Enhancements After the Implantation of Presbyopia-Correcting IOLs

Preparation is key to success.

BY DAVID R. HARDTEN, MD

Contributing to our excellent surgical results today is highly accurate biometry through immersion ultrasound or optical, noncontact, axial length measurements. We have refined formulas for calculating IOL powers to enhance predictive accuracy. In addition, we can offer a variety of IOL types and models to patients.

As surgical outomes have improved, patients' expectation have risen. Higher goals can mean frustration when we have to fine-tune results, but adjustments are often necessary to provide patients with spectacle independence for all ranges of vision after cataract surgery with presbyopia-correcting IOLs. We are typically happy when our patients achieve a spherical error within 0.50 D of the intended correction and an astigmatic error that is no more than 0.50 D. It is not always possible to obtain such results with lens surgery alone. Natural anatomic variability can lead to residual refractive error. This article discusses the use of refractive surgery enhancements in presbyopia-correcting IOL patients.

WHAT TO CONSIDER BEFORE PERFORMING AN ENHANCEMENT

Overview of Treatment Options

Incisional keratotomy can reduce corneal astigmatism. Conductive keratoplasty can treat hyperopia and/or astigmatism. An IOL exchange or piggyback IOLs can correct spherical errors. Laser vision correction can address residual myopia, hyperopia, and/or astigmatism as well as higher-order aberrations. Of all the aforementioned approaches, laser vision correction is the most precise.

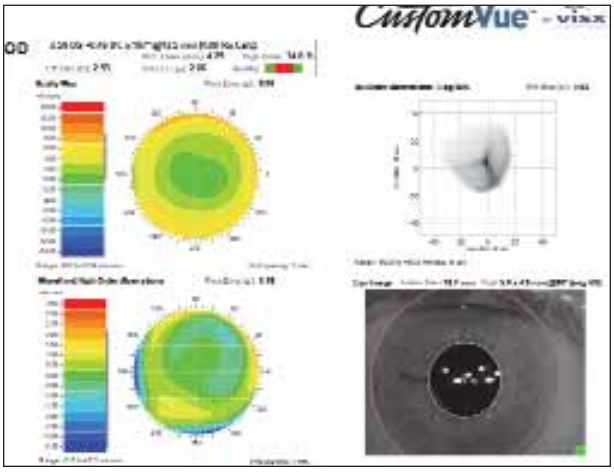

Figure 1. This patient's UCVA was 20/60 after receiving the ReZoom IOL (Abbott Medical Optics Inc., Santa Ana, CA). The manifest refraction was -1.75 +0.50 X 105, and the wavefront measurement showed a refraction of -2.58 +0.46 X 107. Because of the significant difference between the manifest and wavefront refractions, the author performed a standard LASIK procedure, after which the patient saw 20/20 at distance and J2 at near. According to the author, it is difficult to capture wavefront measurements through refractive IOLs, and the wavefront map may not be an accurate reflection of the true refractive state of the central visual system.

Refractive Stability

If I do not obtain the desired refractive result for patients, I perform additional testing postoperatively. Some of these measurements are ideally obtained prior to the lens surgery in order to determine whether laser vision cor-

rection is possible or safe. Postoperatively, I can typically verify refractive stability by measuring a refraction that lasts between 2 and 3 months after lens implant surgery. By then, the dehiscence of small, well-constructed, self-sealing incisions is unlikely during the microkeratome's passes. I perform pachymetry measurements to ensure that there will be enough residual stroma for LASIK, or if I need to change the surgical plan to surface ablation. Although I perform topography when planning the cataract incision, I repeat the process after implanting presbyopia-correcting IOLs to identify changes in the cornea.

A slit-lamp examination helps to identify keratoconjunctivitis sicca, anterior basement membrane dystrophy, corneal neovascularization, and endothelial disease. It also determines the clarity of the posterior capsule. Before laser vision correction surgery, it is important to treat significant preoperative dry eye aggressively with artificial tears, ointments, topical cyclosporine, and/or punctal plugs. A funduscopic examination and/or optical coherence tomography is performed to exclude the presence of cystoid macular edema. In the presence of anterior basement membrane dystrophy, a surface ablation is preferred to avoid a microkeratome-induced epithelial slough. A millimeter of corneal neovascularization often is not problematic, but greater amounts can lead to intraoperative bleeding. By altering the hinge's placement, typically with a femtosecond laser, I may be able to avoid cutting across these vessels; otherwise I can perform a surface laser procedure. Eyes with a compromised endothelium are at risk for a poorly adherent LASIK flap. If in doubt about the endothelium, specular microscopy may be helpful. Posterior capsular clouding can interfere with accurate refractions and wavefront aberrometry. I have a low threshold for performing an Nd:YAG capsulotomy before a refractive enhancement. In patients with accommodating IOLs, I almost always perform an Nd:YAG capsulotomy prior to an enhancement, because opening the posterior capsule may change the refractive error.

The Identification of Candidates for LASIK or Surface Ablation

Many patients prefer LASIK, because it provides a faster visual recovery than surface ablation (eg, PRK, laser epithelial keratomileusis, epi-LASIK). In certain cases, however, surface ablation may be a safer option (for example, in eyes with anterior basement membrane dystrophy, thin corneas, and suspicious topographic patterns). I often choose a wavefront-guided treatment over standard ablation, although reliable aberrometry measurements are very difficult to obtain in eyes with presbyopia-correcting IOLs. One major advantage of customized LASIK is the ability to use iris registration, which may result in better effects for the astigmatic correction. Because even manifest refractions are multifocal in eyes with a presbyopia-correcting IOL, it is important to push toward the most hyperopic refraction possible that refracts the distance portion of the lens, and this manifest refraction should match the wavefront measurement. It may be more difficult to capture a wavefront measurement because of the multifocality of the lens, capsular opacity, or a small capsular opening (Figure 1). Standard LASIK is best in eyes with suspect wavefront measurements, and it typically provides good results. It is important that the UCVA correlate with the refraction. We should beware refracting the near zones on the IOL. It does not make sense to perform a standard or customized ablation of -2.25 D on an eye that sees 20/40 uncorrected. I often aim for a little myopia with the Crystalens (Bausch & Lomb, Rochester, NY).

PERSONAL EXPERIENCE

At Minnesota Eye Consultants, my colleagues and I felt sufficiently confident about wavefront measurements to use the data for the refractive enhancement of only 12% of 40 eyes that had received presbyopia-correcting IOLs. In 88%, the wavefront captured did not adequately match the manifest refraction and UCVA, so we performed standard LASIK. In all of the eyes, the average reduction in astigmatism was from 1.33 ±0.76 D to 0.38 ±0.41 D postoperatively. In terms of the spherical equivalent, laser treatment produced a decrease from an absolute mean of 1.03 ±0.76 D to -0.14 ±0.50 D on average.[1]

CONCLUSION

Ophthalmologists who perform lens surgery but not laser vision correction can consider referring patients to a refractive surgeon in their community, or they can learn to do laser vision correction. In all such cases, it is wise to determine the financial responsibilities of the surgeon and the patient in advance. Certainly, patients should understand that they may need an enhancement procedure after lens surgery and the potential additional costs. By discussing with patients their refractive goals preoperatively, surgeons will be able to select the most appropriate lens and will be better able to determine when enhancement surgery is required. ■

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1. Hardten, DR. Refractive surgery enhancements after presbyopic IOLs. Paper presented at: The 2009 ASCRS Symposium on Cataract, IOL and Refractive Surgery; Cornea Day Meeting; April 3, 2009, San Francisco, CA.