Traumatic Epithelial Ingrowth Despite Non-Displaced Lasik Flap

Abstract
A 50-year-old female developed significant aggressive epithelial ingrowth after a minor corneal abrasion to her left eye, which required surgical removal. On presentation, she exhibited no signs of corneal flap manipulation or displacement. This report exemplifies the latest presentation of traumatic epithelial ingrowth from initial LASIK surgery and the only case without flap displacement, emphasizing the need for close follow-up and examination of all LASIK patients even after minor trauma.

Keywords: LASIK; Epithelial ingrowth; Laser assisted in-situ keratomileusis;

Abbreviations: LASIK: laser assisted in-situ keratomileusis; UCVA: uncorrected visual acuity; DLK: diffuse lamellar keratitis; OCT: optical coherence tomography

Introduction
Most patients undergoing laser in situ keratomileusis (LASIK) recover without issue. In certain cases, however, postoperative complications may threaten vision unless treated properly. One of these complications, corneal epithelial in growth, often occurs in the first day of 1-2% of LASIK cases [1]. Epithelial cell growth may encroach on the visual axis, impairing vision. These patients may develop corneal melt leading to permanent vision loss if not treated appropriately [2]. The formation of a corneal flap by LASIK leaves a potential space between the flap and the stroma. Etiologies for epithelial ingrowth are twofold: (1) cellular replication after introduction to the interface of the flap from the corneal periphery via cutting, lifting, or flap manipulation and (2) cellular migration from the flap border after surgery [3]. Risk factors for epithelial ingrowth include multiple LASIK procedures and hyperopic correction as opposed to myopic correction [4]. Case reports of traumatic incidents that have disrupted the corneal flap have also been reported, inducing epithelial ingrowth and the patient's vision was still 20/20 in both eyes. In the right eye. The affected left eye was 20/40, improving to 20/25 on pinhole. The conjunctiva was mildly injected. Slit lamp examination revealed minimal corneal abrasion of the epithelium temporally at 3 o'clock surrounded by mild corneal edema. The flap was intact, in place, and its edges were uninvolved. The rest of the eye exam was within normal limits. The patient was started on tobramycin/dexamethasone ophthamlic drops and was asked to return in 1 week.

During the patient's next visit, she described no discomfort and reported vision improvement and symptom resolution. She displayed UCVA of 20/20 in the right eye and 20/25 in the left eye. On slit lamp examination, her left eye exhibited resolution of the corneal abrasion and edema. There was, however, corneal haze noted in the interface directly under the area of the injury that extended toward the visual axis. The flap was still intact. Because of concern for disseminated lamellar keratitis (DLK), prednisolone acetate ophthamlic drops were prescribed for every two hours and the patient was referred to a refractive surgeon. Five days later, UCVA was 20/20 in her left eye. Slit lamp examination demonstrated significant epithelial ingrowth under the mid periphery of the flap with direct extension into the visual axis, preserving a clear zone of interface temporally toward the edge of the flap (Figure 1).

Because of significant epithelial organization and imposing threat to the visual axis, the ingrowth was surgically removed. After procedural consent, the flap was lifted after marking the forward edge with a pen. The ingrowth, which extended to the temporal edge of the visual axis, was then peeled away in one piece. After irrigation and careful inspection, the flap was then replaced (Figure 2). The patient was prescribed ofloxacin and prednisolone acetate drops and was instructed to return for reevaluation in one day. She returned with a clear visual axis and a smooth flap. One month later, there was no return of epithelial ingrowth and the patient's vision was still 20/20 in both eyes.
Discussion

LASIK permanently changes the inherent anatomy of the cornea. Once a patient undergoes LASIK surgery, the cornea heals exclusively at the periphery of the microkeratome wound away from the visual axis, thereby leaving a persistent potential space under the flap. Even years after LASIK, only minimal adhesions may hold the flap to the stroma, leaving the rest of the interface patent and predisposing the flap to displacement after trauma [6]. Figure 3 describes reported cases of traumatic LASIK flap epithelial ingrowth. Mean patient age was 36 and the female to male ratio was 1:0.67. Five cases in the series were caused by finger sticks to the eye and three were from a twig or branch. Seventy percent experienced full recovery of their vision; thirty percent of patients’ visual deficits remained, despite improvement. Two cases did not require debridement of epithelial ingrowth; one case in the series involving corneal perforation mandated penetrating keratoplasty. Our case is the latest-onset of traumatic epithelial ingrowth, 15 years after initial LASIK, and the only case without flap displacement [5-21].

In the current case, epithelial ingrowth resolved on slit lamp exam after flap lift, debridement, and drop treatment; visual symptoms did not return. How the epithelial cells were introduced under the corneal flap remains unclear. Traumatic crystalline foreign bodies at the LASIK flap interface without flap displacement has been reported. Choi postulated that a sharp, high velocity, but weak ocular trauma could open the potential stromal space and leave debris without displacing the flap [20]. We speculate a similar mechanism occurred with this patient or that the twig may have microscopically penetrated to the interface, implanting surface epithelial cells into the potential space. Cellular proliferation may have given the patient their presenting symptoms. Although corneal slit lamp examination is the standard for detecting epithelial ingrowth, anterior segment optical coherence tomography (OCT) may be a useful diagnostic tool. OCT may evaluate corneal structure changes related to disease before surgical debridement [21]. After treatment, careful monitoring with close follow-up in these patients is necessary. Higher rates of recurrence even after surgical debridement have been reported [22].

Post-traumatic epithelial ingrowth introduces cells into the corneal flap interface and corneal disturbance is observed. In this report, however, epithelial ingrowth occurred beneath the flap without any sign of disruption. This report exemplifies the need for close follow-up and examination of all LASIK patients even after minor trauma, since corneal anatomy is indefinitely altered. Ophthalmologists should educate patients on epithelial ingrowth as a post-operative complication and carefully monitor patients for signs, regardless of observed flap disruption or distant chronology from the initial LASIK procedure.

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Figure 3: Cases of Traumatic LASIK Flap Epithelial Ingrowth. This case study is the latest-onset from initial LASIK and the only case without flap displacement.

References
