

# Complex Cataract Surgery on an Eye With an Opaque Cornea

BY MARK D. EWALD, MD; BENNIE H. JENG, MD; THOMAS "TJ" JOHN, MD;  
CLARK L. SPRINGS, MD; AND ALAN N. CARLSON, MD

## CASE PRESENTATION

A 52-year-old Hispanic man suffered a traumatic injury to his left eye from a piece of tile at a construction site in January 2013. He sought care locally during the subsequent month for an infection that worsened despite topical antibiotics.

The patient was referred to the Duke Eye Center with a descemetocoele and worsening inflammation (Figure 1). His eye was cultured and aggressively treated with topical antibiotics. Cultures and Gram stain were not helpful, and his cornea perforated a week later. An eccentric keratoplasty (tectonic and therapeutic) was performed on an emergency basis. The patient did very well with the exception of a cataract that developed over the ensuing months. He was scheduled for cataract surgery.

On the day of surgery, the patient was noted to have an opaque cornea. The cost of the medication had contributed to his discontinuation of the corticosteroid drops, and he had unfortunately developed acute graft rejection since his last eye examination. Given the degree of corneal opacification, scarring and vascularization as well as the extent of anterior and posterior synechiae, the patient was rescheduled for a full-thickness penetrating keratoplasty (PKP)—rather than Descemet stripping automated endothelial keratoplasty or Descemet membrane endothelial keratoplasty—in combination with cataract/IOL surgery. The center's social worker became deeply involved to address the medical team's concerns about noncompliance.

Regarding cataract surgery and the IOL's insertion, what special precautions and techniques are used in an eye with a previous infection, extensive posterior synechiae, and poor visibility through an opaque cornea from scarring or, in this case, graft failure (Figure 2)?

—Case prepared by Alan N. Carlson, MD.



Figure 1. Initial presentation: acute suppurative, necrotic microbial keratitis.

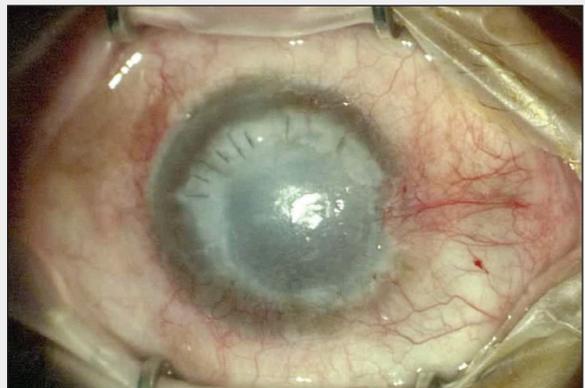


Figure 2. Resolution of the infection left a scar that affected surgical decision making.

**MARK D. EWALD, MD**

We ophthalmologists concentrate our medical and surgical efforts on restoring vision. This vignette, however, highlights the potential complications—noncompliance due to economic factors in this case—that can occur outside a clinic or OR. I certainly agree with involving a social worker in this patient's care. Also needed is a conversation between the surgeon and patient on the latter's ability to care for the eye postoperatively. If the patient is unable or unwilling to adhere to the postoperative regimen, further surgical intervention should be postponed.

With respect to cataract surgery, careful management of the sequelae of the patient's previous infection and resulting inflammation is needed. Posterior synechiolysis can be performed with viscoelastic in the anterior chamber and an iridodialysis spatula passed through a paracentesis. If the pupil does not dilate after the iridolenticular adhesions are broken, the surgeon can consider placing iris retraction hooks or a Malyugin Ring (MicroSurgical Technology) to improve the view of the cataract.

Before creating the capsulorhexis, the surgeon must be prepared to apply capsular dye to the anterior capsule if the infectious and inflammatory process has created a white lens that is blocking the red reflex. Thorough hydrodissection will also be important; there may be additional capsular scarring and adhesions to the lens itself from the prior conditions.

Visualization of the anterior segment will be poor, given the failed corneal transplant. Assuming the patient will be able to care for his eye postoperatively, I would consider performing a repeat corneal transplant, open-sky removal of the cataract using the techniques described earlier, and placement of a three-piece IOL. Poor adherence to the postoperative drug regimen will result in a second failed corneal transplant, chronically poor vision, and little enthusiasm on an ophthalmologist's part for performing a third surgery.

**BENNIE H. JENG, MD**

Is the cornea too opaque to allow phacoemulsification and the implantation of an IOL? If not, then I would start by making a paracentesis and a scleral tunnel incision (because a PKP will need to be performed in the same sitting). I would lyse all of the iris-lens capsular adhesions under viscoelastic. I would then decide on an iris expander; either a Malyugin Ring or iris hooks could be used. If I chose the latter, I would try to place one of the hooks near the scleral tunnel wound to make a diamond configuration, as described by Oetting.<sup>1</sup> At this point, the viscoelastic could be removed, and I would

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**—Bennie H. Jeng, MD**

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try to stain the anterior capsule of the lens with trypan blue to facilitate visualization through the opaque cornea. I would perform phacoemulsification and IOL implantation per my usual technique. If the view proved challenging intraoperatively, a light pipe at the limbus or even in the eye could help with illumination. After closure of the wounds, a standard PKP could be performed.

If the cornea were too opaque to allow safe phacoemulsification and IOL implantation, I would plan to perform an open-sky extracapsular cataract extraction and IOL surgery. I would start by placing a Flieringa ring, lysing the iris-lens adhesions, and placing iris hooks. A Malyugin Ring in this setting would not be the best choice, because expression of the lens nucleus might not be possible through the device's opening. At this point, trephination of the cornea could proceed, and I would stain the anterior capsule with trypan blue dye. Either a large continuous curvilinear capsulorhexis (CCC, my preference) or a can-opener capsulotomy could be performed. The lens nucleus could then be expressed through controlled hydrodissection. I would remove the cortex with a Simcoe manual irrigation/aspiration instrument. A three-piece IOL could be placed in the bag if a CCC were performed or implanted in the bag or the ciliary sulcus if a can-opener capsulotomy were used. The PKP could then be finished.

**THOMAS “TJ” JOHN, MD**

The infiltrate's close proximity to the limbus complicates management. Based on the figure, the cloudy cornea appears to be due to both graft failure and possible infiltrates at the graft-host junction. The priority in this case is to address the corneal infection that appears to be present along the graft-host junction from the 5- to the 2-o'clock position (clockwise). A large, repeat therapeutic graft may be indicated if the infiltrate is not responding to medical treatment.

Because cataract surgery is an elective procedure, I would avoid the operation until the infection has been eradicated and the eye is quiet. At that time, because of the compromised view of the anterior segment, I would consider performing an open-sky triple procedure with cataract extraction and in-the-bag implantation of a posterior chamber IOL in an osmotically and mechanically softened eye to prevent vitreous pressure during an open-sky procedure. This second graft should be well centered. All iris adhesions could be lysed at the time of the triple procedure.

Care should be taken during hydrodissection and the lens expressed out of the capsular bag with adequate visibility. I would create a large capsulorhexis for easy delivery of the cataractous lens, and I would use a viscoelastic agent to enhance safety. I would employ osmotic agents as needed. The potential for glaucoma-related issues postoperatively would have to be addressed.

#### CLARK L. SPRINGS, MD

The key for combined PKP and cataract/IOL surgery is successful in-the-bag fixation of the IOL. At the preoperative visit, I would take the patient to the minor room and inspect the anterior segment under the operative microscope to determine if there is any view of the anterior segment structures. If the view is adequate, I would plan for a closed-system capsulorhexis with trypan blue dye, exposure prolonged to ensure a deep blue stain. I would aim for a largish capsulorhexis (5 mm) so that I could prolapse the lens with hydrodissection and perform supracapsular phacoemulsification to protect the posterior capsule. After implanting the IOL, I would perform an intracameral injection of a miotic before proceeding with PKP.

If the view were too poor for any anterior segment maneuvers, then the cataract surgery would have to be performed under open-sky conditions. This approach would decrease the likelihood of achieving a CCC and stable, in-the-bag fixation of the IOL. After lysing the posterior synechiae, I would stretch the pupil to approximately 5 mm and use it to guide the capsulorhexis. I have found that a stretched pupil helps to bar a capsular tear from extending peripherally. Applying downward pressure on the lens with an iris spatula in my nondominant hand would simulate the effect of a pressurized anterior chamber.

The movement of a capsulorhexis forceps is centrally shearing, which will keep a tear from extending peripherally (as opposed to a standard technique in which the motion of the capsulorhexis forceps exerts a tearing force peripherally).

#### ALAN N. CARLSON, MD

These distinguished and expert contributors recognized the complexity and multitude of issues of this particular case. Medical compliance and follow-up care were my top priority before I agreed to perform additional surgery, and the center's social worker was invaluable in this regard.

After complete resolution of all infection and active inflammation, the residual scar prevented a closed-system, limbal approach. Opting for an open-sky procedure, I wanted to use a speculum that would maximize the patient's comfort but also not contribute to back pressure. I find that a wire lid speculum works well in highly cooperative patients who do not tend to squeeze their lids during surgery.

The original graft was intentionally eccentric due to the location of the infection and perforation. The repeat procedure used a full-thickness, centered graft. I prefer a controlled entry, which I accomplished by adding viscoelastic through a paracentesis prior to surgical entry of the cornea. I managed anterior and posterior synechiae with viscodissection, blunt dissection, and—when necessary—sharp dissection. An open-sky capsulorhexis can be particularly tricky, as Dr. Springs pointed out. Trypan blue ophthalmic solution (VisionBlue 0.06%; DORC International) helped immensely in this regard. The dye improved my visualization of the open-sky capsulorhexis that was initiated centrally, spiraling out to the desired size. The optimal size is less than 5 mm to avoid prolapse of the IOL's optic, which might occur with any back pressure.

I continued cortical cleaving hydrodissection after the first wave to cause a second wave of fluid that led to hydro-expression of the lens nucleus, which was easily extracted. I performed cortical removal using irrigation and aspiration with a high-flow state to keep the capsular bag open and essentially flush out the residual cortex. I primarily used viscoelastic as a lubricant for the IOL's insertion, because the bag would not open as readily as it would in a closed system.

In my experience, a multipiece acrylic IOL is superior and less likely to prolapse or extrude than a plate or one-piece "Gumby" acrylic IOL design. The remainder of the procedure was fairly standard. With respect to the PKP, I used interrupted sutures rather than a single running suture due to the extent of corneal neovascularization.

A video of how I handled this case is available on Eyetube.net or at <http://bit.ly/1unVPzF>. ■

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