

Loose Epithelium and Adherent LASIK Flap

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AND WILLIAM B. TRATTLER, MD

CASE PRESENTATION

A 34-year-old white woman presents for a refractive surgery evaluation. She has worn soft contact lenses without incident for 17 years. She denies any past medical or ocular history, and there is no family ocular history. She has no complaints of discomfort with contact lenses.

An examination reveals a BSCVA of 20/20 OU with -3.00 D sphere OD and -3.25 D sphere OS. The size of the scotopic pupil is 6 mm, and the corneal pachymetry measures 550 μm OU. A slit-lamp examination shows clear corneas and anterior segments. The fundus examination is unremarkable. The cycloplegic refraction is similar to the manifest refraction. Corneal topography shows a symmetric bowtie with minimal astigmatism in both eyes. The data on posterior surface elevation are normal.

After an informed consent discussion with the patient, the surgeon proceeds with customized laser vision correction using the 60-Hz Intralase FS laser (Abbott Medical Optics Inc, Santa Ana, CA). Creation of the right eye's flap is uneventful, with a planned thickness of 130 μm and a diameter of 9 mm. Prior to excimer laser ablation in the patient's right eye, the surgeon creates the left eye's flap with the same parameters. A small linear shadow is visible under the applanation plate, in the superonasal quadrant of the flap, prior to application of

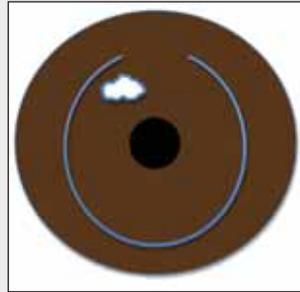


Figure 1. The superonasal quadrant of the LASIK flap was tightly adherent.

the laser pulse. Creation of the flap is allowed to continue, and there is no evidence of irregularity in the pattern of bubbles across the extent of the flap.

Lifting of the right eye's LASIK flap is routine, but the surgeon notes that the eye has loose epithelium paracentrally. After excimer ablation, he repositions the flap and places a bandage contact lens. In a similar fashion, the surgeon lifts the left eye's LASIK flap. Again, he observes loose epithelium paracentrally. When the surgeon approaches the superonasal quadrant, where the linear shadow was visible upon applanation, the flap is tightly adherent. Starting inferiorly, he can elevate the remainder of the flap but not past a 2 X 3-mm area superonasally (Figure 1).

What might have caused this complication? How would you proceed? Are there any steps you would have taken to avoid this situation?

ELIZABETH A. DAVIS, MD

The loose epithelium in both flaps and the buttonhole in the left eye suggest the presence of anterior basement membrane dystrophy (ABMD) that was either subclinical or overlooked. In ABMD, the aberrant basement membrane and abnormal hemidesmosomal attachments lead to loose epithelium that can be abraded readily by a microkeratome and even an applanation cone. The thickened basement membrane (seen as a small linear shadow) can interfere with the transmission of femtosecond laser energy and hence preclude the formation of a cleavage plane.

At this point in the surgery, the patient's right eye can be treated with the excimer laser beneath the flap, and a

bandage contact lens may be placed over the eye after the flap's replacement. The surgeon must be vigilant, however, for the development of localized diffuse lamellar keratitis in the area of abraded epithelium as well as a greater risk for epithelial ingrowth there.

The patient's left eye cannot be treated beneath the flap, because it cannot be lifted due to the buttonhole. The surgeon's options are (1) to replace the flap, place a bandage lens, and later perform PRK or (2) to immediately proceed with PRK. In either case, I would recommend the adjunctive use of mitomycin C (MMC) at the end of the ablation. Again, because of the loose epithelium, diffuse lamellar keratitis and epithelial ingrowth are possible.

All patients seeking laser vision correction should be screened for ABMD. A history of recurrent corneal erosions or fluctuating vision can sometimes be elicited. Because ABMD can cause irregular astigmatism, the BCVA may be less than expected for what appears to be an otherwise healthy eye. Keratometry may display irregular mires, and irregular astigmatism may be present on corneal topography. The presence of ABMD on slit-lamp examination is best discerned with retroillumination and a widely dilated pupil. In this case, the cysts, dots, and fin-gerlike maps are readily visible. In severe ABMD, a phototherapeutic keratectomy should be performed first in order to treat the irregular astigmatism and obtain a reliable refraction, WaveScan (Abbott Medical Optics Inc.), and topography. After 3 to 6 months of stability, PRK could be performed. In mild cases where BCVA is not affected and irregularity is minimal, the surgeon can proceed directly to PRK.

CLAYTON FALKNOR, MD, AND TERRY KIM, MD

A long-feared complication of LASIK is an abnormal flap (eg, a partial flap, a free cap, or a buttonhole). The literature contains many reports of such cases involving a mechanical microkeratome. As the use of a femtosecond laser to create the LASIK flap has become more popular, the incidence of abnormal flaps has decreased significantly; to our knowledge, there are no published reports of buttonhole flaps caused by a femtosecond laser. That is not to say, however, that no complications occur. Although rare, they include vertical gas breakthrough (subepithelial or transepithelial) with a loss of suction,¹ air bubbles in the anterior chamber,² macular hemorrhage,³ peripheral sterile corneal infiltrates,⁴ and transient light sensitivity syndrome.⁵

In the case presented, the linear shadow seen under the appplanation plane likely represented an area of folded, loose epithelium. As a result, the femtosecond laser pulse was unable to penetrate to the appropriate stromal depth with the expected laser energy during the raster phase in the one isolated area. Dissection was therefore incomplete in the plane of the flap at the superonasal quadrant.

We recently had a similar case. After using the 60-Hz Intralase FS laser to create the LASIK flaps in both of a patient's eyes, we noticed a 2.5 X 1.0-mm paracentral buttonhole in the second eye. The flap was not lifted and was allowed to heal. Several months later, we performed a transepithelial PRK using laser scraping, with the application of MMC 0.02%, in lieu of attempting to re-create the flap with the femtosecond laser. Three weeks after surgery, the patient was doing very well.

In 2003, Tekwani and Huang reported a 9.7% inci-

dence of intraoperative epithelial defects in eyes undergoing LASIK using a Hansatome microkeratome (Bausch + Lomb, Rochester, NY).⁶ The risk factors were increased age, greater preoperative corneal thickness, treatment of the second eye, and maintenance of the suction ring's vacuum during the microkeratome's reverse pass. At the ASCRS convention this year, Andrew Holzman, MD, reported that "every 10 years' increase in age is associated with a twofold increase in the risk of epithelial disruption."⁷

The patient described in the case presented had none of the aforementioned findings. Given the loose epithelium in both eyes intraoperatively, however, we have to wonder if the slit-lamp examination might have revealed an epithelial basement membrane dystrophy. This finding might have steered the surgeon toward performing PRK instead of LASIK.

WILLIAM B. TRATTLER, MD

When speaking with patients about LASIK, I believe it is important to mention that, rarely, problems with the flap may require the completion of the procedure on a different day. In this case, where the flap cannot be lifted safely, I would replace it and advise the patient that we will need to return on another day to complete the surgery.

Approximately 6 weeks later, I would perform an alcohol-assisted surface ablation procedure with MMC 0.02% applied for 12 seconds. A few days prior to the treatment, I would have the patient return for a final examination to confirm refractive stability. My final target refraction for a 34-year-old is typically +0.30 D. An additional consideration is that, when using MMC intraoperatively, I have found that I need to reduce my treatment by 10%. In this case, I would therefore target plano and expect the patient's postoperative refraction to be approximately +0.30 D.

Because the patient would undergo surface ablation rather than LASIK in her second eye, I would reset her expectations in regard to speed of visual recovery and postoperative discomfort. Overall, I would expect her to achieve a highly satisfactory visual result. ■

Editor's note: this article discusses the off-label use of MMC.

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