High Myopic Astigmatism

BY JAY BANSAL, MD; KEITH LIANG, MD; DAVID A. WALLACE, MD; AND MING WANG, MD, PHD

CASE PRESENTATION

A 36-year-old man has never been able to wear contact lenses despite numerous attempts. His manifest refraction is -14.5 +4.5 X 92 OD and -13 +3.5 X 100 OS. Pachymetry measures 579 µm OD and 578 µm OS. The slit-lamp and fundus examinations are normal, as is the patient's intraocular anatomy. He would like to discuss his refractive surgical options (Figure 1).

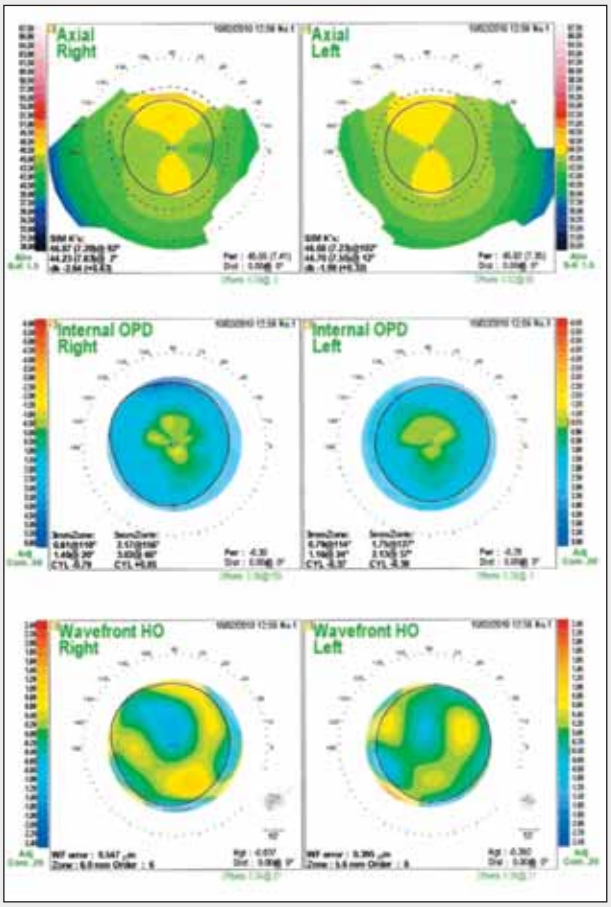

Figure 1. An examination with the Nidek OPD-Scan II (Nidek, Inc., Fremont, CA) reveals symmetrical with-the-rule astigmatism.

JAY BANSAL, MD

In my opinion, this patient has three viable options, all requiring an extensive discussion of their risks and benefits:

- Visian ICL or TICL (both from STAAR Surgical Company, Monrovia, CA; TICL not available in the United States) followed by LASIK
- refractive lens exchange with a toric IOL, probably followed by LASIK
- wavefront-optimized LASIK with femtosecond laser-created flap

Given his age, the patient has to decide between an intraocular (IOL or ICL) and an extraocular (LASIK) procedure. Optically, the former will yield better results but at a greater risk (eg, cataract, presbyopia, retinal detachment, infection) compared with LASIK.

After an extensive discussion, I am comfortable treating this type of patient with wavefront-optimized LASIK using a thin flap (100 µm) created with a femtosecond laser. If the patient had 6-mm pupils, I would perform the ablation with a 6-mm optical zone instead of 6.5 mm to save stromal tissue. Prior to LASIK, I would counsel this patient about alternative options for treatment (ICL and IOLs) available now and what I believe will be available in the near future. I would further advise him regarding the unlikelihood of any future enhancements after the LASIK procedure. It would also be important to counsel him regarding his increased risk of dry eyes, decreased contrast sensitivity, and halos/glare. Finally, he would need to be aware that he might still require a small prescription for spectacles/contacts for optimal visual acuity postoperatively.

The majority of patients in my practice elect to proceed with wavefront-optimized LASIK and achieve good results. Thus far, my younger patients have shown little interest in an intraocular procedure, but this may change in the near future.

KEITH LIANG, MD

Assuming the patient has an appropriate anterior chamber depth (> 3.5 mm with the IOLMaster [Carl Zeiss Meditec, Inc., Dublin, CA]) and a white-to-white measurement greater than 11.5, I would recommend a Visian ICL and laser vision correction as a two-staged procedure. His topography looks normal, with some of his astigmatism located within the lens. It is the amount of astigmatism that necessitates laser vision correction.

The first stage of the procedure would include meticulous measurements for the ICL. I would measure the white to white under a microscope and use calipers, since this information is critical to the lens' sizing. I would try to place an ICL of -10.00 D or lower. This would allow the ICL's optic to be 5.8 mm, giving the patient the largest corneal effective optical zone of 7.30 mm. Since he will require laser vision correction, any residual myopia can be addressed along with his astigmatism. I would perform a YAG peripheral iridotomy 1 to 2 weeks preoperatively and offer same-day sequential ICL surgery.

The second stage would occur 6 to 8 weeks after the ICL's implantation. The choice of wavefront-optimized or wavefront-guided LASIK/PRK would depend on the patient's optical aberrations after ICL surgery. In my experience, the Allegretto Wave Eye-Q excimer laser system (Alcon Laboratories, Inc., Fort Worth, TX) has no problem tracking eyes that have ICLs. The patient's steep keratometry readings are optimal for myopic laser correction. This second stage would allow me to correct any myopic surprises from the ICL calculations, which is why I would create the largest effective optical zone with the ICL and maintain that zone with a correction for low myopic astigmatism.

The patient's expectations would have to be addressed, because a two-staged procedure will require some patience. I would discuss his risks and benefits and allow a retinal surgeon to examine him prior to surgery. Even with the Visian TICL, this patient might require a two-staged procedure due to his high astigmatism.

DAVID A. WALLACE, MD

If the topography and pachymetry are as stated, and if in all other respects this patient would be a good candidate for the Visian ICL (endothelial cell count, anterior chamber depth, etc.), then I would be enthusiastic about two possible options. First would be bioptics with the ICL followed by LASIK, an approach I have used with modest frequency for patients exactly like this one. The second alternative, in principle, would be the Visian TICL. I now create the LASIK flap before implanting the ICL (sometimes on the day of the laser peripheral iridotomy). Two to 4 weeks after placing the ICL, I lift the flap and treat the patient's residual refractive error.

I am in the habit of imaging the anterior and posterior surfaces of all laser refractive candidates. I would therefore obtain a study with either the Orbscan topographer (Bausch + Lomb, Rochester, NY) or the Pentacam Comprehensive Eye Scanner (Oculus, Inc., Lynnwood, WA) to complete his workup. For surgical planning, I would prefer to use a high-frequency ultrasonic instrument to determine a sulcus-to-sulcus measurement for ICL sizing. Sizing based on any white-to-white measurement does not always correlate perfectly with the sulcus-to-sulcus measurement.

MING WANG, MD, PHD

The patient has normal corneal thickness and corneal topography. Assuming good ocular health, a stable refraction, and good BCVA, the patient has two options if he is motivated and understands their risks and potential complications. The first is refractive lens exchange with a limbal relaxing incision (LRI) and the placement of a toric IOL. The second is implantation of the Visian ICL, with or without an LRI, followed by a planned LASIK/PRK procedure.

Typically, a small number of my patients choose refractive lens exchange. I would discuss with this patient the risks, including a slightly increased chance of retinal detachment due to his high myopia. If he elected to proceed, I would ensure that the patient understood that he might subsequently require a keratorefractive procedure to address his astigmatism. I would also explain that the best surgical endpoint would be plano for the dominant eye and -1.25 D for the nondominant eye, and I would conduct a contact lens monovision trial if needed. In terms of surgery, I would extract the crystalline lens, create an LRI, and implant a toric IOL.

If the patient chose instead to receive a phakic IOL, I would explain that the Visian TICL may become available late this year or next year and suggest that waiting would be an excellent option. If he wished to proceed immediately with surgery and he were strongly motivated to undergo ICL surgery now, I would determine his candidacy for the lens (in terms of anterior chamber depth, etc.). I would also discuss with him the risks of ICL surgery, which include the need for subsequent keratorefractive surgery to correct residual spherical error and astigmatism in addition to the routine risks of endophthalmitis, cataract, glaucoma, etc.

The astigmatic treatment plan and ICL power calculation depend on whether or not the surgeon performs an LRI at the time of the ICL's implantation. I generally do, which reduces the amount of astigma-

tism requiring subsequent correction by LASIK/PRK and thus increases the laser procedure's precision and accuracy.

In this case, I would perform an LRI to debulk the cylinder during the ICL surgery and target a postoperative spherical equivalence that was either equal to zero (eg, -2.25 +4.50 cylinder and -1.75 +3.50 cylinder) or a bit more minus (eg, -4.50 +4.50 cylinder and -3.50 +3.50 cylinder). The reason is that spherical values of opposite signs tend to cover up the cylinder. The efficacy of refractive surgery for such eyes (where the magnitude of the sphere is at least equal to that of the cylinder) is much better than for mixed astigmatism, where the magnitude of the cylinder is much larger than that of the sphere. It is important to keep in mind that the LRI does not change spherical equivalence. ■

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