

Central Corneal Scar

BY ALAN R. FAULKNER, MD; WILLIAM F. WILEY, MD; AND JEFFREY WHITMAN, MD

CASE PRESENTATION

A 25-year-old woman desires better visual acuity in her left eye. Her past ocular history is significant for a manifest refraction of -1.25 D sphere in both eyes. Her ocular anatomy was normal prior to a corneal abrasion in her left eye from the paw of her dog. Despite the injury, she continued wearing contact lenses until she presented with severe pain from a multiorganism infection with methicillin-resistant staphylococci and *Aspergillus*. After multiple courses of various antibiotics and antifungal treatments, the infections resolved, but the patient was left with a central corneal scar in her left eye.

She underwent an uneventful phototherapeutic keratectomy (PTK) for the corneal scar. The referring surgeon performed uneventful LASIK on her right eye, and her UCVA is currently 20/15 OD. Figures 1 and 2 show the results of computed tomography and topography for her left eye. The patient's current manifest refraction is +4.00 +0.50 × 160 for a BCVA of 20/20 OS. She has been wearing a +3.75 D contact lens to deal with the anisometropia, but she is concerned about her risk of infection. The patient cannot tolerate glasses. Her cycloplegic refraction is +10.00 +0.5 × 163 for a BCVA of 20/20 OS. Her corneal keratometry readings are 32.86 @ 141/32.2 @ 051. Central pachymetry measures 386 μm in her left eye. The remainder of the examination is normal except for minimal superior haze outside the visual axis.

The patient asks about treatment options for the refractive error in her left eye.

—Case prepared by Karl G. Stonecipher, MD.

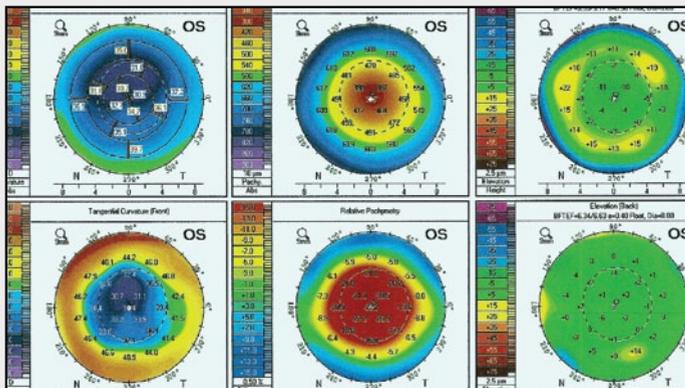


Figure 1. Tomography with the Pentacam Comprehensive Eye Scanner (Oculus Optikgeräte) shows marked flattening of the cornea with a thin central pachymetry reading of 386 μm in the patient's left eye.

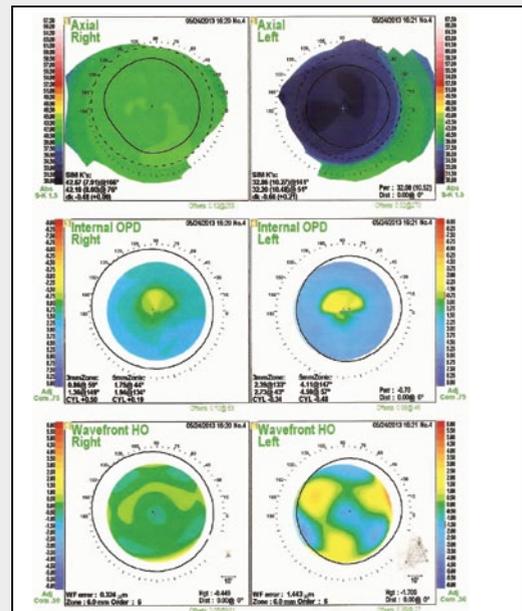


Figure 2. Nidek OPD imagery shows the normal post-LASIK topography and confirms the central flattening from the PTK in the patient's left eye.

ALAN R. FAULKNER, MD

Figures 1 and 2 show marked central flattening with peripheral steepening. The topographic changes are remarkably similar to those seen with consecutive hyperopia status post RK or an old treatment for high myopia using a small optical zone. Also significant is the pupil's size relative to the "optical zone" of the PTK. The steep peripheral knuckle is responsible for high spherical aberration and a multifo-

cal cornea, resulting in the large increase in hyperopia with cycloplegia and, more importantly, a large pupil.

Ideally, this patient would undergo topography-guided laser treatment that would not only achieve the desired refractive outcome but also remove the steep peripheral transition zone and decrease the induced spherical aberration. Lacking the availability of such technology, I think she would do well with hyperopic PRK. The patient has tolerat-

ed aberrations while wearing a contact lens, and hyperopic PRK would not likely worsen the higher-order aberrations. Central corneal thickness is not an issue, because tissue would only be removed peripherally.

As with post-RK eyes, I would treat the manifest refraction but reduce the sphere by 20%, because I find that eyes with this type of topography are prone to overcorrection. I would administer mitomycin C. Prior to surgery, I would explain to the patient that her outcome is subject to some variability depending on pupillary size and that her risk of retreatment is higher than normal.

WILLIAM F. WILEY, MD

An ideal option for this patient might be a hyperopic phakic IOL (not currently available in the United States). A phakic lens could correct her hyperopia while preserving accommodation. Because this eye was mildly myopic, I would expect there to be sufficient room in the anterior segment for a hyperopic phakic IOL. The surgeon could consider comanaging the case with an international ophthalmologist, or he or she could apply for a Humanitarian Device Exemption to perform the surgery in the United States. To determine the proper power of the phakic IOL, I would recheck the patient's manifest refraction to see if she would take nearly the full cycloplegic refraction. (I would also be curious to learn the cycloplegic refraction of her right eye. There is a chance that it was overcorrected, owing to the patient's apparently large accommodative amplitude.)

For a corneal approach, epikeratophakia might be an interesting and effective treatment. This dated technique was originally used to treat aphakia. The surgeon places a lamellar disc from a donor cornea on a de-epithelialized host cornea and sutures the graft into a prepared groove on the host. I am not sure if many ophthalmologists would be comfortable trying this approach, so the option may be more theoretical than practical. That said, epikeratophakia would restore corneal optics by steepening the flat corneal curvature without removing tissue.

Neither of the approaches I have suggested may be possible or practical, in which case the surgeon may have to choose between PRK and a refractive lens exchange. The former might result in better optics by achieving a more normal corneal curvature. Moreover, because the treatment would be delivered peripherally, the risk of corneal weakening might be relatively low. Intraoperative aberrometry would be a must if I were considering an IOL procedure.

JEFFREY WHITMAN, MD

This case brings to the fore the mandate, "First, do no harm." If this patient can be successfully fit with a contact lens and educated how to prevent corneal problems from

lens wear, this would be the preferred treatment. If the patient rejected this option, a surgical solution would not include more laser vision correction. The cornea is already very flat; it has been thinned to less than 390 μm and may cause aberrations in her vision in the future. Hyperopic ablation at even the manifest level is often unpredictable and, I believe, not long lasting, which would be problematic in this young patient.

Considering her age, to maintain binocular function at various focal distances and to minimize optical aberrations, I think the Crystalens AO (Bausch + Lomb) would be a very good choice. I would target approximately -0.50 D of myopia. Refractive lens exchange would not further thin the cornea. Nor would it involve guesses related to the manifest versus cycloplegic readings, which differ dramatically. If the refractive endpoint were not hit by the first lens surgery—a difficult goal with this unusually shaped eye—I would implant a piggyback lens rather than perform laser vision correction for the reasons already stated. I would use the ASCRS postmyopic LASIK calculator or the Olsen formula to calculate the IOL's power. I would then try to confirm the power using the ORA System (WaveTec Vision) while the patient was on the OR table and the eye was aphakic. ■

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