Distance Correction After ALK

BY JAY BANSAL, MD; WILLIAM I. BOND, MD; AND JAY S. PEPOSE, MD, PHD

CASE PRESENTATION

A 39-year-old white male presents for a refractive surgery consultation. His past medical and family history are negative, but his ocular history is significant for bilateral automated lamellar keratectomies (ALK) 15 years ago at another clinic. His examination is significant for a UCVA of 20/200 OU, which corrects to 20/20 OD with a refraction of -2.00 -0.75 X 180 and to 20/20 OS with a refraction of -1.75 -1.00 X 165. Central pachymetry by ultrasound measures 551 µm OD and 553 µm OS. Keratometry readings are 42.15 D/41.92 D OD and 42.29 D/42.14 D OS. Barely visible 360° ALK scars, approximately 8 mm in diameter, are visible at the slit lamp and appear to be well centered in both eyes.

The patient desires full distance correction in both eyes (Figure 1). No records surrounding his ALK procedure are available, including his preoperative prescription. How would you counsel this patient regarding his options, their associated risks, and the best alternatives? Ultimately, how would you proceed in this case?

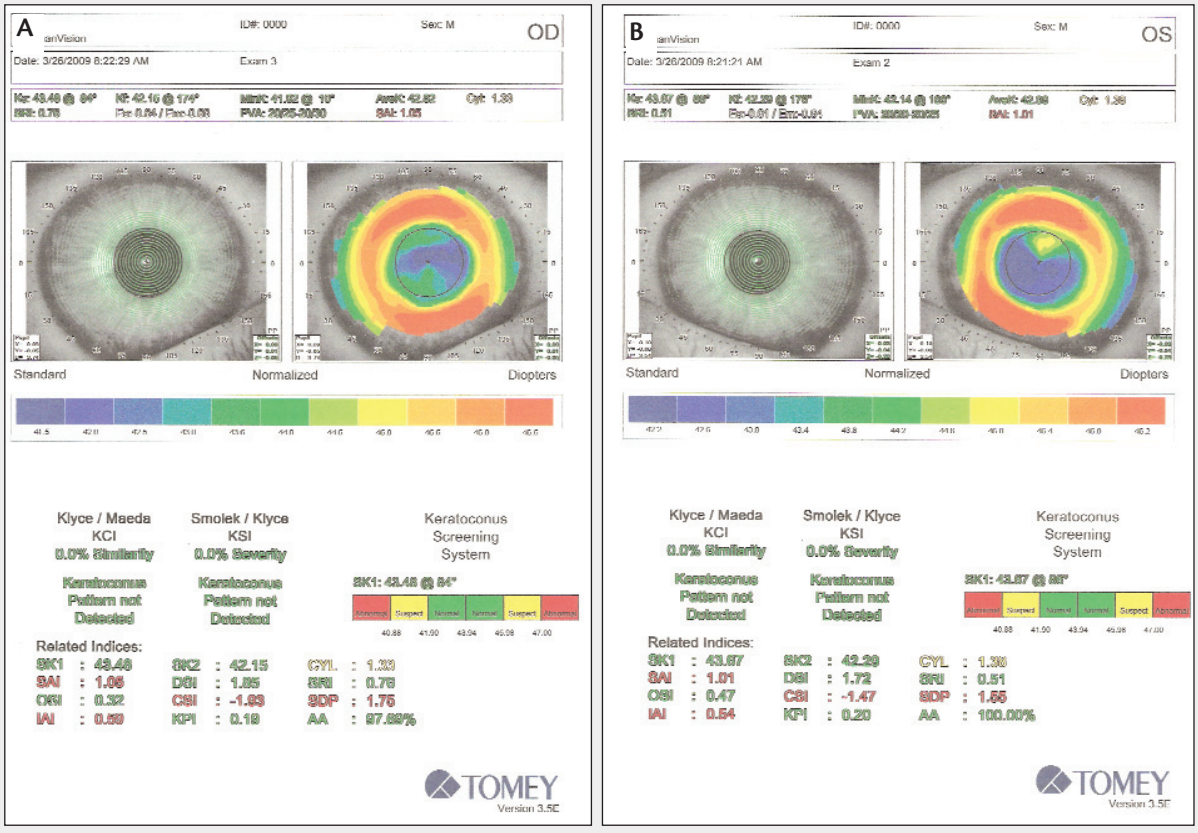

Figure 1. Topography of the patient's right (A) and left (B) eyes.

JAY BANSAL, MD

My initial impression is that this patient received an excellent outcome from the ALK technology that was available 15 years ago. It would be helpful to know his preoperative refraction, topography, and pachymetry.

I would gain information on the flap's thickness and pachymetry with the Visante OCT (Carl Zeiss Meditec, Inc., Dublin, CA) and obtain a wavefront map for additional data on the patient's refraction and aberrations. I would then counsel him regarding his options for treatment, which include

- PRK with mitomycin C (MMC)
- lifting of the original flap followed by laser ablation
- a side cut only with the IntraLase FS laser (Abbott Medical Optics Inc., Santa Ana, CA) inside the 8-mm flap followed by lifting of the original ALK flap
- creation of a new IntraLase flap that is larger and 40 µm thicker than the previous ALK flap
- implantation of a phakic IOL

Although all of these treatments can produce the desired result, I believe PRK with MMC 0.02% is the safest strategy. Lifting the flap would be associated with a greater risk of flap-related complications and epithelial ingrowth. The implantation of a phakic IOL is an intraocular procedure and would not address the patient's astigmatism.

I would perform a standard ablation transepithelial PRK with MMC applied for 30 seconds. I prefer a standard treatment to a wavefront-guided procedure, because the former reduces the potential for an overcorrection induced by the high spherical aberration left by the previous lamellar procedure. It would be important to counsel the patient regarding his increased risk of corneal haze and slower visual recovery with PRK over a corneal flap.

WILLIAM I. BOND, MD

I have had a fair number of post-ALK patients desiring modification over the years. The examiner can usually tell if the ALK procedure was initially for myopia or hyperopia by the type and depth of the scars. Deeper scars were for a hyperopic treatment (said to create a "controlled ectasia," adding to the already oxymoron-rich field of ophthalmology). Initially, this patient was probably a high myope, since the surgeon would have performed RK on a low myope.

At 39, the patient needs to understand that presbyopia is coming. My approach would be a contact lens trial in the office (soft lenses could be used because he will have a good idea of what he will see with the amount of astigmatism he has). Next, I would have him perform a monocular contact lens trial in each eye to see if he prefers near or far vision in his dominant eye. After that, I would ask the patient to read for a fair amount of time using his full distance correction with contacts in both eyes so he would know what to expect.

> "I think that LASIK is contraindicated in all patients who have had ALK."
> —William I. Bond, MD

Correcting presbyopia before it exists is virtually always a bust. I have yet to meet a "prepresbyope" who likes monovision for any amount of time. If I try to tell these individuals that they will like it in 5 or 10 years, they tell me that everybody is dead in the long run. That said, I think that the office trials of contact lens monovision and reading with full distance correction are still valuable, chiefly as education for patients. When they develop presbyopia, they will probably remember this experience.

In this case, an argument could be made for operating on one eye at a time to allow the patient to test monovision. In my experience, however, most patients prefer to undergo surgery on both of their eyes in the same sitting. The great majority of prepresbyopic 39-year-olds want full distance correction and figure they will use temporary readers later if necessary. Privately, they think they will never need glasses.

An interesting feature of this case is the lack of corneal irregularity. The patient's vision is correctable to 20/20 with a straightforward approach, indicating negligible irregular astigmatism. The corneal thickness is ample, and the keratometry readings are more normal than one generally observes after ALK. The topographic studies, which seem to be of good technical quality, are fairly regular, although a topography-guided procedure (when FDA approved) might address the minor irregularities that are present.

I think that LASIK is contraindicated in all patients who have had ALK. I had already successfully created several LASIK flaps over old ALK flaps when I had one of the most memorable LASIK flap experiences of my life in this very type of case. I would not wish the like on any surgeon or patient. PRK is the best option in this case. As to epithelial removal, I have not had any trouble using an epithelial removal brush over old ALK flaps, which tend to be smaller, thicker, and more strongly healed than some LASIK flaps. A transepithelial

approach would be very safe. Based on FDA approvals, I would be forced to remove the epithelium manually with my Wavelight 400 laser (Alcon Laboratories, Inc., Fort Worth, TX), with which I perform the large majority of cases. I could, however, use the Visx Star S4 (Abbott Medical Optics Inc.) for its transepithelial capability. The amount of desired correction is not great.

Preoperatively, I would stress to the patient that PRK on an eye that has undergone ALK (or RK or LASIK) can be slow with unpredictable outcomes and a high chance of further procedures. This might be another reason to operate on one eye at a time. Otherwise, I would use a standard PRK informed consent.

JAY S. PEPOSE, MD, PHD

Topography shows well-centered regions of corneal flattening with small functional optical zones. The patient's left eye has radial asymmetry superiorly. Pachymetry shows average central corneal thickness bilaterally, and the slit-lamp examination reveals 360° scars consistent with corneal caps in both eyes.

Representing a paradigm shift away from incisional keratorefractive surgery, ALK was an important precursor of LASIK surgery, albeit with far less advanced and exact instrumentation or reproducible results. When ALK was first introduced, the surgeon created a corneal cap or disc of between 7 and 8 mm in diameter using a 160-µm plate. Then, he or she performed a 4.2-mm resection of a stromal lenticle of varying thickness, depending on the spherical equivalent of the attempted correction. Unlike modern LASIK ablation profiles, ALK involved no transitional zone beyond the central region of stromal resection. The resultant small functional optical zone is therefore frequently associated with high positive spherical aberration and may increase the likelihood of myopic regression.

Before considering any refractive procedure, the first necessary determination is refractive stability. It will be important to verify that this patient's refraction has been stable over the past year or 2 and that the myopic shift is not a sudden change. He should undergo a cycloplegic refraction and examination to identify signs of cataract, diabetes, keratoconus, ectasia, or other potential causes of a myopic shift. I would also review the results of wavefront aberrometry and regional pachymetry.

Fifteen years after ALK, it is unlikely that optical coherence tomography will be able to image the lamellar plane of the cap interface, so the amount of preserved residual stromal bed is uncertain. Any flap-based retreatment would therefore risk violating a 250-µm residual bed or intersecting the original cap interface, which could leave an irregular bed or residual slivers of stroma at this plane. In addition, LASIK might biomechanically destabilize the cornea more than a surface treatment would.

If the patient showed evidence of refractive stability, I would favor an advanced surface ablation technique with the off-label use of MMC—along with oral vitamin C and the avoidance of high exposure to environmental ultraviolet light—in an effort to minimize his risk of developing corneal haze. Given the impact of small functional optical zones without transitional zones on the induction of spherical aberration (and the radial asymmetry on the left topographic map, which may also be associated with high coma), I recommend caution with a wavefront-guided treatment, particularly if the amount of tissue calculated for ablation seems out of proportion to the attempted correction. In such situations, efforts to decrease high degrees of spherical aberration could lead to a hyperopic overcorrection without appropriate compensation in the physician offset. This patient should be advised of the risks of the procedure, which include (but are not limited to) over- or undercorrection, corneal haze or scarring, the loss of BSCVA, infection or ulceration, and the development of ectasia. ■

Section editor Stephen Coleman, MD, is the director of Coleman Vision in Albuquerque, New Mexico. Parag A. Majmudar, MD, is an associate professor, Cornea Service, Rush University Medical Center, Chicago Cornea Consultants, Ltd. Karl G. Stonecipher, MD, is the director of refractive surgery at TLC in Greensboro, North Carolina. Dr. Coleman may be reached at (505) 821-8880; stephen@colemanvision.com.

Jay Bansal, MD, is the medical director of LaserVue Eye Center in Santa Rosa, California. He acknowledged no financial interest in the products or companies he mentioned. Dr. Bansal may be reached at (707) 522-6200; bansal@laservue.com.

William I. Bond, MD, is the medical director of Bond Eye Associates in Pekin, Illinois. He is a paid consultant to Alcon Laboratories, Inc. Dr. Bond may be reached at (309) 353-6660; bondeye@bondeye.com.

Jay S. Pepose, MD, PhD, is the director of the Pepose Vision Institute and a professor of clinical ophthalmology and visual sciences at the Washington University School of Medicine in St. Louis. Dr. Pepose may be reached at (636) 728-0111; jpepose@peposevision.com.