Regeneron, and Spark Therapeutics and has equity/patent interests in Auris Surgical Robotics. Dr. Prenner is a consultant and owner of Panoptica; a consultant for Genentech, Regeneron, and Alcon; and is a DSMB member of Clearside.