

Protecting the Endothelium During Phacoemulsification

Keeping the endothelium safe helps to rapidly return vision to patients postoperatively.

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When modern phaco technology is used in combination with proper surgical technique, postoperative corneal decompensation is rare. There are several patient-based factors, however, that increase the likelihood of corneal decompensation. With patients electing to have cataract surgery and refractive lens exchange at increasingly younger ages, protecting the endothelial cell layer at all times is essential to avoid the potential for an epidemic of pseudophakic bullous keratopathy (PBK) in the future. Patients' expectations after cataract surgery continue to increase, and they now anticipate perfect vision from as early as the first postoperative day. The main determinant of a patient's visual acuity on postoperative day one is the extent to which the endothelium has been protected.¹

SURGICAL MEASURES TO IMPROVE OUTCOMES

I use a soft-shell technique in cases in which I am particularly concerned about endothelial protection. Before creating the capsulorhexis, I place a small amount of dispersive ophthalmic viscosurgical device (OVD; Viscoat [Alcon]) in the anterior chamber. Next, I place a larger amount of cohesive OVD (Healon [Abbott Medical Optics] or Provisc [Alcon]) under the dispersive OVD and watch the dispersive OVD spread upward over the endothelium. If necessary, this maneuver can be repeated before starting phacoemulsification and/or before inserting an IOL. Care must be taken not to overfill the anterior chamber with a dispersive OVD before phacoemulsification, as this type of viscoelastic conducts heat and could cause wound burn. If necessary, I aspirate some OVD before commencing phacoemulsification. At the end of

the case, I ensure that all of the OVD is aspirated due to the risk of a postoperative IOP spike.

I do not use a soft-shell technique in all cases because of the threat of a spike in pressure with dispersive OVDs. I will preemptively treat with oral acetazolamide, but I do not feel that this is necessary for all patients.

Fuchs Endothelial Dystrophy

This common corneal dystrophy is characterized by central corneal guttata. Anticipating the likelihood of significant corneal decompensation postoperatively is challenging, even for corneal specialists. For patients in whom there are significant confluent central guttata, it is prudent to seek a corneal specialist's opinion, as many of us now choose to combine phacoemulsification with selective endothelial transplantation (Descemet stripping automated endothelial keratoplasty, Descemet stripping endothelial keratoplasty, and Descemet membrane endothelial keratoplasty). I assess the cataract and guttata to determine which is responsible for patients' symptoms. In most cases, both are. The combined technique preempts an occurrence of PBK. Surgical outcomes of endothelial keratoplasty are significantly higher with Fuchs dystrophy than they are with PBK, therefore, surgeons must not wait for or cause PBK, because permanent corneal scarring and haze can ensue.

Even more common than confluent central guttata is the appearance of early Fuchs dystrophy with a few guttata. They are unlikely to be visually significant, and in such cases, it is safe to proceed carefully with phacoemulsification using a soft-shell technique.

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Shallow Anterior Chamber

A hyperviscous OVD such as Healon GV (Abbott Medical Optics) allows as much deepening of the anterior chamber as possible. Chopping the nucleus is helpful to reduce phaco energy. I use a soft-shell technique to protect the endothelium in cases of a dense nucleus, previous surgery (especially previous corneal transplant surgery), and in any case where greater surgical complexity and manipulation is expected such as weak zonules and small pupils.

IMPROVING VISION ON THE FIRST POSTOPERATIVE DAY

Donnenfeld et al evaluated the effect of preoperative topical steroid pulsing on endothelial protection.¹ The endothelial cell layer is neuroectoderm derived and, like all neurological tissue, responds more favorably to surgically-induced injury when the inflammatory system is preemptively downregulated. According to the study, difluprednate (Durezol; Alcon Laboratories) reduced inflammation more effectively than prednisolone acetate, resulting in more rapid return of vision postoperatively. Since

difluprednate is not available in the United Kingdom, my patients receive four doses of dexamethasone 0.1% 1 hour before surgery.

CONCLUSION

We continually strive to raise the bar for what can be achieved with modern cataract surgery. To ensure that patients achieve not only rapid visual recovery but also enjoy long-term excellent vision, it is essential that we properly respect and protect the endothelial cell layer during surgery. ■

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1. Donnenfeld ED, Holland EJ, Solomon KD, et al. A multicenter randomized controlled fellow eye trial of pulse-dosed difluprednate 0.05% versus prednisolone acetate 1% in cataract surgery. *Am J Ophthalmol.* 2011;152(4):609-617.