

Single-Piece Syndrome

The newest form of IOL-induced glaucoma.

BY GARRY P. CONDON, MD

The AcrySof line (Alcon Laboratories, Inc., Fort Worth, TX) of single-piece hydrophobic acrylic IOLs has become tremendously popular since its introduction in 2000, and these lenses can now be inserted through incisions as small as 2.2 mm.¹ Thanks to their soft foldable optics and large, square-edged, floppy haptics, these lenses are easily injected into the capsular bag in a gentle, controlled fashion. Leaving any part of the lens outside the bag and in direct contact with the posterior surface of the iris, however, often results in iris chafing with pigment dispersion that can cause IOP elevation, a microscopic hemorrhage, and chronic inflammation. A number of recent reports have documented the potential for single-piece acrylic IOLs, and in particular their haptics, to produce uveitis-glaucoma-hyphema (UGH) syndrome when they are placed either partly or completely in the sulcus.²⁻⁴

Despite a growing awareness of this problem, many glaucoma surgeons continue to see patients on long-term suboptimal treatment for UGH syndrome associated with malpositioning of this particular IOL. A number of factors may explain the lack of more immediate recognition of the problem and earlier effective treatment. First, the UGH syndrome in these cases typically has a somewhat delayed onset—greater than 12 months in one study.⁵ For that reason, the underlying problem may often be missed or forgotten. Second, in the past, if cataract surgery were complicated by posterior capsular rupture, implanting this IOL entirely in the sulcus was deemed acceptable.⁶ Moreover, in cases of pseudoexfoliation and zonular compromise, the asymmetrical implantation of the IOL, with one haptic in the capsular bag and the other in the sulcus, was not recognized as a problem.

The delayed onset of UGH and its initially mild symptoms in these patients often leads to ineffective medical treatment for several years, while a progressive escalation in pigment dispersion and iris trauma produces worsening glaucoma, inflammation, and microhyphema.

In 2010, the FDA approved the Softec HD lens (Lenstec, Inc., St. Petersburg, FL). This single-piece hydrophobic

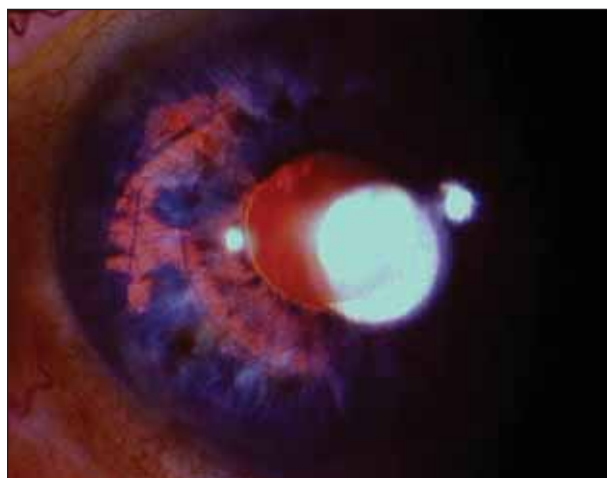


Figure 1. The area of iris transillumination corresponds to the nasal haptic and the portion of the optic positioned anterior to the capsular bag that are chafing the iris.

acrylic IOL has a profile similar to that of the AcrySof IOL. The potential of the former to produce single-piece syndrome has yet to be evaluated.

THE FALLACY OF THE APPARENTLY WELL-POSITIONED IOL

When these patients present years after their original cataract surgery to the uveitis or glaucoma consultant, he or she often does not immediately recognize the true malpositioning of the IOL. If the lens is entirely in the sulcus, the pliability of its haptics allows the optic of the lens to appear remarkably well centered. A careful slit-lamp examination with retroillumination will usually clearly reveal a pattern of loss in the iris pigment layer that directly outlines the configuration of one or both haptics. This is particularly the case when only one haptic is in the sulcus (Figure 1). Ultrasound biomicroscopy may help reveal which portions of the lens lie outside the bag.

If the IOL was placed in the sulcus because of posterior capsular rupture, any eventual microhemorrhagic event

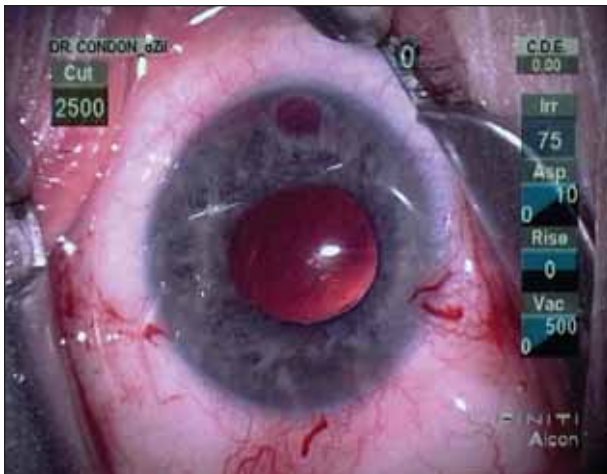


Figure 2. An atrophic full-thickness iris hole and peripheral transillumination defect have been caused by one-half of this AcrySof lens' lying in the sulcus.



Figure 3. Iris retractors allow the surgeon a clear view of the haptic positioned anterior to the bag, as he is about to amputate it with a Rappazzo scissors.

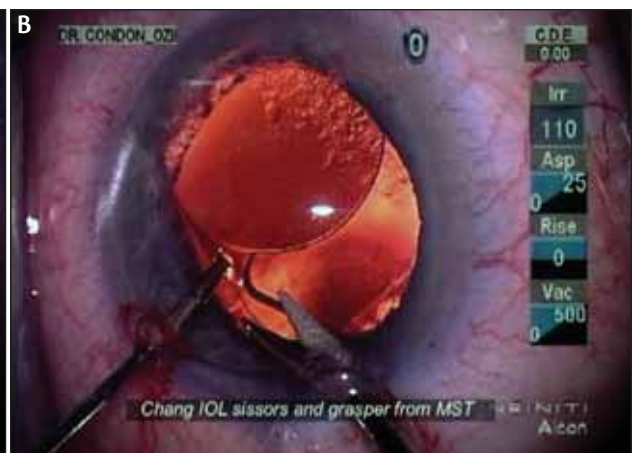


Figure 4. The temporal haptic is the only portion of the lens within the bag, and it is tightly fibrosed in the fornix (A). The surgeon uses microsissors to cut the fibrosed haptic from the lens. He allows a small portion of the haptic to remain in the bag to avoid tearing the bag or zonule (B).

could result in a vitreous hemorrhage. I have seen a number of such patients who have undergone repeat pars plana vitrectomy by a vitreoretinal surgeon who has not considered exchanging the IOL. Indeed, he or she often may feel that the lens is perfectly positioned because of its excellent centration. The unique features of the pliable-yet-sharp haptics and the planar configuration of this IOL disguise its malposition and yet propagate unrelenting pigment epithelial and irido-vascular trauma.

IT ONLY GETS WORSE

It is certainly reasonable to prescribe ocular hypotensive and anti-inflammatory medications as initial therapy in patients who develop an UGH syndrome from a malpositioned single-piece IOL. Even if their initial response

is excellent, however, they require close observation. Unfortunately, medical therapy in the vast majority of these cases is inadequate but often continues for several years, allowing the process to escalate and the trabecular meshwork and iris microvasculature to deteriorate (Figure 2). In my experience, patients are too often advised against an IOL exchange simply because the position of the lens looks “too good.” Delaying surgery to replace the lens can result in progressive glaucomatous damage to the optic disc and an inability to regain control of the IOP after removal of the offending IOL. The reality is that this entire dilemma can be cured with surgery, and I have found that a majority of these patients readily agree to surgery after spending years trying unsuccessfully to control their problem.

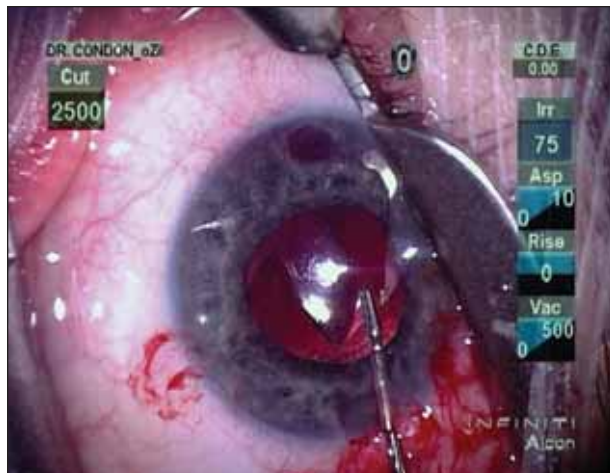


Figure 5. After cutting out a central triangular portion of the optic, the surgeon can easily remove the remaining lens through the 2.4-mm incision.

DEFINITIVE SURGICAL THERAPY

Early IOL exchange surgery is the best option if the patient is symptomatic from smoldering, persistent, low-grade uveitis or if his or her IOP is uncontrolled. When only one haptic extends outside the capsular bag, an alternative approach is to amputate the offending haptic at the edge of the capsular bag to eliminate any further contact with the iris. Both of these surgical options are well within the capability of an anterior segment surgeon with readily available microforceps and microscissors.

Preoperatively, I try to determine whether the majority of the IOL is outside the capsular bag or whether only a single offending haptic is anterior to the capsular bag. I also want to know whether the posterior capsule is open so that I am prepared to perform any required partial vitrectomy if the lens is to be exchanged. In an eye with pseudoexfoliation, there is always the possibility of an absent zonule. Any areas where the zonule is open need to be determined at the time of surgery, prior to manipulations of the IOL. Iris retractors can be extremely beneficial for visualizing peripheral structures of the capsule and zonule during surgery (Figure 3).

In my experience, most cases involve an asymmetrically positioned IOL, with one half outside the capsular bag and the other half within the fornix of the capsular bag. In these cases, the haptic correctly located in the capsular bag is often solidly fibrosed into position. It is best, then, to amputate this haptic at the edge of the capsulorhexis with microscissors rather than to attempt to remove it and risk tearing the capsular bag or zonule. Any portion of the lens that remains well within the capsular bag can be left behind for the purposes of the IOL exchange

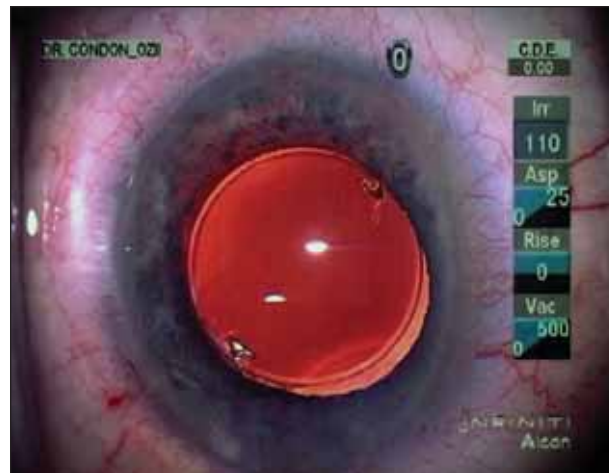


Figure 6. The surgeon has implanted the replacement three-piece IOL in the ciliary sulcus. The lens has a diameter of 13.5 mm and demonstrates excellent centration.

(Figure 4). I instill a generous amount of viscoelastic to protect the corneal endothelium and tamponade any areas of potential vitreous prolapse. This measure combined with the use of iris retractors, microforceps, and microscissors will usually allow for uneventful, controlled surgery. I have found that topical tetracaine and intracameral 1.5% unpreserved lidocaine are usually adequate for anesthesia.

I approach the eye temporally with a clear corneal 2.4-mm incision and additional paracentesis tracts to allow for hooks and microforceps, as needed. The initial instillation of the viscoelastic usually reveals which portion of the IOL is outside the capsular bag. There are a number of options for removing the single-piece acrylic IOL once it has been freed from any capsular attachments. I prefer to use the IOL grasper and scissors from MicroSurgical Technology (Redmond, WA) to remove a pie-shaped portion of the optic first. The remaining piece of IOL is then in a configuration that can be easily pulled through the 2.4-mm incision (Figure 5). In cases where all but one haptic of the IOL is contained within the capsular bag, I simply amputate the offending haptic as close to the optic as possible by means of the horizontal microscissors or the vertical Rappazzo scissors (Figure 3).

I favor a large-diameter three-piece silicone IOL (model AQ2010; STAAR Surgical Company, Monrovia, CA) as a replacement lens. This IOL has an overall diameter of 13.5 mm, an optical diameter of 6.3 mm, and a round-edged anterior optic. The lens is vaulted and must be correctly oriented. It can be manually folded or placed in an injector. For safe, controlled insertion of the lens, it is necessary to enlarge the corneal incision to at least 3 mm. I typically inject the entire lens into the

anterior chamber and confirm that it is correctly oriented before placing each haptic in the sulcus with micro-forceps (Figure 6). Although it may be possible to capture the optic of the lens with any residual capsular opening, I do not find that step necessary, given the overall size and optical diameter of this IOL. An alternative would be a three-piece acrylic IOL, for which I would prefer posterior capture of the optic because of its smaller diameter and square edges.

In high myopes with large anterior segment diameters, I consider using iris sutures to fixate the IOL and reduce any rotational instability. It is important to reduce the power of the IOL when placing it in the sulcus. I generally decrease the lens' power by 1.00 D, but that adjustment is based on the overall power of the IOL.

THE BOTTOM LINE

A patient with persistent, recurrent, low-grade signs and symptoms of chronic inflammation associated with pigment dispersion and elevated IOP needs to be carefully evaluated for the possibility of a malpositioned single-piece acrylic IOL. The vast majority of these patients will require IOL surgery to effectively resolve the problem. If this procedure is performed early enough in their clinical course, very few will require surgical intervention for any secondary glaucoma. □

A video of Dr. Condon's surgical management of a malpositioned single-piece IOL is available at <http://eyetube.net/?v=gufan>.



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