

Post-LASIK Ectasia

BY LEELA RAJU, MD; ROY S. RUBINFELD, MD; AND CHRISTOPHER E. STARR, MD

CASE PRESENTATION

A 24-year-old man is referred for LASIK. On initial presentation, his manifest refraction was -6.25 -2.00 X 180 for a BCVA of 20/20 OD and -6.25 -2.50 X 180 for a BCVA of 20/20 OS. Central ultrasound pachymetry readings were 505 μ m OD and 504 μ m OS. Figure 1 shows his measurements with the Topographic Modeling System TMS-4 (Tomey Corp.). Intraoperative ultrasound pachymetry confirmed a flap thicknesses of 103 μ m OU. The patient has never worn contact lenses and desires freedom from spectacles. His family history, both ocular and medical, is completely normal, as are his slit-lamp and dilated fundus examinations. At this point, he was turned down for LASIK due to his age,

prescription, pachymetry readings, and topography and was advised to have additional measurements at a later date.

Fifteen months later, the patient's refraction was essentially unchanged (-6.50 -2.25 X 180 OD and -5.75 -2.50 X 180 OS), but his BCVA is now only 20/25 OU. Figure 2 shows the topographic measurements of the patient's eyes. He underwent uncomplicated customized LASIK on both eyes with programmed flaps of 100 μ m using the iFS Laser (Abbott Medical Optics Inc.). The ablation depth with a STAR S4 IR Excimer Laser System (Abbott Medical Optics Inc.) was 141 μ m OD and 149 μ m OS.

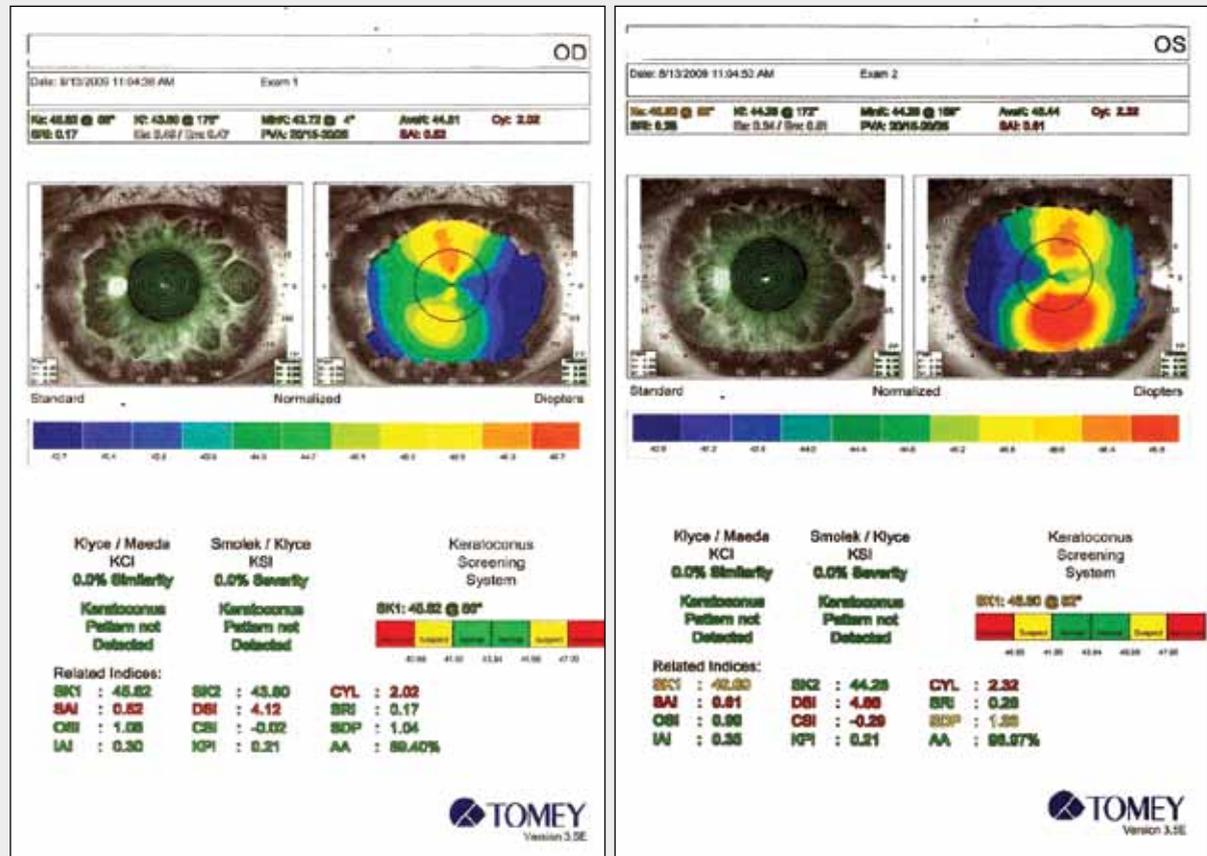


Figure 1. Topography of the patient's right (A) and left (B) eyes.

CASE PRESENTATION (CONTINUED)

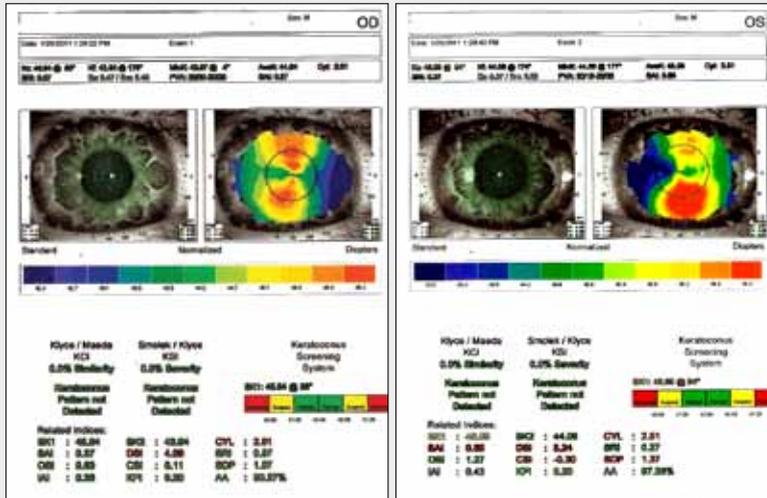


Figure 2. Topography of the patient's right (A) and left (B) eyes 15 months later.

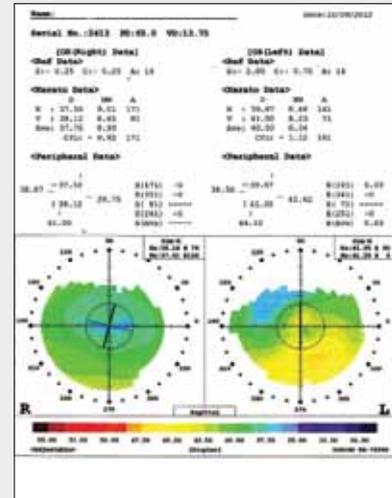


Figure 3. Topographic measurements taken 16 months after LASIK.

Sixteen months postoperatively, the patient presents with decreased vision in his left eye. Figure 3 shows his topography. His UCVA is 20/20 OD with a plano refraction and 20/100 correcting to 20/80 OS with a refraction of -1.25 -0.50 X 3. He is pleased with the outcome in his right eye but is not interested in

wearing a contact lens in his left eye, because he has no history of contact lens wear. He says that he frequently rubs both of his eyes vigorously. How would you proceed?

—Case prepared by Stephen Coleman, MD.

LEELA RAJU, MD

The slight claw-like pattern on the earlier topographies may have suggested that the patient's corneas were not completely normal. The fact that he could not be corrected to 20/20 on a subsequent visit is also concerning. Looking at the topographies, especially the last one taken of the left eye, I would be concerned that ectasia is developing. The right eye may also exhibit some of the same characteristics in the future. I would consider corneal collagen cross-linking (CXL) to slow or stop the ectatic progression and make sure the patient understood that a contact lens may still be necessary in one or both eyes to achieve best possible vision in the future. It is also important to stress that eye rubbing may contribute to progression, and I would recommend topical medication to help reduce the patient's allergic symptoms.

ROY S. RUBINFELD, MD

This case deals with a key concern of all LASIK surgeons and patients: ectasia. Since the US approval of the excimer laser in 1996, both diagnostic and LASIK surgical technologies have improved greatly. Nonetheless, most refractive surgeons still spend significant time determining which

patients are at higher risk for developing ectasia and how it is best prevented. Ectasia has even been reported to occur in the absence of detectable risk factors.

This patient's refraction remained stable for more than 1 year. Careful observation of the original topography in the left eye, however, shows inferior steepening, although the computerized indices did not detect a keratoconic pattern. It would be interesting to see what the posterior surface of the cornea looked like at that point and whether the Pentacam Comprehensive Eye Scanner (Oculus Optikgeräte GmbH) or similar advanced imaging technology would have been able to rule out this patient as having a higher-than-normal risk of ectasia prior to surgery.

At this point, the patient appears to have ectasia with significantly reduced BSCVA. He should undergo CXL in an effort to stop any further vision loss related to post-LASIK ectasia in the left eye. If advanced imaging demonstrates any evidence of early ectasia or posterior corneal abnormalities in the right eye, then CXL should be performed in both eyes. If this patient lives in the United States where CXL is not yet FDA approved, he can access this treatment through one of the ongoing investigational studies. Since 2009, my practice has been involved with a multicenter

physician-sponsored study group (www.cxlusa.com) with sites across the country to make this treatment available to patients in need. Our results with epithelium-on CXL since 2010 have been excellent, as reported at many scientific meetings.

If this patient wants to try and achieve the best possible uncorrected vision in his left eye, he may also consider a combination of topography-guided PRK combined with CXL, which would have to be performed outside the United States. Aleksandar Stojanovic, MD, in Norway, David Lin, MD, in Vancouver, British Columbia, and John Kanellopoulos, MD, are highly experienced in these techniques if the patient were willing to travel.

CHRISTOPHER E. STARR, MD

This appears to be an unfortunate case of post-LASIK ectasia in a patient who is a confirmed high-risk eye rubber. With all LASIK surgeries, the prevention of postoperative ectasia through careful preoperative screening is of paramount importance. The visual acuity in his left eye is only 20/80 now, but hindsight is 20/20, and thus, on careful review of the preoperative data, a number of clear warning signs become evident. First, the patient, at age 24, is young and therefore signs and symptoms of keratoconus may be subtle clinically or not present at all. He also has moderately high myopia and cylinder as well as thin corneas. On Placido disk-based topography, there is a suspicious inferior steepening OS and an asymmetrical bowtie with radial skewing of the axis OD. In addition, the keratometry readings are a bit steeper than normal, approaching 47.00 D in the left eye. All subtle red flags suggesting potential forme fruste ectasia.

Of note, the patient's topography and refraction remained fairly stable during the 15-month hiatus between visits, and the built-in topographic ectasia screening software failed to detect any abnormal patterns—criteria likely critical in the surgeon's decision to proceed with surgery. Although I now prefer a residual stromal bed of at least 300 μm , the computed value of slightly greater than 250 μm in this case is still widely regarded as standard of care. The biggest red flag of all, in my opinion, is the fact that, despite a stable refraction, the BSCVA decreased from 20/20 to 20/25 OU at the second visit, implying irregular astigmatism and possibly early ectasia. Even though Placido disk-based topography remains the gold standard for the assessment of anterior corneal curvature, tomography-based posterior corneal curvature and pachymetric spatial profiling indices are also critical in our modern approach to LASIK screening.

In this case, it would not be surprising if there were significant preoperative posterior float elevation and/or inferior corneal thinning on pre-LASIK tomographic

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—Roy S. Rubinfeld, MD

imaging. In addition, corneal biomechanical assessment can be a useful adjunct in cases with subtle or equivocal topographic or tomographic findings. At this point, sadly, the damage is done, and this patient, who wants to avoid wearing contact lenses, might consider CXL and/or intracorneal ring segments. Most certainly and most importantly, he absolutely must stop rubbing his eyes. ■

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