



ASSESSING PRK AND LASIK PATIENTS



A guide to managing patients after previous refractive surgery.

BY TRACY SCHROEDER SWARTZ, OD, MS, FAAO, DIPL ABO; AND ERIK ZINGLER, OD

More than 9 million people underwent LASIK from 2000 to 2007.¹ Some of these patients are now presenting to their eye care providers requesting touch-ups, or enhancements, to their original procedure. It behooves those who wish to offer comprehensive eye care to know how to manage these requests.

Visual changes after keratorefractive surgery are most often due to natural aging and largely due to lenticular, not corneal, changes. Optometrists may tend to refer patients back to their surgeons for additional refractive treatment when they present with these kinds of changes. However, this may not be in the best interest of the patient or the referring optometrist. There are times when it is best to avoid further

surgery rather than risk worsening a patient's visual function.

Patients requesting enhancements typically fit certain profiles: They are less than 40 years old and have experienced myopic progression after a primary myopic treatment; or they are older than 40, were treated

for hyperopia, and have experienced treatment regression or, less commonly, progression of hyperopia.

GET THE RECORDS

When a patient with a history of refractive surgery presents requesting surgical enhancement, it is critically

AT A GLANCE

- Patients who underwent PRK or LASIK years ago may present to their optometrist requesting touch-ups, or enhancements.
- Obtaining records from the operating surgeon can help in deciding how to proceed.
- Demonstrating possible outcomes of enhancement surgery using loose lenses or contact lenses can give patients an idea of what to expect.

important to know the specifics of the previous surgery, if available. Request records from the operating surgeon, if possible. Patients' medical records ideally should contain information such as the type of surgery (LASIK, PRK, epi-LASIK, conductive keratoplasty, radial keratotomy), the treatment parameters (myopia, hyperopia, or astigmatism; flap thickness and size), the flap creation method (microkeratome ["blade"] or femtosecond laser ["all-laser" or "blade-free"]), and the preoperative keratometry and pachymetry.

Sadly, for patients who underwent surgery more than 10 years ago, before electronic health records gained wide adoption, some or all of this information may be unavailable. If this is the case, careful analysis of the patient's current status using topography or tomography, anterior segment OCT, and biomicroscopy is required.

DIAGNOSTIC TESTING

Diagnostic testing for a retreatment is similar to that required for primary treatments. It includes monocular UCVA, manifest refraction with BCVA, cycloplegic refraction, IOP measurement, and topographic and tomographic imaging.

Tomography—2D imaging that creates a 3D image—is required to rule out ectasia. Significant elevation on the posterior float, with or without accompanied elevation on the anterior float, is a concern. Pachymetry must be evaluated to determine whether enough tissue exists to allow retreatment. A thorough fundus exam is required to rule out pathology that may be reducing the patient's visual quality, such as central or peripheral retinal disease, lenticular changes, and glaucoma.

Biomicroscopy to assess corneal health and ocular surface disease (OSD) is critical. Fibrosis in the LASIK flap margin or evidence of corneal melting, wrinkles, or flap debris should be noted. Stromal haze after PRK should be documented.

These patients commonly present with some degree of OSD. In addition to slit-lamp examination, several diagnostic tests can be used not only to detect dry eye, but also to document the problem so that the patient can see it. This testing may include meibomian gland imaging, point-of-care testing for osmolarity and for levels of matrix metalloproteinase-9, Schirmer testing, and tear film analysis.

OSD should be treated before surgery is scheduled because ocular surface changes can alter the refractive error and because untreated OSD may increase after surgery. After 3 to 6 months of treatment, patients should experience resolution of most,

if not all, subjective visual complaints.

Objective assessment of lenticular changes allows the eye care provider to document dysfunctional lens syndrome (DLS), the result of lenticular changes that precede true cataractous opacification. In addition to loss of accommodation, DLS brings with it an increase in higher-order aberrations that cause image degradation. Systems that assess lenticular function and DLS include the HD Analyzer (Visiometrics) and combination wavefront-topography devices, which measure optical quality. A less objective method is Scheimpflug imaging, as on the Pentacam (Oculus Optigeräte). By comparing the density

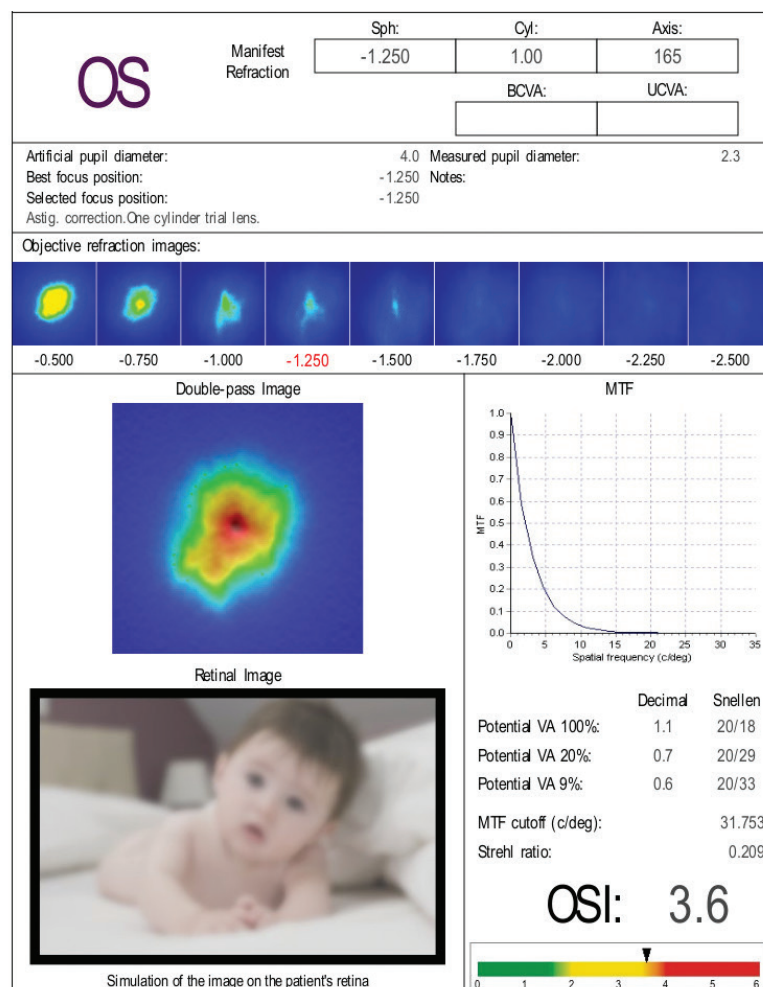


Figure 1. HD Analyzer (Visiometrics) displays the effect of lens backscatter on vision in a patient presenting for LASIK enhancement. Note the steep modulation transfer function (MTF) curve and the blur in the retinal and simulated images. The Ocular Scatter Index (OSI) quantifies the degree of intraocular diffusion in the eye. The value of 3.6, inside the yellow to red range, indicates that the patient would be expected to have symptoms.



Figure 2. Combined topography and wavefront analysis of a patient with previous LASIK complaining of blur in his right eye (OD). Visual Function Analysis using the iTrace (Tracey Technologies) shows a highly aberrated eye OD compared with the normal wavefront map for the patient's left eye (A). The dysfunctional lens index (DLI) was significantly reduced by a congenital cataract (B). The cataract in the contralateral eye looked identical to the cataract OD upon biomicroscopy, but the DLI in that eye was 10.0 with no visual impact (C).

of the lens to that of the cornea, the optometrist can identify the presence of lens opacification that may be the cause of degraded visual function (Figures 1–3).

DEMONSTRATING OUTCOMES

Demonstrating the possible outcome of surgery using loose lenses or contact lenses is a good idea. When demonstrating this for the patient, it is advantageous to overcorrect the patient so as not to raise expectations too high. For example, if the refraction of the eye was $+0.75 -0.25 \times 180^\circ$, demonstrating $+1.00$ or $+1.25$ will help the patient understand the imperfection of corneal healing after surgery and the likelihood of residual myopia. If he or she tolerates this blur and wishes to proceed, the patient is more likely to be satisfied afterward.

The simplest enhancements are myopic touch-ups within 24 to 36 months after the primary LASIK procedure. These patients are often young with a healthy corneal epithelium, and a LASIK flap lift is a relatively low-risk procedure. The most common complication would be epithelial ingrowth, and patients should be educated about this risk.

If the original surgery was PRK, the healing process and visual recovery are relatively quick. For all PRK enhancements, regardless of the patient's age, normal healing usually results in a dip in VA from days 5 to 7 postoperatively, until the corneal epithelium is intact and the edema resolves. Postoperative recovery must be discussed with patients to establish proper expectations.

LOOK AT THE LENS

For patients over 40, careful assessment of the crystalline lens to rule out lenticular changes and DLS is critical. These patients are experiencing symptoms of hyperopia and/or presbyopia. Although these patients do not typically have the same high visual expectations as a myopic patient, it is valuable to

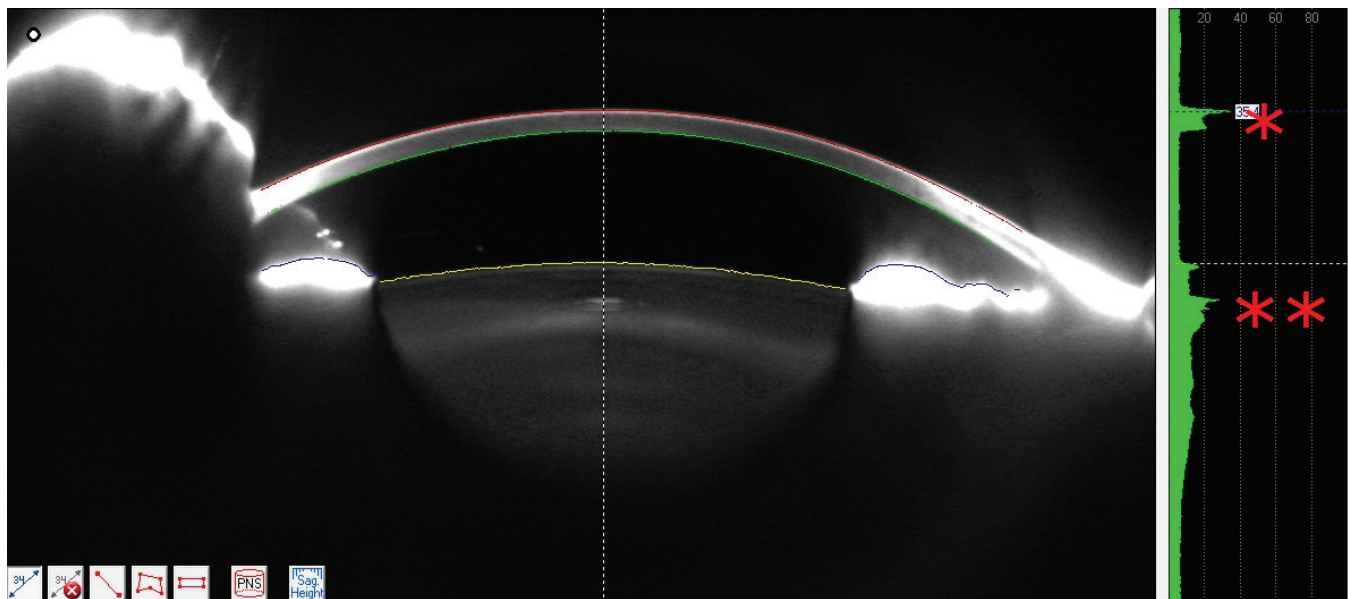


Figure 3. Scheimpflug image (Pentacam) of the same eye as in Figure 1. The red asterisk (*) indicates the corneal densitometry. The red double asterisk (**) indicates the lenticular densitometry.

measure the degradation of their VA under mesopic conditions. This testing should be performed after the dilated cycloplegic refraction. If VA is significantly reduced in this setting, it is best to avoid additional vision correction, particularly PRK, which can increase stromal haze, in turn increasing mesopic symptoms. The aberrations induced can also be additive to those created by DLS. This results in reduced VA, which worsens in low-light or dark conditions. These patients are better treated with refractive lens exchange.

RETREATING HYPEROPIC CORRECTIONS

Patients whose original treatment was for hyperopia are the most challenging to retreat, and they require the most careful evaluation and surgical consideration. In addition to the concerns of OSD and DLS, treatment centration and optical zone considerations must be included in the decision-making for additional surgical correction in these patients.

Early excimer laser technology used relatively small optical zones. Even a mildly decentered ablation can result in further degradation of acuity after an enhancement due to amplification of higher-order aberrations. Patients may complain of loss of sharpness or worsened quality of vision, as well as worsened vision in dim or dark conditions.

Additionally, it is generally accepted that hyperopic corrections should not exceed 50.00 D of corneal steepening. Such extreme corneal shape change significantly increases the risk of regression of the treatment and loss of BCVA.

RISKS

Risks associated with LASIK retreatments include infection, flap complications after relifting, epithelial ingrowth, ectasia, inflammation, loss of BCVA, residual refractive error, and increased dry eye and OSD. Risks of PRK include slow healing with reduced VA, infection, stromal scarring, inflammation, loss of BCVA, residual refractive error, and increased dry eye and OSD. A good informed

consent should highlight all of these possibilities.

PLAY DETECTIVE

Although patients who present with visual complaints after refractive vision correction often attribute changes to the previous surgery, it is up to the clinician to determine the true etiology of the complaint. Careful diagnostic testing differentiates the cause of the vision loss and facilitates patient education. ■

1. Number of LASIK surgeries in the U.S. 1996-2020. Statista. July 18, 2016. www.statista.com/statistics/271478/number-of-lasik-surgeries-in-the-us/. Accessed September 19, 2019.

TRACY SCHROEDER SWARTZ, OD, MS, FAAO, DIPL ABO

- Consultative optometry, Laser Eye Center, Huntsville and Decatur, Alabama
- tracysswartz@gmail.com
- Financial disclosure: Speaker (Alcon); Consultant (Tracey Technologies)

ERIK ZINGLER, OD

- Clinical Director, LasikPlus, Omaha, Nebraska
- ezingler@gmail.com
- Financial disclosure: None