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Traumatic Epithelial Ingrowth Despite Non-Displaced Lasik Flap

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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.

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 ingrowth, 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, in one case, ingrowth was delayed 14 years after initial LASIK [5]. There are no reports of epithelial ingrowth after LASIK without corneal flap displacement. We report a case of epithelial ingrowth after minor corneal abrasion without manipulation or displacement of the LASIK flap 15 years after surgery.

Case Background

A 50-year-old woman with a history of LASIK 15 years ago presented to the emergency room after poking her eye with a twig in her garden. Physical exam demonstrated a corneal abrasion of the left eye. The patient was asked to follow up with her ophthalmologist the next morning. Ophthalmology evaluation demonstrated an uncorrected visual acuity (UCVA) of 20/20 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 a 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 unremarkable. The patient was started on tobramycin/dexamethasone ophthalmic 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 ophthalmic 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 moderate epithelial ingrowth under the midperiphery of the flap with direct extension towards the visual axis, preserving a clear zone of interface temporally toward the edge of the flap (Figure 1).

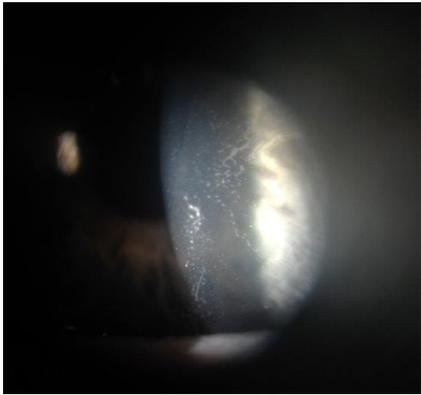


Figure 1: Slit lamp photograph of left cornea demonstrating epithelial ingrowth under the midperiphery of the LASIK flap with direct extension into the visual axis.

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).

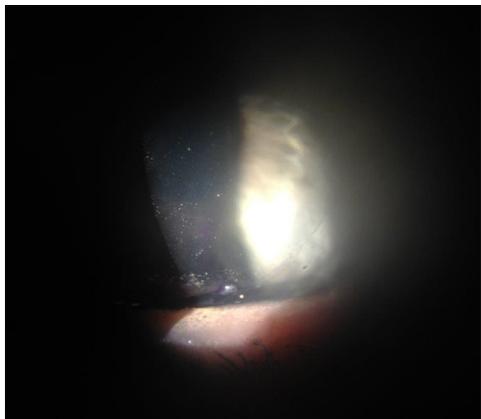


Figure 2: Slit lamp photograph of left cornea after surgical debridement of epithelial ingrowth and subsequent flap replacement.

The patient was prescribed ofloxacin and prednisolone acetate drops and was instructed to return for re-evaluation 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].

Table 1 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 [5-19, 20].

In the current case, epithelial ingrowth resolved on slit lamp exam after flap lift, debridement, and drop treatment; her initial symptoms of blurry vision 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 [21]. 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. 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.

Table 1: Cases of Traumatic LASIK Flap Epithelial Ingrowth.

Author	Year Published	Patient Age	Sex	Time after LASIK	Eye	Etiology	Flap Displacement	VA, Before	Treatment	VA, After
Lemley	2000	37 Yo	F	17 m	OS	Airbag	Yes	20/100	Debridement	20/20
Leung	2000	50 Yo	F	1 y	OS	Bird beak	Yes	20/400	Debridement	20/30
Melki	2000	28 Yo	M	10 d	OS	Basketball	Yes		Flap Replacement	20/30
Melki	2000	21 Yo	M	24 d	OD	Fingernail	Yes	4/200	Debridement	20/20
Aldave	2001	29 Yo	M	18 m	OD	Fingernail	Yes	20/200	Debridement	20/40
Patel	2001	28 Yo	F	10 m	OS	Fingernail	Yes	20/200	Debridement	20/40
Sun	2001	26 Yo	M	10 m	OD	Stone	Yes		Penetrating Keratoplasty	20/20
Mifflin	2002	37 Yo	M	3 y	OS	Tree branch	Yes	20/40	Debridement	20/20
Booth	2003	38 Yo	M	30 m	OS	Football	Yes	20/25	Debridement	20/20
Srinivasan	2004	23 Yo	F	4 y	OD	Fingernail	Yes	20/400	Flap Replacement	20/20
Cheng	2006	23 Yo	M	7 y	OS	Fingernail	Yes	20/70	Debridement	20/20
Cheng	2006	33 Yo	F	1 y	OS	Broom stick	Yes	CF	Debridement	20/20
Cheng	2006	38 Yo	F	2 y	OD	Folder	Yes		Debridement	20/25
Yeh	2006	50 Yo	F	21 m	OD	Bush Twig	Yes	20/200	Debridement	20/70
Kim	2010	29 Yo	M	9 y	OS	Dog paw	Yes	CF	Debridement	20/25
Moshirfar	2011	48 Yo	F	7 y	OS	Iron Cord	Yes	20/40	Debridement	20/20
Holt	2012	59 Yo	F	14 y	OS	Blunt wooden block	Yes	20/30	Debridement	20/20
Lovieno	2012	45 Yo	F	2 y	OD	Cupboard door	Yes	20/40	Debridement	20/20
Sinha	2014	26 Yo	F	4 y	OS	Wooden Splinter	Yes	20/60	Debridement	20/20
Aboumerhi	2015	50 Yo	F	15 y	OS	Twig	No	20/40	Debridement	20/20

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