

Risk Assessment

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CASE PRESENTATION

A 23-year-old Asian Indian male consults you for a refractive surgery evaluation. He has used soft, daily-wear contact lenses for 10 years and removes them before bed. He has seasonal allergies for which he takes Zyrtec (Pfizer Inc., New York, NY) as needed. Otherwise, his medical and ocular history is unremarkable.

On examination, his UCVA is 20/20 OU. His manifest refraction is similar to his current spectacles, which are 4 years old: -1.75 D sphere = 20/20 OD and $-2.50 +0.50 \times 90 = 20/20$ OS. An external examination shows the patient's ocular motility and confrontation fields to be normal. His left eye is dominant. Corneal pachymetry readings by ultrasound are $535 \mu\text{m}$ OD and $540 \mu\text{m}$ OS.

The slit-lamp examination reveals normal anterior segments with the exception of a faint, inferior line of iron in both eyes. There is no complete Fleischer ring. The IOP measures 21 mm Hg in each eye, and the crystalline lenses are clear bilaterally. A dilated examination of the fundus is normal.

The cycloplegic refraction is identical to the manifest refraction.

Retinoscopy reveals definite scissoring of the reflex in both eyes. The

(Continued)

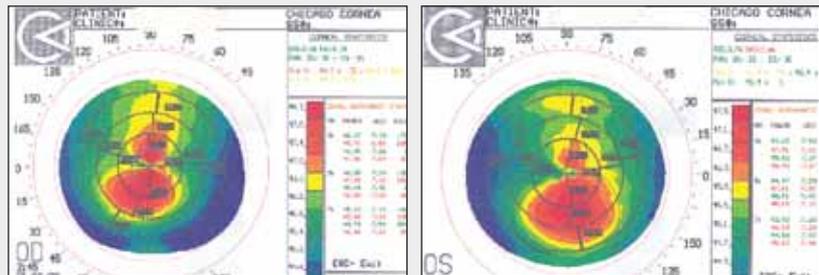


Figure 1. Placido corneal topography of the patient's eyes shows incomplete, asymmetric bowties with inferior steepening.

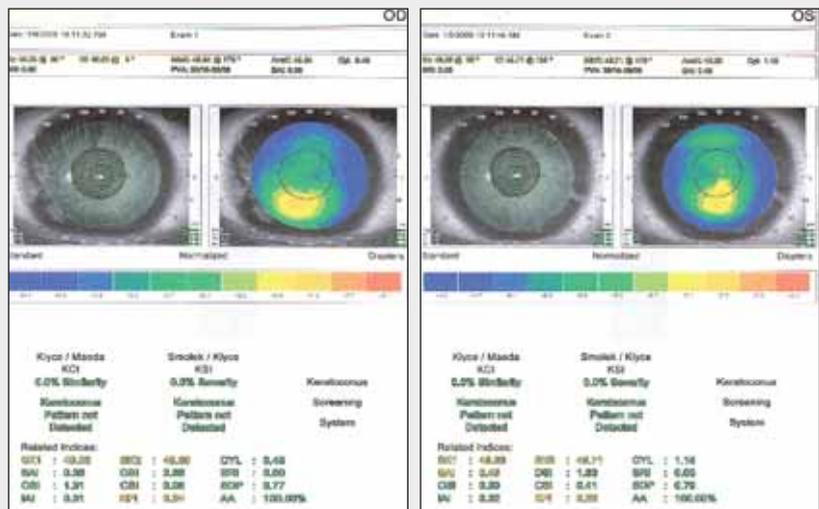


Figure 2. Keratoconus screening indices using the Klyce-Maeda and Smolek-Klyce parameters do not detect keratoconus in either eye.

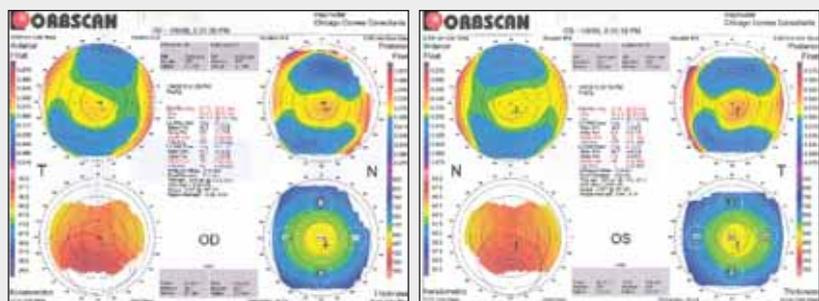


Figure 3. Imaging of both of the patient's eyes with the Orbscan topographer shows inferior steepening on the keratometric maps but no significant posterior corneal elevation in either eye.

CASE PRESENTATION (CONTINUED)

patient's corneal topography is shown in Figures 1 and 2, and images obtained with the Orbscan (Bausch & Lomb, Rochester, NY) and Pentacam Comprehensive Eye Scanner (Oculus, Inc., Lynnwood, WA) are provided in Figures 3 and 4, respectively.

How would you proceed?

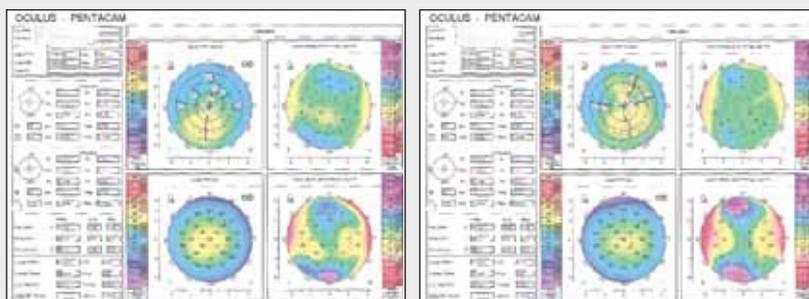


Figure 4. Scans obtained with the Pentacam show findings similar to those from the Orbscan for both of the patient's eyes.

J. BRADLEY RANDLEMAN, MD

This patient has low myopia and excellent BSCVA, but he also has some abnormal physical findings, including scissoring on retinoscopy and faint lines of iron in the cornea as well as suspicious topographies. Based on the Ectasia Risk Score System,¹ his cumulative score is 5, including 3 points for inferior steepening on topography and 2 points for an age of 23. Based on this score and the subtle physical findings described in the case presentation, I would not offer the patient LASIK.

Furthermore, the physical findings in this young patient are suspicious for early keratoconus. I therefore would also not offer surface ablation, because these abnormalities might very well advance, even without surgical intervention. Even minimal surface ablation for this small refractive error would result in the removal of Bowman's membrane, weaken the cornea, and possibly exacerbate the natural course of ectatic corneal disease. Although Intacs (Addition Technology, Inc., Des Plaines, IL) are another option, I would be reluctant to use them due to the potential for inducing astigmatism or other ocular aberrations by implanting these segments. I therefore would recommend no surgery for the patient at this time.

There may, however, be exciting opportunities for this patient in the very near future. A multicenter clinical trial of collagen cross-linking is ongoing in the US. Outside this country, the procedure has demonstrated promising results in stabilizing ectatic corneas. If the procedure is found effective in the US clinical trials and it is approved for use, the patient in this case might benefit from combination therapy: collagen cross-linking followed by surface ablation. Surgeons have already successfully used this technique in cases of more advanced keratoconus and achieved excellent UCVA and postoperative stability.²

AUDREY R. TALLEY-ROSTOV, MD

Recent studies by Randleman et al have shown that the risk factors for ectasia include abnormal preoperative

topography (including inferior steepening), an age of less than 25 years, and central pachymetry readings below 500 μm . These researchers developed a point system for assessing individuals' risk of developing ectasia following corneal refractive surgery.¹

Given that the primary risk factor for developing ectasia is inferior steepening on topography (3 points on the risk assessment table) and that the patient has an additional risk factor of young age (2 points on the risk assessment table), I would not recommend LASIK or surface ablation (PRK) at this time. Risk-assessment point values of 4 or more suggest that the patient is in the high-risk category for developing ectasia.¹ I would identify these risk factors in my discussion with the patient and let him know that it is easier to stay out of trouble than to get out of it. Although the corneal pachymetry readings are within normal limits and his myopic prescription is not extreme, his risk factors are too great for LASIK or PRK to be performed safely. I would recommend that he continue wearing contact lenses.

Intrastromal corneal ring segments are an option, but the refractive result is not as accurate as with LASIK or surface ablation. In addition, the potential for nighttime visual disturbances (presence of halos secondary to the ring segments) would most likely be unacceptable to a patient who currently has no visual complaints except for a dependence on glasses and contact lenses.

Additional testing of ocular rigidity with an Ocular Response Analyzer (Reichert, Inc., Depew, NY) might provide useful information. Collagen cross-linking might help to prevent future corneal degeneration and/or ectatic development. If the patient is extremely motivated, then he and the surgeon might consider collagen cross-linking followed by topography-guided PRK after proper informed consent. This combined procedure is not yet available in the US, so the patient would require a referral out of the country.

BRIAN S. BOXER WACHLER, MD

For years, many of us looked carefully at topography as the most important preoperative risk factor for postoperative ectasia when evaluating a patient for LASIK. Some surgeons used other assessments such as the residual thickness of the stromal bed. J. Bradley Randleman, MD, R. Doyle Stulting, MD, and their team at the Emory Eye Center in Atlanta deserve a lot of credit for developing a risk-stratification system.¹ We all can use their classification system when evaluating patients for LASIK, specifically regarding their risk of ectasia. I encourage anyone performing LASIK to become familiar with this grading system. The patient in this case would have a score of 5 due to inferior steepening on topography and his age, thus classifying him as high risk and indicating that LASIK is inadvisable.

The alternatives to LASIK for this patient are the Visian ICL (STAAR Surgical Company, Monrovia, CA) and PRK. The risk of ectasia as a result of refractive surgery with the Visian ICL is zero, because no corneal tissue is removed. It is not known whether PRK carries a risk of ectasia.

PRK is associated with a slower recovery of vision compared with the Visian ICL. As a result, PRK does not generate many word-of-mouth referrals to my practice, whereas patients who receive the Visian ICL refer others just as my LASIK patients do. Given these factors, I would be confident about recommending the bilateral implantation of the Visian ICL, a procedure that I perform routinely in my office-based surgical room.

**D. MATTHEW BUSHLEY, MD,
AND TERRY KIM, MD**

Despite normal pachymetry, a stable refraction, and posterior corneal surfaces that appear normal on scans with the Orbscan and Pentacam, there are multiple clinical and topographic findings in this case that warrant scrutiny and a cautious approach to elective corneal refractive surgery. These include the scissoring of the retinoscopic reflex, the incomplete line of iron in each eye, the asymmetric bowties with inferior steepening on topography of both eyes, the moderately skewed radial axis in the patient's left eye, and central keratometry readings greater than 47.00 D OU. Based on the Ectasia Risk Factor Score System recently published by Randleman et al,¹ this patient is at high risk of ectasia based on his age and topographic findings alone, and LASIK is ill advised.

After ruling out contact lens-induced warpage and eliciting any history of eye rubbing secondary to allergic conjunctivitis, it would be reasonable to re-evaluate the patient with the Pentacam in 6 to 12 months to look for any progression of the abnormal topographic patterns or changes to the posterior surface that are suggestive of keratoconus. If the

findings improved or were stable, one could consider a wave-front-guided surface ablation procedure, but only after a detailed informed consent discussion in which the surgeon emphasized the patient's increased risk of ectasia. Meticulous documentation in the chart would be important. The procedure would not involve prophylactic mitomycin C, because the ablation depth would be less than 75 μm . ■

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2. Kanellopoulos AJ, Binder PS. Collagen cross-linking (CCL) with sequential topography-guided PRK: a temporizing alternative for keratoconus to penetrating keratoplasty. *Cornea*. 2007;26:891-895.