Choosing an IOL After LASIK

The cases are challenging, but the patients have a better grasp of premium technologies than the average individual.

BY TAL RAVIV, MD

The number of post-LASIK patients seeking cataract surgery is on the rise, representing a challenge as well as an opportunity. The combination of challenging IOL calculations, imperfect targeting of emmetropia, and very high expectations requires extra steps of the surgeon. On the other hand, I find that these patients generally understand the available premium cataract options better than the average individual.

POST-LASIK VERSUS ROUTINE CATARACT PATIENTS

The evaluation of a post-LASIK patient differs from that of an average cataract patient. In my practice, many of the former underwent LASIK 15 years ago while they were in their 40s and 50s. They are familiar with the concepts of refractive surgery and presbyopia. Moreover, all of them have participated in the self-pay health care sector and understand the difference between covered/reimbursed services and out-of-pocket services. Many of these individuals are early adopters of new technology, and all of them are interested in "lifestyle" health care. I find that these patients are motivated to consider premium IOLs, laser cataract surgery, and intraoperative aberrometry.

DIAGNOSTIC WORKUP

My post-LASIK and traditional patients receive a similar preoperative workup, but I place a special emphasis on corneal topography in the former group. Whether Placido (anterior reflection) based, Scheimpflug, or a combination of the two, topography can confirm that excimer laser ablation was performed and identify the type. It is not uncommon for a patient to confuse the use of a laser (whether for argon laser trabeculoplasty, a retinal procedure, or something else) with LASIK, and topography may be the only way to discern the patient's refractive history.

Oftentimes, patients do not know whether they had a myopic or a hyperopic treatment. I look for the familiar central flattening (Figure 1) or central steepen-

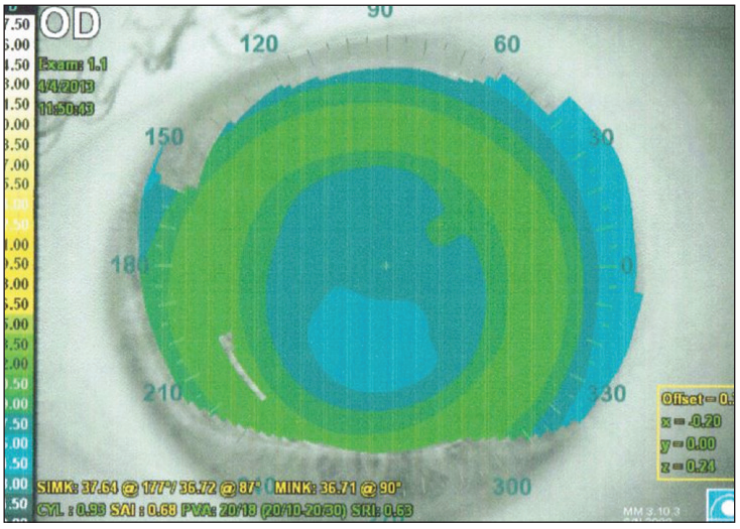

Figure 1. Topography remains the best way to recognize or confirm a history of prior excimer laser treatment, in this case, the central flattening of a -8.00 D myopic LASIK procedure.

ing (Figure 2). Topography also helps me to assess a decentered ablation, residual astigmatism, modern ablation patterns with blend zones or older ablation patterns, and the quality of the ocular surface.

CORNEAL SPHERICAL ABERRATION

Like other ophthalmologists, I was taught that the average normal cornea has positive spherical aberration, a postmyopic LASIK cornea has even more positive spherical aberration, and a posthyperopic LASIK cornea has negative spherical aberration. A number of diagnostic devices—topographers or aberrometers—can help to measure the actual spherical aberration. This information can be useful when choosing the type of IOL.

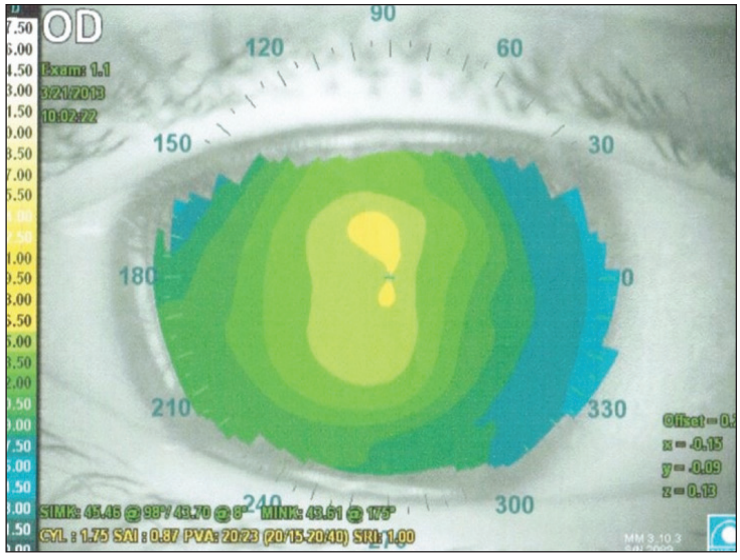

Figure 2. Central steepening is the hallmark of prior hyperopic LASIK, in this case with significant residual astigmatism as well.

FORMULAS

The most challenging (but, thankfully, rapidly evolving) aspect of cataract surgery on postrefractive surgery eyes remains accurate and reproducible IOL power calculations. Spherical, toric, multifocal, and accommodating IOLs all perform best in an emmetropic eye. Ophthalmologists' ability to achieve refractive results within 0.50 D of plano is greatest for LASIK and PRK, worse for cataract surgery, and worst for the cataract procedure on postrefractive surgery eyes.[1,2]

Like many of my colleagues, I use the American Society of Cataract and Refractive Surgery's postrefractive IOL calculator (http://iolcalc.org). The introduction of intraoperative aberrometry has enabled me to more confidently recommend premium IOLs to patients who previously underwent refractive surgery. Specifically, my approach to IOL power calculations has changed in the past 5 years from a dependence on the clinical history method to newer formulas requiring no prior data to my currently heavy reliance on intraoperative aberrometry.

For patients who underwent myopic LASIK/PRK, I rely on the American Society of Cataract and Refractive Surgery's calculator and focus primarily on the Shammas and Haigis-L formulas that use no prior data. I target approximately -0.50 D of myopia, and I rely on the ORA System with VerifEye (WaveTec Vision) to make real-time adjustments to the IOL power based on the aphakic refraction. Intraoperative aberrometry has noticeably improved my outcomes in this population, and similar experiences are beginning to be reported in the peer-reviewed literature.[3] Greater refractive accuracy has allowed me to significantly expand my use of accommodating and toric IOLs and, more importantly, increase my patients' level of satisfaction. I use intraoperative aberrometry in 100% of my postrefractive surgery cases. Although this practice does not guarantee an emmetropic result, I believe it represents today's best available method for me.

For patients who underwent hyperopic LASIK/PRK, I rely on the Shammas formula in conjunction with intraoperative aberrometry. For eyes with a complex history or that have undergone multiple enhancements, I increasingly rely on the ORA System. I always use the formulas for the predominant treatment. For example, if refractive surgery treated -5.00 D of myopia and the patient later had a +1.00 D enhancement, I rely on the postmyopic LASIK formulas.

Postradial keratotomy eyes often have variable refractions, so I find that aiming for myopia is frequently the best option. The ORA System seems to be less reliable for these eyes, likely due to the IOP sensitivity of the refraction.[4]

My success with the aforementioned approaches notwithstanding, I always emphasize to patients the limitations of IOL power calculation methods and currently available devices. I explain to patients that they may need a refractive enhancement on the cornea, via an IOL exchange, or with a piggyback lens after the cataract procedure.

Emerging technologies use the total corneal power from Scheimpflug topographers[5] or measurements based on corneal optical coherence tomography

> "For complex cases of misaligned or irregular laser ablation, I ... choose an aberration-free IOL, because it is less sensitive to optical decentration."

to achieve better refractive outcomes.[6] The field is advancing quickly.

IOL SELECTION

Spherical Aberration

Many US cataract surgeons use aspheric IOLs in cataract surgery, because this design has been incorporated into a majority of the toric, multifocal, and accommodating IOLs on the market. Lenses with negative or zero spherical aberration have mostly replaced those with positive spherical aberration. Studies have shown that, by countering the positive spherical aberration of the cornea, aspheric IOLs deliver improved visual outcomes, as measured by contrast sensitivity testing and driver simulation studies.[7,8]

For eyes with increased positive spherical aberration after myopic LASIK, I usually choose an IOL with the most negative spherical aberration available such as a Tecnis ZCB00 or Tecnis Toric (both from Abbott Medical Optics). The AcrySof Toric IOL (Alcon) may be used for higher astigmatic correction. For eyes that have undergone hyperopic LASIK, I will use either an IOL with positive spherical aberration or an aberration-free lens such as the enVista, Crystalens, or Trulign (all from Bausch + Lomb). For complex cases of misaligned or irregular laser ablation, I also choose an aberration-free IOL, because it is less sensitive to optical decentration.

Premium IOLs

I routinely use accommodating and toric IOLs in post-LASIK patients, but I generally avoid multifocal IOLs in this population. Even wavefront-guided LASIK increases aberrations in the optical system,[9,10] and multifocal IOLs decrease contrast sensitivity. Colleagues, however, have reported good results with multifocal IOLs in patients in whom the amount of LASIK correction was low (ie, treatment between -4.00 and +1.50 D). There is a dearth of published studies on this subject,[11] but I hope such data will become available in the near future.

I usually recommend laser cataract surgery to these patients, owing to the procedure's excellent capsular centration, ensured capsular overlap of the IOL's edge, and overall precision. (Of note, I avoid making corneal arcuate incisions into the LASIK flap.)

I generally address presbyopia in post-LASIK patients with an accommodating IOL and some combination of mini monovision. Most of these individuals are well into their presbyopic years and have either adapted to their monovision LASIK results or prefer bilateral emmetropia. I always try to maintain their presbyopic approach and just make a clearer version of it. As I say to them, I attempt to dial their vision back a few decades in time.

CONCLUSION

My post-LASIK cataract patients are highly motivated to maintain (or return to) a spectacle-free state. They have already invested financially in an ophthalmic lifestyle procedure, and they are eager to protect their investment. The latest power calculation formulas, intraoperative aberrometry, new diagnostic imaging, and laser precision bring me closer to reaching my patients' visual goals. ■

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