

Avoiding Postoperative Corneal Edema

For a cataract surgery patient with 4+ nuclear sclerosis and 3+ corneal guttata, what special steps do you incorporate to avoid postoperative corneal edema?

**BY M. BOWES HAMILL, MD; ERIC D. DONNENFELD, MD;
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M. BOWES HAMILL, MD

For this patient, cataract surgery may be the most straightforward aspect of the procedure, and the preoperative preparation is equally, if not more, important than the surgery itself. The case begins with a careful preoperative assessment of the patient with the goal of detecting corneal edema. Questions concerning early morning visual complaints and a careful slit-lamp examination with sclerotic scatter illumination may reveal corneal swelling. A preponderance of these patients will have worsening of their edema after phacoemulsification despite the most meticulous surgical technique. As a result, if any edema is present, the patient should not undergo cataract surgery alone but rather a combined cataract and Descemet stripping endothelial keratoplasty (DSEK) procedure. The patient should also be extensively counseled about the potential for postoperative corneal edema's developing and the possibility of a suboptimal visual result from the presence of 3+ guttata alone. As a final step in the preoperative preparation, given the presence of 3+ guttatae, the IOL power should be chosen to leave the patient with a myopic postoperative residual refractive error (about -1.25 D) so as to prevent a subsequent hyperopic residual refractive error should DSEK eventually become necessary.

A "soft shell" technique using an initial anterior injection of a dispersive ophthalmic viscosurgical device (OVD) followed by a more posterior injection of a cohesive OVD is very helpful in protecting the endothelium. As a suggestion, the initial volume of the dispersive agent should be relatively modest. It should be sufficient to coat the endothelium, as these agents can trap bubbles and nuclear chips in the periendothelial layer, which can be difficult to remove at the end of the case without resulting in unintended endothelial damage.

ERIC D. DONNENFELD, MD

Thanks to advances in cataract surgery, a patient with significant guttata and a dense nucleus can safely undergo cataract surgery. My advice on the management of this patient boils down to three important points: stay as far away from the cornea as possible, reduce phaco energy and flow, and frequently instill a dispersive viscoelastic.

For this case, I would consider creating a scleral incision to keep the phaco tip as far away from the cornea as possible, and I would perform phacoemulsification in the bag without bringing the nucleus into the anterior chamber. I would use a chopping technique that reduced phaco energy and flow. I have found that modern phaco devices that combine longitudinal and transverse motions of the phaco tip are effective and more energy efficient than a conventional longitudinal phacoemulsification. Although the technology is new, I have had great success using the LenSx laser system (Alcon Laboratories, Inc., Fort Worth, TX) in cases such as this one to chop the lens into small segments, which dramatically reduces phaco energy and keeps corneas clear. I might apply Viscoat (Alcon Laboratories, Inc.) two or three times during the course of this case.

From a pharmacological perspective, I have found that pretreating patients with a strong corticosteroid helps keep corneas clear by protecting the neuroectodermal endothelium.¹ I administer difluprednate (Durezol; Alcon Laboratories, Inc.) in a pulsed dose every 15 minutes for seven doses right before surgery. I avoid using trypan blue, because it will stain the guttata and reduce my visualization of the lens. Finally, this patient may eventually require a DSEK procedure. I would leave the patient a -1.25 D myope, because DSEK results in a hyperopic shift of this magnitude, and I would not implant a presbyopia-correcting IOL because of the loss of contrast sensitivity. With advanced surgical and pharmaceutical techniques, a

patient with significant guttata and a dense nucleus can often have a very successful outcome.

ROGER F. STEINERT, MD

To protect the fragile, vulnerable endothelium, I would do the following:

- Use lots of dispersive OVDs, reinjecting multiple times during the ultrasound portion of the surgery.
- Use either transversal or torsional ultrasound to reduce total ultrasound energy.
- Perform all of the ultrasound nuclear disassembly as deeply as possible in the capsular bag. Avoid phacoemulsification in the iris plane and especially in the anterior chamber. I would not “tilt and tumble!”

R. BRUCE WALLACE III, MD

This relatively common scenario changes the visual prognosis for a cataract patient, especially in the early postoperative period. Most affected individuals are unaware they have Fuchs dystrophy. Explaining this finding preoperatively and their probable development of corneal edema after cataract surgery helps to reduce their anxiety if visual improvement is not obvious soon after surgery (Figure 1).

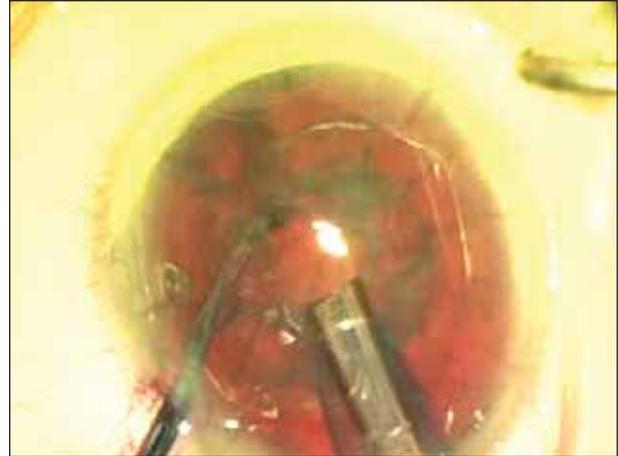


Figure 1. Phaco irrigation in line with the bevel of the phaco needle.

The following intraoperative techniques can help reduce postoperative corneal edema. Use balanced salt solution with glutathione. Turn the 30° bevel of the phaco needle sideways to direct phaco energy laterally rather than superiorly (toward the endothelium). Turning the

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phaco irrigation sleeve so that the opercula are in line with the bevel rather than 90° away helps avoid irrigation trauma to the endothelium (Figure 1). I adopted this method after reviewing laboratory studies by William Fishkind, MD. Frequently reintroduce a dispersive viscoelastic under the endothelium. Carefully apply phaco energy. A dual-linear phaco foot pedal can help you to toggle from I/A to phacoemulsification as needed for nuclear removal. Remove as much nuclear material as possible in the posterior chamber rather than elevate it into the anterior chamber. As an example, remove the nuclear core first. Then, engage the peripheral nucleus and epinucleus. Inject sub-Tenon triamcinolone at the end of the procedure.

Postoperatively, the frequent dosing of topical steroids (one drop every hour while awake for 3 days) can help reduce endothelial cell loss. Monitoring IOP to avoid elevated pressure may also promote a clearer cornea. ■

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1. Donnenfeld E, Holland E, Solomon K, et al. A multicenter randomized controlled eye trial of pulse-dosed digluprednate 0.05% versus prednisolone acetate 1% in cataract surgery [published online ahead of print June 25 2011]. *Am J Ophthalmol*. doi:10.1016/j.ajo.2011.03.018.