Traumatic Corneal Flap Dislocation
Four Years after LASIK
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Abstract

Purpose: To report occurrence, management, and outcome of late-onset traumatic dislocation of laser in situ keratomileusis (LASIK) flaps

Case report: We report a patient with late-onset LASIK corneal flap dislocation after blunt ocular trauma occurring four years after surgery. An ultrasound biomicroscopy (UBM) was performed to view the status of flap and determination of flap thickness.

Results: Repositioning of the flap was performed in the operation room. During repositioning, the surface of the bed was debrided and deepithelialized, then the dislocated flap was floated into position with the aid of an iris spatula. A bandage contact lens was placed and topical antibiotic and corticosteroids were given postoperatively. The dislocated corneal flaps were successfully repositioned. After 3 months, the uncorrected visual acuity (UCVA) was 20/30 and the best corrected visual acuity (BCVA) was 20/25 with a refraction of +0.25-0.5×10.

Conclusion: LASIK corneal flaps are vulnerable to traumatic dehiscence and dislocation. UBM is a useful and easy to perform technique and show the anatomical status of the flaps.

Keywords: Laser in Situ Keratomileusis, Flap Dislocation, Ultrasound Biomicroscopy

Introduction
Laser in situ keratomileusis (LASIK) is one of the most frequently performed procedures in refractive surgery. The postoperative complications after LASIK are usually divided into those presenting within the first few days after surgery (early) and those presenting weeks to months after surgery (late). Late postoperative complications include flap dislocation, epithelial ingrowth, stromal melts, irregular astigmatism, keratectasia, and dry eyes. Late flap dislocations are those that occur more than one week after surgery. Several reports have documented the trauma as a cause of late dislocation of the corneal flap. Traumatic flap dislocations could be in association with high velocity blunt ocular trauma as well as minor injuries.
High-resolution ultrasound biomicroscopy (UBM; 50–100 MHz) is an excellent echographic method for the examination of the anterior part of the eye. This examination is noninvasive, repeatable, and suitable for diagnostic and morphometric examinations. This technique is able to resolve flap from the residual stromal bed.

We describe the occurrence, management, and visual outcome of a patient with severe, late-onset traumatic flap dislocation who attended 3 weeks after trauma. We also describe the use of UBM for diagnosis and determination of flap thickness.

**Case report**

A 31-year-old man referred to our clinic due to traumatic flap dislocation 3 weeks after trauma. He had undergone uneventful LASIK for refractive errors of $-3.00-0.50 \times 5$ in the right eye and $-2.75-1.50 \times 155$ in the left 55 months ago. On presentation, his refraction was plano in the right eye, with a uncorrected visual acuity (UCVA) of $20/20$, and irregular astigmatism in the left, with a UCVA of $20/200$. The LASIK flaps were created with a superior hinge. He had a blunt trauma with a shovel to his left eye 3 weeks ago. The flap had macrostriae in the interface in slit-lamp examination (Figure 1). Significant debris was embedded in the interface and the bed was reepithelialized. His anterior chamber had no cell and flare. A UBM was performed to view the status of flap and it showed alternate hypo- and hyper-reflective echoes in the superficial stroma indicating striae under flap (Figure 2).

Repositioning of the flap was performed in the operation room. During repositioning, the surface of the bed was debrided and deepithelialized, the dislocated flap was floated into position with the aid of an iris spatula. One day postoperatively, the patient had 1+ Descemet’s folds and no cell and flare. There were no striae under the flap. The UCVA was $20/60$ and best corrected visual acuity (BCVA) was $20/30$ with a refraction of +1.00-0.75×20. The patient was treated with topical steroids and ciprofloxacin eyedrops and a topical lubricant. After 3 months, UCVA was $20/30$ and BCVA was $20/25$ with a refraction of +0.25-0.5×10 (Figure 3).

Figure 1. Slit-lamp examination of patient at presentation showing macrostriae in the interface.

Figure 2. UBM of patient at presentation showing alternate hypo- and hyper-reflective echoes in the superficial stroma indicating striae under flap.

Figure 3. Slit-lamp examination of patient 3 months after surgery. The macrostriae have been disappeared completely.
Discussion

Late-onset flap dislocations - occurring weeks to months after surgery - are rare in comparison to early-onset flap dislocations that can occur in as many as 1% to 2% of cases within 1 to 2 days after surgery. A displaced or subluxated flap is an emergency. The goal of early flap repositioning is to prevent possible formation of fixed folds and epithelial ingrowth. The flap should be lifted and its undersurface and the stromal bed thoroughly examined for epithelial cells and debris. Three to four minutes of drying time should be allowed to ensure good adherence.

Patients undergoing LASIK are often active individuals who are at risk for ocular trauma. As LASIK has increased in popularity to correct refractive errors, cases of traumatic flap injuries can be expected to become more common. Sridhar et al found reports of 26 cases of late-onset LASIK flap dislocations in the literature, occurring between 10 days and 38 months after surgery and the mechanisms of trauma included the eye being struck with a basketball, football, edge of a paper bag, finger, dog’s paw, bird beak, snowball, rock, automobile airbag, cable, gun spring, tree branch, shoetip, pecan falling from a tree, unknown minor trauma, accidental self-removal of flap, and flap displacement associated with corneal epithelial debridement during vitrectomy. Studies on rabbits indicate that irregular corneal stromal regeneration occur at the wound margins. Similar results have been reported in human eyes, where the stromal bed surface and undersurface of the corneal flap were found to be free from cellular response or collagenase activity.

The visual prognosis of early flap subluxation has been reported to be good. A displaced or subluxated flap should be considered an emergency. The flap should be repositioned as early as possible to prevent formation of fixed folds and epithelial ingrowth. The flap should be lifted and its undersurface and the stromal bed thoroughly examined for epithelial cells and debris. Three to four minutes of drying time should be allowed to ensure good adherence. Application of a contact lens for a few days can provide added protection against further displacement. In a completely detached flap, repositioning might be difficult once the surgical landmarks are lost and such situations may warrant suturing of the flap.

We performed a UBM scan before repositioning of the flap that clearly showed striae under the flap. UBM scan is useful to evaluate anatomical status of flap, classify type of striae and determine which case needs treatment; a challenge for the ophthalmologist. Moreover, UBM is useful and easy to perform, offering more opportunities for diagnosis the anatomical changes in LASIK flap dislocation occurred after trauma. Mannino et al showed that UBM data in a case of traumatic flap dislocation were similar to histological and ultrastructural confoscan. Its features with modest variation were still evidenced in the following months.

Conclusion

Flap dislocation as a potential late complication should be discussed as part of informed consent prior to surgery, specially for patients at higher risk for blunt trauma from occupational situations (eg, in sports specially rugby players or military personnel). However, we can successfully treat this condition if needed. As showed, we can perform UBM scan to study anatomical status of the flap and flap thickness and also to determine which patient needs treatment.

References