

A Simple Method for the Removal of Epithelium Grown beneath the Hinge after LASIK

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The purpose of this study is to demonstrate a method of how to remove epithelium grown beneath the hinge area after laser in situ keratomileusis (LASIK) without affecting the refractive part of the lenticule. In three cases, an incision was made at the base of the hinge by RK diamond knife to free the lenticule from the stroma. The lenticule was lifted from the nasal edge. The epithelium grown along the interface beneath the hinge area was removed with a Bard-Parker No. 15 knife. The lenticular flap was repositioned with interrupted sutures using 10-0 nylon. No further epithelial ingrowth was observed. The central cornea remained clear leaving a peripheral ring-shaped opacity without affecting the preoperative naked visual acuity. In conclusion, epithelial ingrowth along the interface after LASIK can be removed safely without affecting the refractive part by the incision of the hinge area with a RK diamond knife, removal of the epithelium, and suturing of the lenticule to the stromal bed.

Key Words: Epithelial ingrowth, hinge, interrupted sutures, laser in situ keratomileusis

Laser in situ keratomileusis (LASIK) is a refractive technique that consists of a lamellar keratectomy with a hinge at the nasal end, photorefractive excimer laser ablation to the stromal bed, and repositioning of the lenticule without sutures (Pallikaris and Siganos, 1994; Salah *et al.* 1995). The number of these laser surgeries has been growing because they appear to have a number of advantages over other keratorefractive techniques by increasing patient comfort, providing faster visual recovery, decreasing

regression and haze formation in high attempted corrections, and in reducing the postoperative need for steroid therapy (Barraquer, 1949; Swinger and Barraquer, 1981; Waring *et al.* 1987; Werblin, 1989; Seilrter and Wollensak, 1991; Kim *et al.* 1993).

The invasive characteristics of the LASIK procedure, however, have brought forth many complications which have been difficult to solve. One of the most serious complications, with an incidence ranging from 1-to-10% (Fiander and Tayfour, 1995; Salah *et al.* 1995; Helena *et al.* 1997), is epithelial ingrowth along the interface, *i.e.*, the potential space between the repositioned lenticule and the remaining stroma (Bas and Nano, 1991; Laroche *et al.* 1994).

Epithelium grown only at the temporal peripheral interface can be left without treatment or it may be removed easily by lifting the lenticular edge and mechanically scraping. However, if the epithelial sheet spreads extensively along the interface, threatening the visual axis, extensive lifting of the lenticule and mechanical scraping is mandatory. Poten-

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tial complications of this extensive lifting include damage to the flap and inaccurate replacement of the flap leading to irregular astigmatism.

For the epithelium growing continuously beneath the hinge, even though the growth amount is small, a surgeon is required to lift the whole lenticule to gain access to the lesion to remove the tissue.

The authors have developed a simple method to remove the epithelium grown beneath the hinge area without affecting the refractive part of the lenticule.

MATERIALS AND METHODS

Cases

Four eyes among the 110 eyes which were operated at Severance Hospital showed epithelial ingrowth along the interface beneath the hinge area. All the eyes had been operated with the Automated Corneal Shaper (Chiron Vision Inc., Claremont, CA, U.S.A.) and VISX 20/20 (VISX Inc, Sunnyvale, CA, U.S.A.) after complete ophthalmic examination.

Among the four eyes, one eye required no surgery because the epithelium grown for 1.2 mm along the hinge line beneath the lenticule showed spontaneous epithelial consolidation 30 days after surgery.

In the other three cases, however, interfacial epithelial ingrowth was noted beneath the hinge two to

eight days after LASIK (Fig. 1). The epithelium was observed to be growing continuously, threatening the optic zone along the interface in each case and operation was needed for the removal of the interfacial epithelium.

The characteristics of the patients are presented in Table 1.

Methods

Surgery for the removal of the epithelium beneath the hinge was performed after the instillation of 3 drops of Alcaine® (Alcon, Fort Worth, TX, U.S.A.). Sixteen reference radial markings were made with a radial keratotomy marker before surgery to make repositioning of the lenticule easy. Epithelium between each end of the hinge and the area where the epithelium had grown into the interface was removed to expose the Bowmans' layer. An incision was made over the hinge with a RK diamond knife set at 110 m (Fig. 2). The edge of the lenticule was lifted from the cut edge (always the nasal edge) (Fig. 3). The ingrown epithelium beneath the hinge was removed with a Bard-Parker No.15 knife. The flap was put back in place and fixed with 10-0 nylon interrupted sutures.

Corneal sutures were removed within a month. Visual acuity, manifest refraction, and videokeratography were recorded during the follow-up period.

Table 1. Patients' characteristics

Case	Age	Sex	Preop. refraction (visual acuity)	Final refraction (visual acuity)	Treatment modality	Associated disease
1	32	M	-8.25-0.50×20 (20/30)	+sph 0.25 (20/20)	observation	none
2	24	M	-14.50-4.25×175 (20/20)	+3.00+1.00×180 (20/40)	incision and removal of epithelium	Graves' disease
3	23	F	-13.00-3.50×180 (20/25)	+1.00+1.00×60 (20/25)	incision and of removal epithelium	none
4	23	F	-12.50-2.00×165 (14/20)	+1.25+0.75×90 (20/25)	incision and of removal epithelium	none

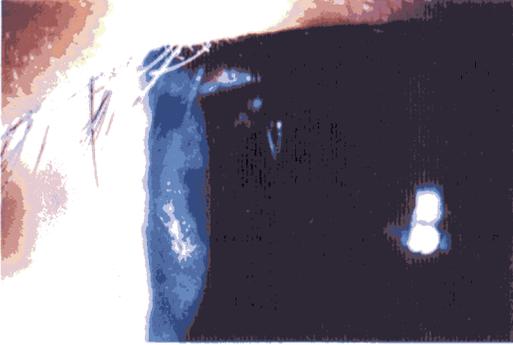


Fig. 1. Preoperative corneal findings in case 2 showing epithelial ingrowth along the interface beneath the hinge.



Fig. 3. Intraoperative corneal findings in case 2. Epithelial cell could be removed after lift of the nasal edge of lenticule.



Fig. 2. Intraoperative corneal findings in case 2. An incision was made at the base of the hinge by RK diam and knife.

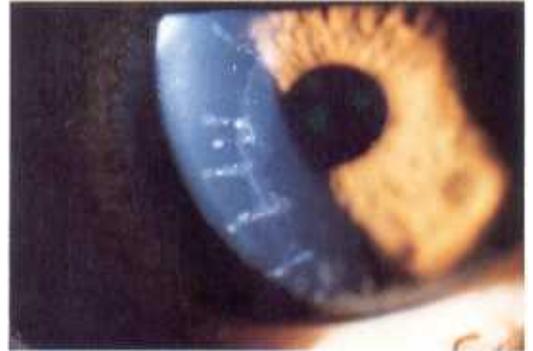


Fig. 4. Postoperative corneal findings in case 4. Peripheral suture scars were noted, but the central cornea remained clear without wrinkling.

RESULTS

All patients were followed up for between 2 to 21 months. Epithelial lesions of all patients were resolved and no further epithelial ingrowth was observed.

Peripheral suture scars were noted, however the central cornea remained clear without wrinklings (Fig. 4).

The uncorrected visual acuity of the operated eye was 20/40 to 20/20 (Table 1) without irregular astigmatism.

Videokeratography taken after incision, epithelial removal, and suture removal showed no change compared to the previous one in every case.

DISCUSSION

The incidence of general epithelial ingrowth after LASIK has been reported to be between 1-to-10% (Fiander and Tayfour, 1995; Salah *et al.* 1995). Although the incidence of the epithelial ingrowth beneath the hinge area has not been reported specifically before, this study (3.64%) showed a somewhat frequent incidence. The authors used the microkeratome designed for myopic keratomileusis in situ. Lenticular diameter in the myopic keratomileusis was designed to be as small as 7.2 mm and this small lenticule may be one of the factors that contributed to the increasing incidence.

The spontaneous consolidation of the epithelium

grown beneath the hinge area in one of the cases suggests that the epithelium grown beneath the hinge needs to be observed for some period without surgical intervention, like the epithelium grown beneath the lenticule in other areas.

In our technique, an incision should be made along the hinge base with a diamond knife to make the lenticular edge free from the stroma. Although the lenticular edge should theoretically be very thin, a deep incision of 100~120 microns was needed in each case to completely free the lenticule at once. This 100~120 micron-deep incision left no effect on the refractive system.

We applied interrupted sutures to decrease the chance of another epithelial removal surgery, which should be performed in case of epithelial regrowth. Epithelium, once removed, did not grow back along the interface after interrupted suturing in this study. Potential complications for total lifting of the lenticule include damage to the flap and mis-replacement of the flap leading to irregular astigmatism. Three cases in this study showed no lenticular wrinkling or decreased visual acuity. This suggests that the technique used by the authors did not affect the optical portion of the lenticule or stroma.

The authors concluded that an incision on the base of the hinge and mechanical removal of the epithelium beneath the lenticule is a satisfactory method in removing epithelium grown beneath the hinge area without completely lifting the lenticule.

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