Giant Epithelial Ingrowth Induced by Blunt Injury after Automated Lamellar Keratoplasty

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Abstract: Epithelial ingrowth may develop after automated lamellar keratoplasty due to traumatic wound disruption. It can be treated with flap relifting, removal of the epithelial sheet, and repositioning the flap with anti-torque suture. The right eye of a 37-year-old woman was treated during automated lamellar keratoplasty for myopia 6 years prior to her presentation after suffering a blunt striking injury involving her infant son's hand. Epithelial ingrowth from flap edge was found 2 weeks later and progressed to 6 × 6 mm in size with deterioration of visual acuity. This condition was treated with flap lifting and scraping of the epithelial tissue at the flap-stroma interface, and by application of 50% alcohol. An anti-torque corneal suture was used for augmented repositioning and then removed after 2 weeks. One month after treatment, best corrected visual acuity was 20/20 in her right eye, and there was no more ingrowth tissue noted. Giant epithelial ingrowth may occur subsequent to automated lamellar keratoplasty and cause catastrophic flap complications. The flap can be saved by immediate and proper management.

Key words: Epithelium, corneal; Eye injuries, complications; Keratoplasty, penetrating; Myopia; Postoperative complications

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Epithelial ingrowth is a relatively uncommon complication of refractive surgery. It has a low 2.2% incidence rate following refractive surgery, probably due to its self-limited nature.[1–3] Progressive epithelial ingrowth most often originates from the epithelial defect and is associated with incomplete flap adhesion.[2,3] Pronounced epithelial ingrowth from flap edge may induce astigmatism, cause significant loss of vision, and result in melting of flap.[2] Early recognition of epithelial ingrowth allows for appropriate monitoring and when required, intervention. In automated lamellar keratoplasty (ALK) for myopia, a microkeratome is also used to first create a flap, and then to make a mechanical cut in the stromal bed to correct the refractive error.[4] Epithelial ingrowth has been reported in ALK, but is often self-limited due to early recognition and treatment.[5] We report an unusual case of giant epithelial ingrowth without flap melting after ALK. The successful restoration of vision was achieved by a conventional method.

Case Report

A 37-year-old woman underwent bilateral ALK for myopia at another hospital 6 years prior to this visit. The initial manifest refraction was –6.0 D with best corrected visual acuity of 20/20 in both eyes. The postoperative course was uneventful, and uncorrected visual acuities were 20/20 in both eyes. She suffered from a striking injury to the right eye involving her 6-month-old son's hand in April 2003. Corneal abrasion was diagnosed at a local clinic and pressure patching was performed.

Two weeks later, she visited our clinic and complained of blurred vision in the right eye. Visual acuity was 20/100 OD and was corrected to 20/25 with +1.00 D cyl –4.75 D × 175°. Slit lamp examination demonstrated an epithelial ingrowth from the upper edge of the nasal hinge flap continuous with the surface epithelium (Fig. 1A). Corneal topography revealed irregular astigmatism. Removal of this epithelial ingrowth was suggested due to impending involvement of visual axis.

However, the treatment was interrupted because the patient was afraid to visit our hospital due to the outbreak of severe acute respiratory syndrome in Taiwan. Her vision deteriorated to 20/400 OD and could not be corrected when she returned to our clinic in December 2003. Epithelial tissue was growing from the upper temporal edge of the flap on the right eye to a size of 6 × 6 mm, which was obscuring the

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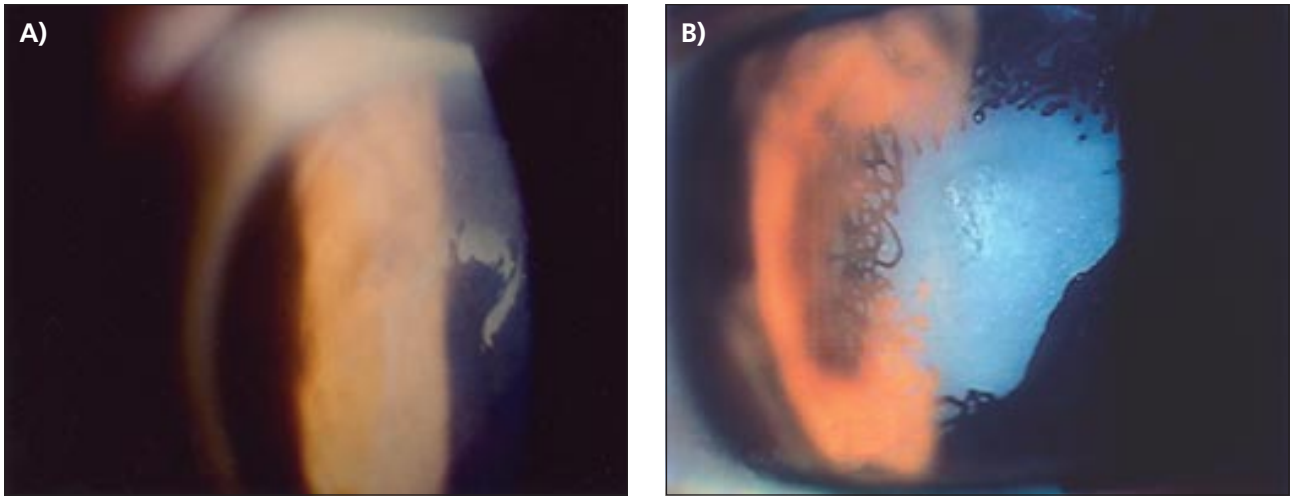

Fig. 1. A) Epithelial ingrowth 6 years after automatic lamellar keratoplasty. B) A 6 × 6 mm sized epithelial ingrowth encroaches on the visual axis after 8 months.

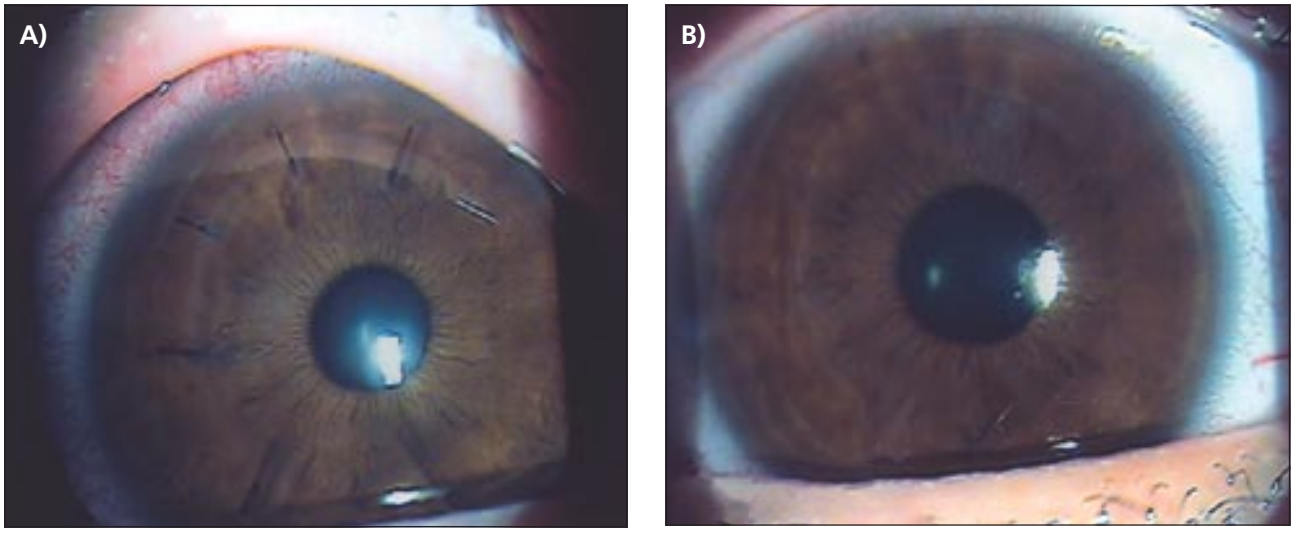

Fig. 2. A) Flap repositioned with sutures. B) One month later, the flap was clear and no recurrence was noted (best corrected visual acuity 20/20).

visual axis (Fig. 1B). Immediate removal of epithelial ingrowth tissue was performed. The flap was lifted, the posterior flap surface and stromal bed were scraped with blunt spatula, and 50% alcohol was applied for 10 seconds at the flap side and the stromal bed. The flap was then repositioned and sutured with 6 interrupted 10-0 nylon corneal sutures to tighten the apposition between the flap and the keratectomy bed (Fig. 2A). A therapeutic soft contact lens was applied at the end of the operation to prevent further epithelial defect. Visual acuity improved to 20/63 at 1 day after operation. The corneal sutures were removed after 2 weeks. After 1 month, uncorrected visual acuity was 20/30 and could be corrected to 20/20 with +1.00 D cyl –3.50 D × 20°. The flap remained clear and there was no recurrence of epithelial ingrowth noted (Fig. 2B).

Discussion

Epithelial ingrowth can occur immediately or a long time after lamellar keratoplasty. The risk factors for development immediately after surgery include epithelial defects at the time of or soon after surgery, epithelial basement membrane dystrophy, hyperopic laser-assisted in situ keratomileusis corrections, repeated lamellar refractive surgery, flap instability, presence of diffuse lamellar keratitis, and a history of epithelial ingrowth in the fellow eye.[1–3] However, late-onset epithelial ingrowth probably occurs either by a postoperative invasion of epithelial cells under the flap after trauma or by an intraoperative implantation of epithelial cells at the flap-stroma interface.[1–3]

Probst and Machat classified epithelial ingrowth into a thin ingrowth located within 2.0 mm of the flap edge with no associated flap changes, a thicker ingrowth without flap edge melting, and a pronounced ingrowth that has progressed beyond 2.0 mm of the flap edge or that has led to flap melting. The former cases may be treated on a non-urgent basis, while the latter should be treated as soon as possible.[6] In our patient, the epithelial ingrowth after ALK occurred after a blunt injury, which resulted in the ingrowth of surface epithelial cells under the unfolding flap. After 8 months, the epithelial sheet extended into the interface and the visual axis was affected. It is interesting that although half of the interface was involved for such a long time, the flap did not melt. Therefore, we were able to treat it successfully and non-urgently as suggested from the classification of Probst and Machat.

A conventional method to remove epithelial ingrowth uses a blade or sponge to scrape the epithelial cells from the underside of the flap and from the stromal bed. After surgical removal of epithelial cells, residual epithelial cells can be eliminated with 50% alcohol or phototherapeutic keratectomy under the cap or on the stromal surface. Finally, suturing the flap edge to seal the entry site for epithelial cells has also been successfully used to prevent ingrowth recurrence from the flap edge.[7] Although we removed the giant epithelial ingrowth from the underside of the flap and from the stromal bed with a blunt spatula, residual islands of epithelial cells were evident under microscope. After applying 50% alcohol, the islands of epithelial cells were totally eradicated. After surgery, the flap edge was sutured. No recurrence was found 6 months later.

From our search of the literature, this is the largest epithelial ingrowth after ALK without flap melting. We reason that the epithelial sheet did not block the nutrition from aqueous humor, preserving the flap. Although conventional treatments such as scraping of the epithelium from the back of the flap and from the stromal bed, cleaning the interface with alcohol, and suturing the flap closed are helpful for such a case, early treatment may be the most important factor for healing vision-threatening epithelial ingrowth.

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