

LASIK Striae

BY ARTHUR CUMMINGS, MB CHB, MMED(OPHTH), FCS(SA), FRCS(Ed);
THEO SEILER, MD, PhD; TOBIAS KOLLER, MD; AND DAMIEN GATINEL, MD

CASE PRESENTATION

A 27-year-old woman underwent uneventful LASIK for -5.50 D myopia in both eyes. The Moria M2 microkeratome (Antony, France), with a 90 single-use disposable head, and the Allegretto Wave Eye-Q excimer laser (Wavelight Laser Technologie AG, Erlangen, Germany) (400 Hz; Q value adjusted to -0.50) were used for the procedure.

Preoperative pachymetry was 550 μm OU, as measured by the Orbscan (Bausch & Lomb, Rochester, NY) and ultrasound. The flaps, measured by intraoperative subtraction pachymetry, were 120 OD and 110 OS. The treatment optical zone was 7 mm.

The patient was evaluated for lubrication, comfort, flap position and interface clarity at 1 hour postoperatively; all were satisfactory. The patient already had 20/20 binocular vision without correction. Protective eyewear was placed, and the patient was given instruction to (1) not rub or clean the eyes and (2) use antibiotics and corticosteroid drops three more times that evening.

The following day (ie, postoperative examination day 1), the patient did not note any complaints regarding comfort, although the perceived vision out of the left dominant eye was worse than the right nondominant eye. Both eyes were 20/20 uncorrected, and the corneal topographies are noted in Figures 1 and 2.

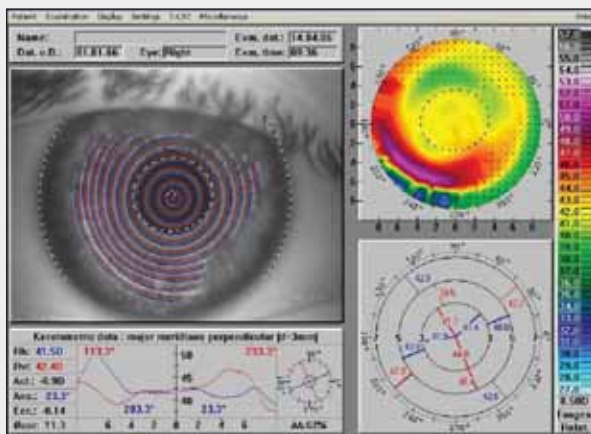


Figure 1. Postoperative day 1 topography of the right eye with the perfect flap is shown.

On slit-lamp biomicroscopy, the right LASIK flap was perfect, and the left LASIK flap showed signs of horizontal striae involving the visual axis. The left corneal photograph is noted in Figure 3.

The patient is an avid sportswoman and night driver, and, is therefore concerned about her visual quality. The management course is problematic. Should you wait and see if the quality improves or surgically correct the symptomatic striae? If you choose surgical correction, which method is appropriate?

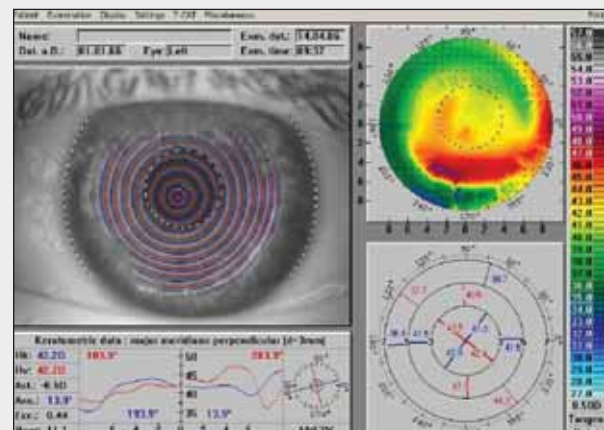


Figure 2. Postoperative day 1 topography of the left eye presenting with horizontal flap striae is shown.

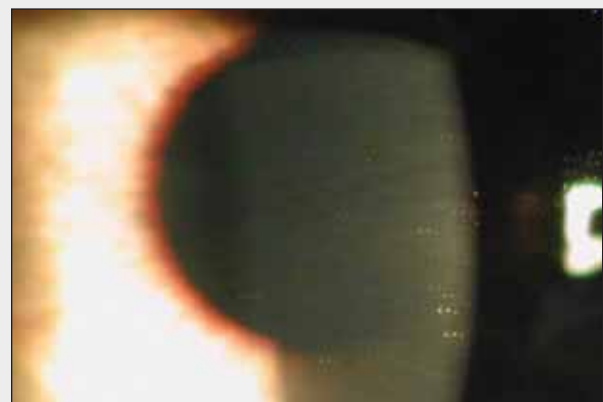


Figure 3. Clinical photograph of the flap surface of the left eye at postoperative day 1 depicts slight horizontal striae involving the lower center of the cornea.

**ARTHUR CUMMINGS, MB CHB,
MMED(OPHTH), FCS(SA), FRCS(ED)**

Microstriae seldomly affect the quality of vision over the long-term, thanks to epithelial remodelling. I expect that quality of vision would improve over a few weeks in the case of microstriae if left alone. Conversely, macrostriae require an intervention to smooth the flap and iron out the striae.

I would opt for surgery because there is a simple and safe option to correct striae on day 1. The intervention that I propose for the first postoperative day involves simply brushing or stroking the flap with a wet Weck cell sponge to iron out the striae. This should be performed at the slit lamp.

After administering topical anaesthetic drops, one may use the sponge to smooth out the flap from the hinge toward the periphery using firm strokes. It typically takes 3 to 5 minutes to achieve the desired result, after which a bandage contact lens should be placed in the eye for 24 hours. The desired endpoint is achieved when the flap edges are in close contact with the edge and the gutter is equally wide along the periphery of the flap. It is important to note that at this stage, the epithelium normally appears to be in worse condition than it was before the flap was brushed. Fine epithelial breaks tend to occur over microfolds that have been stretched.

Patient follow-up should occur the next day for review and removal of the contact lens. In most cases, the flap tends to be perfectly smooth with no evidence of striae. If the desired effect was not achieved, the flap needs to be formally lifted in the operating theater on day 2, under the laser's slit lamp biomicroscope. It is necessary to clear all excess epithelium that has accumulated either along the edges or on the corneal bed. Afterward, the flap may be rinsed and allowed to float back into position.

No further action is required. If the flap is lifted at a later stage and the striae are more established, however, the use of sterile water and even sutures may be necessary. Should this situation arise, I normally place another bandage contact lens and possibly leave it in for >24 hours.

Prevention plays an important role, too. Using a bandage contact lens for 24 hours postoperatively in cases where a flap slipped intraoperatively or in patients that tend to squeeze their eyes may prevent this complication. Protective shields should be worn for a full 24 hours after surgery.

Personally, I encourage patients to use the protective shields while sleeping for 1 week following surgery. It is also optimal if a second person can instill the drops, as this generally reduces the risk of the flap being moved by contact with the bottle.

I do not believe corneal topography is of much use on day 1 to help with this assessment. The necessity of surgical intervention is basically a clinical decision; this is the dominant eye and the proposed treatment is safe and tends to be effective. In the rare case when it proves to be ineffective, the flap can still be easily lifted on day 2, and a formal procedure can be performed in the operating theater.

**THEO SEILER, MD, PHD, AND
TOBIAS KOLLER, MD**

Horizontal or oblique linear microstriae on the first postoperative day following LASIK may occur in patients who are prone to squeezing when asked to instill eye drops. This phenomenon is seen more frequently in dominant eyes than in nondominant. It is always a somewhat difficult situation because, on one hand, we know that after a few months, the striae become optically insignificant (due to epithelial remodelling), but the patient frequently continues to complain about his/her mediocre vision. On the other hand, the issue may be resolved easily by stretching the flap. The patient, however, may view this as another intervention and may be apprehensive.

To avoid such a dilemma, a few years ago, my colleagues and I started to apply a bandage lens soaked with antibiotics during the first postoperative night. This strategy bypasses the necessity of eye drops, and the bandage lens acts as a mechanical safeguard. Since that time, we have encountered early postoperative microstriae in few cases. One disadvantage of bandage lenses, however, is that they occasionally cause conjunctival irritation. In these cases, we remove the bandage lens in the late evening.

An immediate stretching of the flap is recommended in this patient because she is already worried. Most often, stretching at the surface without lifting the flap with a wet sponge is possible on the first postoperative day, even at the slit lamp. If you do not succeed, you may have to lift and stretch the flap from the back surface perpendicular to the striae. The edge of the wound bed has to be cleaned carefully from the epithelium to avoid epithelial ingrowth. Also, topical steroids are recommended because diffuse lamellar keratitis may develop.

DAMIEN GATINEL, MD

Visually significant flap striae are a rare but bothersome and frustrating complication. Despite excellent UCVA by Snellen testing, this patient may complain loudly of the image quality perceived by the left dominant eye. This reduction in visual quality is a result of

the irregular astigmatism and scattering caused by the flap microstriae that extend through the entrance pupil area and visual axis. Customizing or narrowing the dioptric scale of the patient's corneal topography may reveal a higher degree of irregular astigmatism on the patient's left cornea. Wavefront analysis should also be performed to quantify and compare the optical aberrations of the right and left eyes.

The flap striae become more difficult to treat as the length of the postoperative course increases because the collagen form memory becomes more permanent with time. Therefore, I would perform the removal of these striae on postoperative day 1.

I recommend using the following surgical technique: Mark the flap edge at the slit lamp (repositioning marks are unnecessary in this situation). Instill phenylephrine 5% to allow intraoperative retroillumination of the surgical microscope light and provide accurate localization of striae. Reflect the flap back, and hydrate the stromal surface with balanced salt solution for 20 seconds. Next, allow the flap to float back into position. Use wet sponges or blunt forceps to gently stretch the flap in the direction perpendicular to the striae. Be sure to avoid any damage to the epithelial surface of the cornea.

In this particular case, the maneuver should be minimal due to the freshness of the striae. Leave the flap alone for 3 minutes so that it may attach to the underlying stromal bed. Finally, place a soft contact lens in the eye for 24 hours to prevent the flap from direct eyelid contact. The soft contact lens facilitates flap adherence and hastens immediate epithelial healing, minimizing the occurrence of epithelial ingrowth.

This course of action should sufficiently eliminate striae and restore the quality of vision. Ideally, this complication should be avoided by paying meticulous attention to flap repositioning during the initial surgery. I suggest gently stroking the flap with a wet Merocel sponge (Medtronic Xomed, Jacksonville, Florida) in the direction opposite to the hinge after laser ablation and flap repositioning.

Ink markings made prior to flap creation greatly aid in realignment. Any asymmetry in the peripheral gutter width may indicate the potential development of flap striae after repositioning. Once repositioned, minimal flap manipulation is advised to reduce the risk of striae.

Postoperative management is crucial in LASIK, and patients must be instructed to not rub or squeeze his or her eye(s) and to wear eyeshields at night. Despite adequate surgical technique, postoperative eye rubbing or squeezing may cause flap striae, especially when the flap

is thin (ie, this case). Although the creation of thin flaps is recommended in thin corneas and/or for high myopic corrections to reduce the risk of ectasia, surgeons should routinely err on the side of thicker flaps, in my opinion. Given the 550- μ m preoperative corneal pachymetry, a 130- μ m flap may have provided greater stability, while leaving 420 μ m of underlying stromal thickness, which is more than adequate for the safe correction 5.50 D on a 7-mm zone. ■

Section editor A. John Kanellopoulos, MD, is a corneal and refractive surgery specialist. Dr. Kanellopoulos is director of Laservision Eye Institute, in Athens, Greece, and practices in New York. He is attending surgeon for the department of ophthalmology at the Manhattan Eye, Ear, and Throat Hospital in New York and clinical associate professor of ophthalmology at New York University Medical School. He states that he has no financial interest in the products or companies mentioned. Dr. Kanellopoulos is a member of the CRSTODAY EUROPE Editorial Board and may be reached at laservision@internet.gr or +30 21 07 47 27 77.



Jérôme C. Vryghem, MD, is from the Brussels Eye Doctors, in Brussels, Belgium. Dr. Vryghem is a member of the CRSTODAY EUROPE Editorial Board. He may be reached at j.c.vryghem@vryghem.be or +32 2 741 69 99.

Arthur Cummings, MB ChB, MMed(Ophth), FCS(SA), FRCS(Ed), is consultant ophthalmologist at the Wellington Eye Clinic, in Dublin, Ireland. He states that he has no financial interest in any of the products or companies mentioned. Mr. Cummings may be reached at abc@wellingtoneyeclinic.com or +353 1 660882.

Damien Gatinel, MD, is a cataract, corneal and refractive surgery specialist. He is an assistant professor at the Rothschild Ophthalmology Foundation and Bichat-Claude Bernard Hospital, in Paris. Dr. Gatinel is a member of the CRSTODAY EUROPE Editorial Board. He states that he has no financial interest in the products or companies mentioned. He may be reached at gatinel@aol.com or +33 1 48 03 64 86.



Tobias Koller, MD, is a refractive surgeon at the Institute of Ophthalmic and Refractive Surgery, in Zurich, Switzerland. He states that he has no financial interest in any of the products or companies mentioned. Dr. Koller may be reached at +41 43 4883800.

Theo Seiler, MD, PhD, is a professor at the Institute of Ophthalmic and Refractive Surgery, in Zurich, Switzerland. He states that he has no financial interest in any of the products or companies mentioned. Dr. Seiler may be reached at tseiler@zugseil.ch or +41 43 4883800.