Flap lift and repair of postoperative laser in situ keratomileusis complications at the slitlamp

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We describe a technique to treat flap complications after laser in situ keratomileusis while seated at the slitlamp biomicroscope. After topical anesthesia is applied to the cornea, a blunt corneal spatula is used to reflect the flap only to the extent necessary for epithelial debridement. A corneal rake or spatula is then used to remove retained epithelial cells from the stromal bed and underside of the flap. The epithelium is then debrided 1.0 mm to 2.0 mm outside the flap gutter. The increased depth perception with a slit beam greatly improves visualization and identification of the presence of residual epithelial cells or leftover debris after scraping. The slit beam also aids in proper repositioning of the flap after the procedure.

Financial Disclosure: No author has a financial or proprietary interest in any material or method mentioned.

J Cataract Refract Surg 2010; 36:1069–1072 © 2010 ASCRS and ESCRS

Postoperative complications of laser in situ keratomileusis (LASIK) such as epithelial ingrowth,[1] diffuse lamellar keratitis,[2] interface debris, corneal striae,[3,4] and flap injury[5–7] may require intervention that involves lifting the LASIK flap. Removing epithelial ingrowth, repairing flap laceration, and repositioning the errant flap are common reasons for flap lifting.[1,6,7] Typically, the flap is refloated, scraped, and irrigated and epithelium removed under an operating room or laser microscope.[8,9] In certain cases, the use of a neodymium:YAG (Nd:YAG) laser has been reported to successfully treat interface epithelial ingrowth.[10]

While the ergonomics of a patient positioned prone under the surgical microscope are familiar to all surgeons, the lighting from the laser microscope and the decreased depth perception with overhead microscopes compared with that from a slit beam (with its manifold variations on width and angulation) may limit visualization and precise flap repositioning. Overhead microscopes may also hinder identification of leftover debris under the flap or the presence of residual epithelial cells after the stromal bed and stromal underside of the flap have been scraped.[9]

To manage these complications, we performed flap elevation and repair under topical anesthesia with the patient positioned at the slitlamp biomicroscope, avoiding a return to the operating room. We report our results with slitlamp repair of late-onset complications of LASIK surgery.

SURGICAL TECHNIQUE

Topical proparacaine is applied for anesthesia. Povodone–iodine is used to prepare the eye, and a stainless-steel lid speculum is placed in the eye. The patient is seated at the slitlamp; an assistant may be helpful to maintain the patient's head position during the procedure. The flap margin is identified by slitlamp biomicroscopy. A blunt flap elevator (eg, Machat LASIK retreatment spatula, ASICO) is used to lift and reflect the flap to the extent necessary for epithelial debridement (Figure 1, *A*). The whole flap does not have to be elevated. The epithelial side of the partially reflected flap commonly adheres to the unexposed corneal surface, providing visibility to the surgical field (Figure 1, *B*). If the flap does not remain adherent, a 2-handed technique is used to maintain the flap position.

The surface is then examined by slitlamp under high magnification for islands of epithelial cells or interface debris. More extensive undermining of the flap can be performed if necessary to further expose underlying stroma. Mechanical debridement of epithelium from

Submitted: September 16, 2009.
Final revision submitted: February 25, 2010.
Accepted: February 27, 2010.

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Figure 1. *A*: Flap lifter initiating elevation in area to be treated. *B*: The LASIK flap reflected back and adherent to surface while the corneal rake is used to scrape the stromal bed. Only the flap area with epithelium ingrowth has to be elevated. *C*: Higher magnification image of the corneal rake.

the stromal bed and underside of the flap is performed using the bent portion of the Machat spatula or a corneal rake (Impex Surgical) to peel and remove any epithelial ingrowth (Figure 1, *C*). The enhanced visibility using the slit-beam lighting assists in fastidious and complete removal of cells and debris. This is contrary to the often difficult assessment of the stromal bed or inner flap when the operating microscope is used.

The underside of the flap can be scraped using the spatula of the rake, drawing it along the stromal surface. The epithelium is then debrided 1.0 mm to 2.0 mm outside the flap gutter. Balanced salt solution on a cannula can be used to wet the surface of the flap after debridement. The flap is then repositioned in the stromal bed using the spatula. A wet cellulose sponge is used to smooth and refine the flap position. The flap is allowed to dry for 60 to 90 seconds. It is observed for an additional 30 seconds at the slitlamp biomicroscope prior to removing the lid speculum to ensure proper removal of all epithelial cells. After the procedure, the eye is treated with topical antiobiotic and corticosteroid agents 4 times daily for 1 week.

Results

Seven eyes of 6 patients were treated for clinically significant epithelial ingrowth or traumatic flap dislocation following uneventful mechanical microkeratome LASIK (Table 1). Six eyes required flap lift because of postoperative epithelial ingrowth and 1 eye, because of traumatic flap dislocation. Informed consent was obtained from all patients.

All procedures were performed by the same surgeon (R.S.K.). The patients tolerated the procedure well; none required a return to the operating room or repeat surgical intervention. No intraoperative or postoperative complications were experienced. Epithelial ingrowth did not recur during the follow-up period. All eyes achieved a final uncorrected distance visual acuity (UDVA) of 20/20.

Representative Case Histories

A 34-year-old man who had uneventful bilateral LASIK at an outside institution 4 years prior to presentation was struck in the right eye with barbed wire while working without eye protection. By history, the UDVA was equal in both eyes before the trauma. The patient presented to the emergency room of a community hospital on the day of injury with a chief complaint of pain and decreased vision in the right eye. Corneal abrasion was diagnosed, and the patient was discharged on gentamicin ophthalmic ointment. On referral to our institution 48 hours after the injury, the UDVA was 20/200 and the LASIK flap in the right eye was dislocated from 5 o'clock to 10 o'clock, with the flap folded on itself. The exposed stromal bed in the inferotemporal quadrant had epithelialized and did not stain with fluorescein. Epithelial ingrowth was noted to extend into the flap–stromal interface. The flap hinge appeared to be intact. Four days after the trauma, slitlamp repair of the injury was performed: flap lifting, epithelial debridement of the stromal interface and underside of the flap, and flap repositioning, as described. One day after repair, the UDVA was 20/30 and the flap was noted to be flat and in place, with no epithelial debris in the flap–stromal interface. By 2 weeks, the UDVA had returned to 20/20 but trace subepithelial haze remained inferiorly.

A 42-year-old man with myopia (−2.00 right eye, −1.75 left eye) had uneventful noncustomized LASIK in both eyes using a mechanical microkeratome with an 8.5 mm ring. Ablation was performed with an optical zone of 5.5 mm and a transition zone of 7.0 mm. Six years later, uneventful flap lift and enhancement were performed in both eyes to correct residual myopic astigmatism. Epithelial ingrowth was noted under both flaps and extended close to the visual axis within 3 weeks of enhancement. Subsequent to the enhancement, the patient complained of fluctuating and blurry