CONSULTATION SECTION

CATARACT SURGICAL PROBLEM

Edited by Samuel Masket, MD

A 66-year-old chemistry professor is referred for evaluation of a dense uniocular cataract in the right eye after an injury much earlier in life. At age 9 years, he sustained a perforating injury to the globe with a fragment of broken glass in the region of the nasal limbus. Surgical repair was performed, and the patient experienced good vision, albeit life-long glare disability. However, over the past decade, the patient has noted decreased vision but also some reduction of glare symptoms as an advanced nuclear cataract evolved. He requests visual rehabilitation as nighttime driving has become very difficult. On the other hand, he is concerned about a return of disabling glare after cataract surgery.

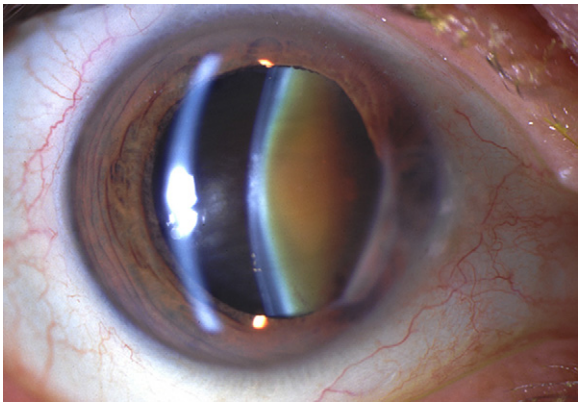

Figure 1. Slitlamp photomicrograph of the involved right eye shows a dense cataract, corneal scar, and iris deformity.

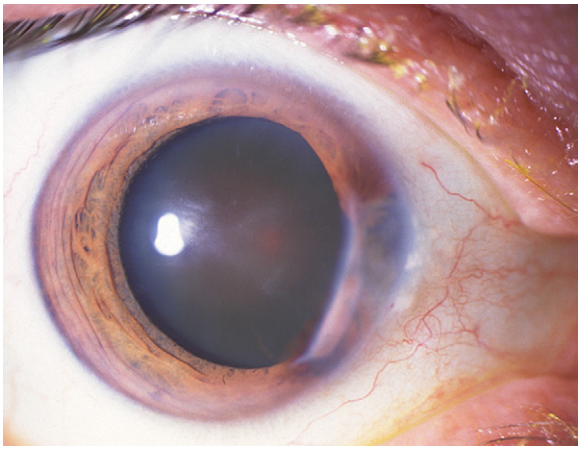

Figure 2. Anterior segment photograph of the right eye.

Current findings include the following: best corrected visual acuity, 20/400 in the right eye and 20/20 in the left eye; intraocular pressure (IOP), 12 mm Hg and 11 mm Hg, respectively. Anterior segment examination of the right eye (Figures 1 and 2) demonstrates a clear cornea centrally with a 2-clock-hour scar at the nasal limbus that extends centrally for approximately 2.0 mm. The anterior chamber is deep, and an advanced brunescent nuclear cataract is observed. There is loss of iris tissue for 2 clock hours under the corneal scar nasally, and the pupil is enlarged and poorly reactive. There is no phacodonesis, although it appears that zonules are absent for approximately 1 clock hour. Examination of the posterior segment is unremarkable. The fellow left eye is fully normal.

Given the patient's complaints and findings, how would you proceed?

■ This patient has an ultrabrunescent lens, traumatic mydriasis, nasal iris incarceration, and presumed zonular dialysis of indeterminate extent. I would proceed with phacoemulsification by making a temporal clear corneal incision and using trypan blue (Vision Blue) to facilitate the capsulorhexis. With mature brunescent cataracts, this has the added advantage of enhancing visualization of the capsulorhexis edge during nuclear emulsification. With weak or missing zonules, the anterior capsule flap tends to veer radially in the affected quadrant because of what I call pseudoelasticity. Without sufficient zonular countertraction, tugging the capsule flap causes the entire peripheral capsule to move with it, mimicking the behavior of a very elastic anterior capsule. Because this makes it very difficult to control the capsulorhexis tear, one must aim for a smaller diameter opening, regrasp the flap more frequently, and use more radially directed forces when advancing the flap.

Because of the apparent zonular dialysis, I would be prepared to insert 1 to 2 disposable Mackool capsule retractors (FCI, Impex) in the nasal quadrant if significant zonular weakness were encountered. Capsule retractors literally fixate the bag to the scleral wall in the affected quadrant. This facilitates nuclear rotation, supports the bag in the anterior–posterior direction, and prevents infolding of the posterior capsule and capsular fornix during aspiration maneuvers. In contrast to capsular tension rings (CTRs), capsule retractors will not impede cortical stripping and their insertion is much less traumatic to the remaining zonular apparatus. Compared to iris retractors, the elongated

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hook of the Mackool capsule retractor is able to ensnare the edge of a small capsulorhexis and yet provide support to the equatorial capsular bag.

Because hardly any epinucleus is present, I would sculpt a central pit and then impale the nucleus at the base of the pit to perform vertical chop. With a brunescent lens, a lax posterior capsule and the absence of an epinuclear shell make removal of the final nuclear fragments treacherous. I would use a dispersive ophthalmic viscosurgical device (OVD) such as sodium hyaluronate 3.0%–chondroitin sulfate 4.0% (Viscoat) to partially inflate the bag as these final fragments are removed. This artificial epinucleus concept, described by Steinert, restrains the lax posterior capsule from trampolining toward the phaco tip, and a dispersive OVD better resists aspiration by the phaco tip. In the presence of zonular dialysis and a small-diameter capsulorhexis, bimanual irrigation/aspiration (I/A) instrumentation has particular utility. In addition to facilitating subincisional cortical aspiration, one can dissociate the irrigation and aspiration instruments to avoid misdirection of irrigation fluid through a zonular defect.

After thorough cortical cleanup, I would anticipate implanting a CTR (AMO, FCI, Morcher) to improve long-term zonular integrity and lessen the risk for capsule phimosis, asymmetric bag contracture, intraocular lens (IOL) decentration, and late bag–IOL dislocation. While acknowledging the lack of long-term controlled studies to confirm my hypothesis, I am convinced that the risk for late bag–IOL dislocation can be lessened by using an IOL with a hydrophobic acrylic optic (which induces less anterior capsule fibrosis than silicone) with poly(methyl methacrylate) (PMMA) haptics (which are stiffer and better resist deformation than single-piece haptics) and by avoiding a small capsulorhexis.[1] Toward this end, I often enlarge the capsulorhexis diameter after placing the CTR and IOL by making an oblique cut with microscissors and retearing the opening.

Because of the traumatic mydriasis, removal of the brunescent lens may cause disabling glare and photophobia. Therefore, after IOL implantation, I would attempt pupillary cerclage with 2 interrupted 10-0 polypropylene sutures. Ordinarily with traumatic mydriasis, 2 interrupted McCannel sutures 180 degrees apart at the pupillary margin will create a smaller, rounded pupil. Because of the nasal iris entrapment within the corneal scar, I would place these 2 McCannel sutures 120 degrees from the midpoint of the scar and each other. An angled Kelman-McPherson forceps would be used to gently unfurl and stretch out the retracted iris tissue in all quadrants. A long STC-6 transchamber needle (Ethicon) would be used to ensnare 1.0 to 1.5 mm bites of the pupil margin, and a Siepser technique would be used to externally tie the intraocular slipknot.[2] Although the pupil will be peaked, this will significantly reduce the area of the entrance pupil.

The Morcher coloboma ring is a CTR with a single, opaque segmental PMMA plate that could be aligned within the capsular bag to cover the IOL edge nasally. However, this device is not approved by the U.S. Food and Drug Administration (FDA) and enough anterior capsule fibrosis may eventually develop to cover the nasal IOL edge and reduce light transmission through this area. I also have access to the Ophtec 311 artificial iris implant as a U.S. investigator in the FDA trial.[3] However, this 9.0 mm diameter PMMA implant requires a very large incision. One Ophtec 311 implant model has no optic in the center, and this could always be implanted later in the ciliary sulcus as a secondary procedure. I would therefore perform pupil cerclage alone as an initial procedure. In this way, the level of glare symptoms and residual photophobia can be fully assessed with the option of an artificial iris device being implanted later, if deemed necessary.

David F. Chang, MD
Los Altos, California, USA

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■ This patient has lived with the injury described for many years. Now, the cataract has advanced to the point that surgery is indicated. Complicating factors include the very dense nature of the cataract, zonular injury, and iris damage, including traumatic mydriasis.

Preparation before the surgery is critical. The surgeon must be prepared to use a number of potential interventions in the course of the procedure. This dense cataract may require trypan blue staining of the capsule to safely visualize the capsulorhexis. There may well be synechias to the lens capsule that require viscodissection. Once initiation of the continuous curvilinear capsulorhexis occurs, the stability of the capsule will become evident. If more than minimal dehiscence is present, retraction hook(s) over the capsulorhexis edge as the capsulorhexis is performed may help stabilization. Mackool hooks are designed for this maneuver.

Placement of a scleral-fixated CTR with Cionni modification (or the Ahmed ring segment) would probably not be indicated if only 1 hour of dehiscence is, in fact, the case. However, I would approach the surgery with the understanding that the damage may be more extensive than it appears at the slitlamp and would be prepared for such