Successful delayed surgical treatment of long-standing and late-onset epithelial ingrowth

Aeri Yoo, MD, Myoung Joon Kim, MD

Twelve years after receiving laser in situ keratomileusis, a 34-year-old man presented with blurred vision and photophobia from a tree branch–related injury 3 years earlier. Examination showed flap dehiscence and severe epithelial ingrowth; surgical treatment was planned. During the procedure, the flap was lifted, epithelial cells were removed, the flap was repositioned, and a suture was placed. After 11 months, no epithelial ingrowth was present and the uncorrected distance visual acuity was 20/20. To our knowledge, this case represents the longest known interval between traumatic flap dehiscence and surgical removal of epithelial ingrowth.

Financial Disclosure: Neither author has a financial or proprietary interest in any material or method mentioned.

Laser in situ keratomileusis (LASIK) refractive surgery is widely performed in a successful manner. It results in greater comfort and faster visual recovery than surface ablations but requires the creation of a stromal flap. Early flap dislocation occurs in 1% to 2% of patients after LASIK and has been reported in a large case series.1,2 Late flap dislocation (more than 1 week postoperative) is more rare.3 Many cases of late epithelial ingrowth related to late flap dislocation have been reported. We report a case of trauma-related late epithelial ingrowth 12 years after LASIK. The case is notable for having the longest known interval from injury to repair, as the epithelial ingrowth was not originally considered treatable.

We used a surgical approach to remove the severe epithelial ingrowth.

CASE REPORT

A 34-year-old man visited our clinic complaining of gradually blurring vision in his left eye from a tree branch–related injury 3 years earlier. Bilateral LASIK had been performed at another clinic 9 years previously, and good visual acuity was preserved before the trauma. At LASIK surgery, the microkeratome was used to create the corneal flap. After the injury, the patient experienced blurred vision and photophobia. A primary care clinic diagnosed corneal abrasion and prescribed a topical antibiotic. The pain was relieved, but the photophobia and blurred vision persisted. At the first visit, there was some epithelial ingrowth in 2.0 mm of the LASIK flap (Figure 1, A and B). Topography analysis showed no severe irregularity (Figure 1, C). It was decided to observe the patient because the uncorrected distance visual acuity (UDVA) was 20/20 and the lesion was located in 2.0 mm of the LASIK flap.

Two years later, the patient revisited our clinic with persistent photophobia and blurred vision. The UDVA was 20/20 in the affected eye. By slitlamp examination, a 3.5 mm × 2.7 mm central cystic-like lesion was observed (Figure 2, A and B). The initial epithelial ingrowth lesion had progressed compared with the lesion in the previous anterior segment photograph (Figure 2). By topography, the irregular astigmatism had increased (Figure 2, C).
Anterior segment Fourier-domain optical coherence tomography (OCT) showed a stromal layer, including epithelium. The depth of the epithelium was 372 μm (Figure 3, A). The normal stromal depth beneath the lesion was 410 μm (Figure 3, B). Considering the progression of the epithelial ingrowth lesion, the patient elected to proceed with a surgical flap lift and epithelium removal.

Surgical repair was performed under topical anesthesia by 1 of the authors (M.J.K). Video 1 (available at http://jcrsjournal.org) illustrates the procedure. Approximately 200 degrees of the LASIK flap was separated and reflected using an incisional spatula. However, tight integration between the stroma and the LASIK flap made lifting the edge difficult and it was only partially achieved. Epithelium was present on the underside of the flap as well as on the stromal bed. Therefore, the surface epithelium overlying the flap and at the flap edge was denuded with a stainless steel blade. The epithelial ingrowth was then scraped and wiped from the stromal interface and the underside of the LASIK flap. Final floating and positioning of the flap was performed using profuse irrigation with a balanced salt solution. After gentle smoothing with a moistened sponge, the flap was in a good position and 10-0 nylon sutures were added. A bandage contact lens soaked in moxifloxacin 0.5% was placed and a protective shield applied. There were no intraoperative complications. Topical prednisolone acetate 1.0% and levofloxacin 0.3% were started 3 hours after surgery.

A good flap position was noted on the first postoperative day. After 7 days, the UDVA was 20/40 and the bandage contact lens was removed. After 1 month, the UDVA was 20/20 and the sutures were removed. Topical medications were discontinued. At the final visit 11 months after the procedure, the UDVA was 20/20 and there was no evidence of recurrent epithelial ingrowth. Slitlamp examination showed a mild infiltration, but there was no epithelial ingrowth or flap striae (Figure 4, A) and the topography had improved (Figure 4, B).

DISCUSSION

Laser in situ keratomileusis is preferred by many clinicians because of the rapid recovery of vision and reduced postoperative discomfort. However, the corneal flap that is made during the procedure can lead to epithelial ingrowth. Early flap dislocation 1 to 2 days after surgery is a well-known complication, with a reported incidence of 1% to 2%. Late flap dislocation from trauma occurring several years after LASIK has also been reported. The interval between LASIK to flap dislocation ranges from...
10 days to 14 years. In most cases, short intervals between flap dislocation and surgical repair have been reported, although treatment delays (ranging from 5 to 8 months) have also been reported. Our case was notable not only for the late development of epithelial ingrowth, but also for the prolonged interval between trauma and surgical repair, which occurred 3 years after the patient was injured with a sharp tree branch. Delayed repair in this case was related to an initial diagnosis of corneal epithelial abrasion by a primary care provider. Our clinic diagnosed late-onset epithelial ingrowth at the first visit. However, observation is the standard treatment for epithelial ingrowth until the lesion interrupts the vision. At the time of the original diagnosis, the patient’s UDVA was normal and we decided to place the patient under observation. This delay in diagnosis likely contributed to the additional complications of flap macrostriae and epithelial ingrowth.

We conclude from this that it is imperative to perform regular follow-up for any sign of growth-related melting of the flap. Epithelial cells may block aqueous diffusion, compromising the nutrition of the flap. Also, migrating epithelial cells may produce proteolytic enzymes that further contribute to stromal melting of the flap. Fortunately, in our patient, the epithelial ingrowth had not spread but was localized, similar to a cyst. The tight integration between the stroma and the LASIK flap that was found during the operation might have acted as a barrier preventing diffuse spread. This effect might be due to the long period between LASIK and the inciting trauma.

In conclusion, we believe that our case represents the longest known interval from trauma to surgical repair, which had caused severe epithelial ingrowth complications. This case also represents the second longest reported interval between LASIK and traumatic epithelial ingrowth. As refractive surgeons, we must make an effort to inform primary care and emergency department physicians that refractive surgery patients are at a greater risk for significant complications following ocular trauma. Additionally, all refractive patients should be advised to seek subspecialty care following any significant ocular trauma to prevent delay in diagnosis and minimize possible complications.
REFERENCES

1. Gimbel HV. Flap complications of lamellar refractive surgery [editorial]. Am J Ophthalmol 1999; 127:202–204
2. Lin RT, Maloney RK. Flap complications associated with lamellar refractive surgery. Am J Ophthalmol 1999; 127:129–136
3. Holt DG, Sikder S, Mifflin MD. Surgical management of traumatic LASIK flap dislocation with macrostriae and epithelial ingrowth 14 years postoperatively. J Cataract Refract Surg 2012; 38:357–361
4. Sugar A, Rapuano CJ, Culbertson WW, Huang D, Varley GA, Agapitos PJ, de Luise VP, Koch DD. Laser in situ keratomileusis for myopia and astigmatism: safety and efficacy; a report by the American Academy of Ophthalmology (Ophthalmic Technology Assessment). Ophthalmology 2002; 109:175–187
5. Kim HJ, Silverman CM. Traumatic dislocation of LASIK flaps 4 and 9 years after surgery. J Refract Surg 2010; 26:447–452
6. Solomon R, Donnenfeld ED, Perry HD, Nirankari VS. Post-LASIK corneal flap displacement following penetrating keratoplasty for bullous keratopathy. Cornea 2005; 24:874–878
7. Srinivasan M, Prasad S, Prajna NV. Late dislocation of LASIK flap following fingernail injury. Indian J Ophthalmol 2004; 52:327–328. Available at: http://www.ijo.in/text.asp?2004/52/4/ 327/14559. Accessed November 11, 2015
8. Jin GJC, Merkley KH. Laceration and partial dislocation of LASIK flaps 7 and 4 years postoperatively with 20/20 visual acuity after repair. J Refract Surg 2006; 22:904–905
9. Davies JB, Randleman JB. Successful delayed surgical revision of a dislocated LASIK flap. Ophthalmic Surg Lasers Imaging 2008; 39:221–224
10. Yeh DL, Bushley DM, Kim T. Treatment of traumatic LASIK flap dislocation and epithelial ingrowth with fibrin glue. Am J Ophthalmol 2006; 141:960–962
11. Ramírez M, Quiroz-Mercado H, Hernandez-Quintela E, Naranjo-Tackman R. Traumatic flap dislocation 4 years after LASIK due to air bag injury. J Refract Surg 2007; 23:729–730
12. Cheng ACK, Rao SK, Leung GYS, Young AL, Lam DSC. Late traumatic flap dislocations after LASIK. J Refract Surg 2006; 22:500–504
13. Stulting RD, Carr JD, Thompson KP, Waring GO III, Wiley WM, Walker JG. Complications of laser in situ keratomileusis for the correction of myopia. Ophthalmology 1999; 106:13–20
14. Nilforoushan M-R, Speaker MG, Latkany R. Traumatic flap dislocation 4 years after laser in situ keratomileusis. J Cataract Refract Surg 2005; 31:1664–1665
15. Kim JS, Chung B, Lee T, Kim WC, Kim TI, Kim EK. Management of long-standing partially torn and flipped laser in situ keratomileusis flaps. J Cataract Refract Surg 2015; 41:464–467
16. Zhang R, Jhanji V, Sun L, Zhang M. Spontaneous resolution of delayed epithelial ingrowth after LASIK. Eye Contact Lens 2013; 39:400–401

First author:
Aeri Yoo, MD
Department of Ophthalmology, Ulsan University College of Medicine, Asan Medical Center, Seoul, Korea