

Progressive Haziness After Enhancement

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CASE PRESENTATION

A 49-year-old female presents with a chief complaint that the vision in her left eye is crisp in the morning but becomes progressively hazier after 2 PM. She is satisfied with the vision in her right eye.

The patient's past ocular history is significant for bilateral LASIK in January 2005, followed by three-incision RK in her left eye in April of that year. She subsequently underwent a LASIK enhancement (via lifting of the flap) in her left eye in April 2006. Her prior records are not immediately available. The patient's complaints of hazy vision began after the enhancement procedure in April 2006. She currently uses Restasis (Allergan, Inc, Irvine, CA) and artificial tears without experiencing any relief of her symptoms.

Performed in the evening after the onset of hazy vision in her left eye, the ocular examination reveals a distance UCVA of 20/20 OD and 20/40 OS and a near UCVA of 20/50 OD and 20/200 OS. The manifest and cycloplegic refractions are identical: $-0.75 +0.50 \times 135 = 20/20$ OD and $+1.00 +0.25 \times 25 = 20/20$ OS. An add of $+1.75$ D yields a visual acuity of 20/20 OU at 16 inches. The patient's pupils and ocular motility are normal on external examination. Corneal pachymetry measures $431\mu\text{m}$ OD and $440\mu\text{m}$ OS.

At the slit lamp, the cornea, anterior segment, and crystalline lens of the patient's right eye are clear. There is a well-centered, superiorly hinged LASIK flap with no abnormalities of the interface. The IOP measures 14mmHg. Her left eye has a well-centered, superiorly hinged LASIK flap with a single, vertically oriented stria between 1 and 7 o'clock that traverses the visual axis. Additionally, three miniature RK incisions within the flap are located at the 10-, 2-, and 6-o'clock positions. The LASIK flap's interface and crystalline lens are clear (Figure 1).

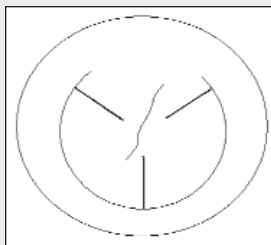


Figure 1. A slit-lamp drawing of the patient's left eye depicts three RK incisions within the flap as well as one vertically oriented stria.

A punctal plug is present in the left lower punctum. A dilated examination of the fundus is nor-

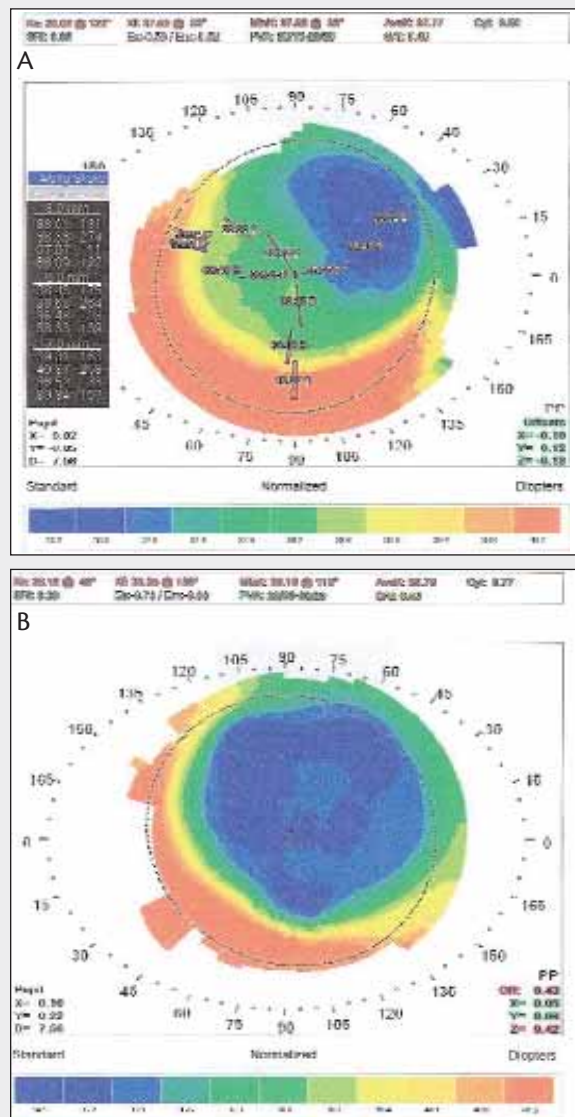


Figure 2. The corneal topography of the patient's right (A) and left (B) eyes is shown.

CASE PRESENTATION (CONTINUED)

mal in both eyes. Figures 2 and 3 share the patient's topographic maps.

What are the potential etiologies of the patient's symptoms, and how would you manage this case?

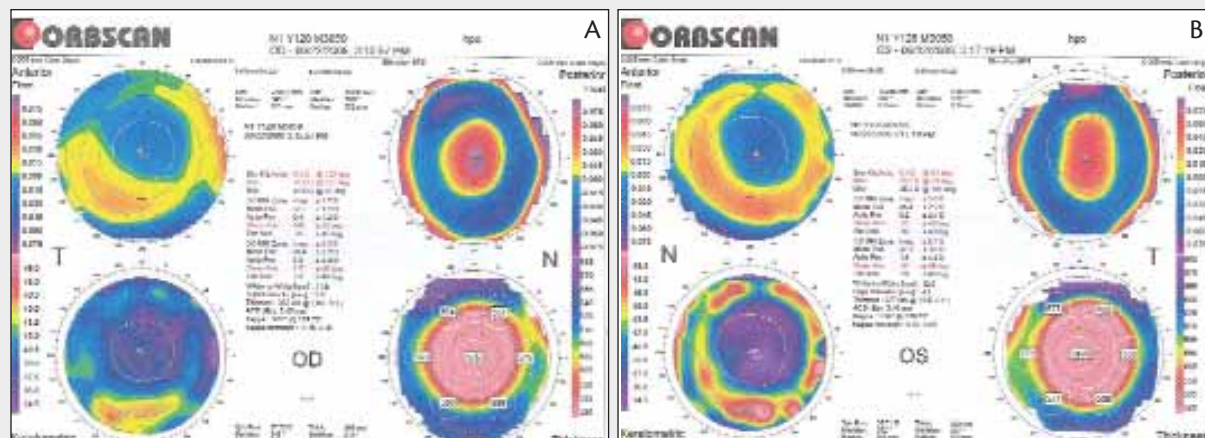


Figure 3. The Orbscan topography (Bausch & Lomb, Rochester, NY) for the patient's right (A) and left (B) eyes is shown.

MITCHELL A. JACKSON, MD

Like most compassionate doctors, my first instinct would be to fix things. This patient has already undergone three refractive procedures on her left eye, however, and has not quite responded "perfectly." At first glance, I would say that I could treat the central flap stria and residual hyperopic refractive error by means of transepithelial PRK with adjunctive mitomycin C¹ to prevent corneal haze. On further consideration, I would instead argue for a more conservative approach, because the patient is pleased with her visual result for most of the working day.

She has remained free of glasses for everything except reading, which would make her refractive surgery a success. Her age of 49 is the primary reason for her complaints after 2 PM. Her accommodation seems to expire as the day progresses. She is also experiencing the postoperative visual fluctuation typical of RK incisions. The best treatment option for her is a pair of glasses with her hyperopic prescription that she may wear for driving or when her vision seems to regress in the afternoon.

I would be leery of pursuing surgical treatment, because the patient's RK incisions and current age mean that further laser vision correction (such as transepithelial PRK) will not be reliable in terms of the healing response. Performing transepithelial PRK despite a thin central pachymetry reading and the additional risks of corneal haze, ectasia, continued visual fluctuation, and/or residual refractive error may make the patient even unhappier. In the future, the implantation of an IOL might be indicated, but I would wait until she medically needs cataract extraction.

I would remind the patient that she has done well with LASIK and would speak highly of her prior refractive sur-

geon. Her results are good with no loss of BCVA from 20/20. In this case and at the present time, I would leave well enough alone.

DAVID R. HARDTEN, MD

This patient's symptoms appear to be related to a progressive problem with accommodation as well as an inability late in the day to overcome hyperopia after her refractive surgery. I would still want to rule out refractive instability through manifest and cycloplegic refractions performed early in the morning. Typically, however, the individuals who experience visual instability throughout the day after RK are more hyperopic in the morning, and I would expect this patient to follow that pattern. The other issue that commonly causes blurring late in the day is dry eye, but an examination while her vision was blurry yielded no findings of dry eye such as punctate keratopathy or a poor tear film breakup time.

The stria must be considered as a potential cause of the patient's visual symptoms. Hyperopic correction results in 20/20 vision, however, and there is no topographic evidence of irregularity from the stria. Visually significant striae can cause topographic irregularities, the most common of which looks like a central island from the centralized bunching of tissue. Midperipheral striae can cause a steep/flat type of topography that resembles a decentration (similar to the topography in her asymptomatic eye).

The options for managing this patient include spectacle or contact lens correction, both of which carry a relatively low risk. I would prefer not to lift the flap again for an enhancement, because I have found that epithelial ingrowth is common when prior RK incisions cross through LASIK

flaps that are relifted. Fortunately, this problem did not happen after the first relifting.

If the patient pushed for surgical management, I would perform surface PRK with the adjunctive use of mitomycin C in a single-dose, intraoperative application after the excimer laser ablation. I would discuss with her whether she would like distance or near correction, although I would guess from her prior decisions on enhancements that she is more interested in distance correction. In patients who are overcorrected after prior myopic procedures, I have typically reduced the treatment for the hyperopic correction by 30%, even with customized ablation software, and this strategy has worked well overall. During the first few postoperative months, I would have the patient taper topical steroids, continue treatment with Restasis, and apply frequent lubrication.

PAUL C. KANG, MD

I believe that the haziness in this patient's left eye that worsens as the day wears on is caused by an accommodative spasm resulting from a combination of postoperative hyperopia and early-onset presbyopia. In the morning, she may see clearly by accommodating through the mildly hyperopic refractive error. At the age of 49, she may not be able to maintain this accommodative state throughout the day and thus experiences blurry vision.

Because the enhancement of her left eye only occurred several months ago, I would initially follow this patient with serial topography and refractions for a period of at least 6 months to ensure refractive stability. It is also crucial in mildly hyperopic/presbyopic patients to obtain an accurate cycloplegic refraction to unmask any residual hyperopia. I therefore often use Cyclogyl (Alcon Laboratories, Inc., Fort Worth, TX) and have the patients wait a full 20 to 30 minutes in the office

before I refract them. During the follow-up period, I would have the patient use glasses or a contact lens and determine if she is a candidate for monovision.

After adequate observation, if her refraction remained stable and the patient still desired a surgical solution, I would consider performing either hyperopic PRK or refractive lens exchange with the possible implantation of a multifocal IOL (the AcrySof Restor lens [Alcon Laboratories, Inc.] or the Rezoom IOL [Advanced Medical Optics, Inc., Santa Ana, CA]).

Although the manual pachymetry reading is 440 μ m OS, the Orbscan reading is only 327 μ m. The thickness of the flap is unknown. Even assuming the thinnest flap, however, I question whether there is sufficient residual stroma for a LASIK retreatment. In addition, I am somewhat reluctant to lift a flap for a third time when it already has striae and has undergone RK, because the chances of other complications such as epithelial ingrowth and more striae are higher.

If the patient were a candidate for monovision and her left eye were not dominant, I would consider this modality when performing PRK. As mentioned earlier, another option is refractive lens exchange with a multifocal IOL. Although she may need PRK to correct any residual refractive error following the IOL's insertion, the benefit of this alternative is the potential conclusion to her history of multiple refractive procedures.

The decision to implant a multifocal IOL unilaterally would be somewhat controversial. Although the bilateral implantation of the lenses is necessary for optimal results, I have found that patients with a multifocal IOL in one eye maintain high levels of satisfaction and functionality without additional refractive aids. Nevertheless, the issue of unilateral versus bilateral implantation would need to be discussed with the patient.

WILLIAM I. BOND, MD

The potential etiologies of this case include a suboptimal cycloplegic refraction. The patient may have accommodated to suit her subjectively preferred but hyperopic right eye, and the clinician may have erroneously thought her accommodating left eye (perhaps plano when not accommodating) to be myopic. The fact that the corneal readings are 2.00D flatter in her left than her right eye would seem to support this hypothesis. The scenario might have happened more than once and might account for the RK in her left eye so soon after the LASIK procedure.

With the diurnal shift of the RK from morning hyperopia to evening myopia, it would be easy for a clinician to be mistaken about the amounts of needed correction. It is probably a good idea always to refract post-RK eyes at a fixed time in the office. Significant refractive fluctuations can occur and lead to major over- and undercorrections as well

as highly dissatisfied patients and surgeons. In courses he taught, Charles Casebeer, MD, then of Flagstaff, Arizona, maintained that 3:30 to 4:30 PM was probably the best time of day on which to base the decision for an enhancement, but consistency in the timing of refractive measurements was really the main issue.

In this case, I would begin with a careful discussion with the patient in an attempt to ensure that she understands that the variability in her refraction will continue after an enhancement of any type. I think it will be necessary to perform at least two careful, fully cycloplegic refractions of both of the patient's eyes at the same time of day, and I would repeat the measurements at 2- or 3-week intervals until they were stable and reproducible.

If the cycloplegic refraction were indeed +1.00 +0.25 X 25 OS as described, I would consider PRK or further LASIK. No dimensions are given for the size of the LASIK flap, but, for the purpose of my response, I will assume it is large enough for a hyperopic treatment. There also appears to be an amply thick stromal bed from the pachymetry given (unless the flap is grossly thick, and then everything really changes).

Although it is a little out of vogue at present, I would suggest carefully lifting the LASIK flap for a retreatment of the bed. I would expect the relatively recent RK incisions to separate during the lifting and replacement of the flap, and I would plan to deal with that occurrence intraoperatively. A meticulous operative technique for lifting and replacing the cut flap, of course, would be crucial. Careful attention to the flap and to the epithelium of the flap and rim would help to prevent or minimize the admittedly higher chance of aggressive epithelial ingrowth. In my experience, 4 or 5 minutes of careful air-drying after the painstaking repositioning of the flap—with particular attention to realignment where the RK separations have occurred—helps prevent ingrowth in the RK/LASIK flap situation.

I suggest lifting the flap largely because it would allow me to treat the central stria, which cannot be visually significant because the patient easily refracts to 20/20 at near and distance. According to the case presentation, however, the stria is central, and the eye may be capable of 20/12 or 20/10 BCVA.

Charles Moore, MD, of Houston developed and taught to me a technique that has been of great help over the years. It is a given that the more fresh and recent the striae are, the better all treatments work. Nevertheless, I have seen Dr. Moore's technique effectively address some cases of long-standing, well-established striae.

First, I flip the flap back fully and extend it away from the hinge as much as possible during its replacement. Next, I place the usual large-diameter soft contact lens over the cornea. After placing a Caro manipulator (part No. 18224; Moria, Antony, France) over the central axis, I push the

instrument straight back with as much force as I can steadily sustain for 30 to 45 seconds. I have repeated this maneuver three or four times, but once often suffices. Usually, the next day, no striae will be visible at the slit lamp, and they virtually never return in my experience.

Before I tried the technique for the first time, I asked Dr. Moore how hard I should press with the Caro instrument. He told me, "Try to make the corneal endothelium touch the optic nerve." There may be a touch of Texan hyperbole in this advice, but it is striking how hard I can press without causing the patient discomfort and how good the results are. The technique is easy and reliable. ■

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