EFFECTS OF LASER *IN SITU* KERATOMILEUSIS ON THE CORNEAL ENDOTHELIUM

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The purpose of this study was to assess the effects of laser *in situ* keratomileusis (LASIK) on the corneal endothelium. In a prospective study, the corneal endothelium of 87 eyes (45 patients) was examined before and 1 month after LASIK. Patients were divided into two groups: people who wear contact lenses (48 eyes) and people who had never worn contact lenses (39 eyes). The corneal endothelium was analyzed for cell density, percentage of hexagonal cells, and coefficient of variation (CV) of cell size. The mean cell density and percentage of hexagonal cells was significantly higher 1 month after LASIK for all 87 eyes. However, the mean CV of cell size was not significantly different. In contact lens wearers, there was a significant increase in mean cell density and percentage of hexagonal cells, but there was no significant change in mean CV of cell size after LASIK. Among patients who had never worn contact lenses, no significant changes were noted in mean cell density, percentage of hexagonal cells, or mean CV of cell size. In this study, LASIK caused no damage to the corneal endothelium. Postoperative improvements in the mean cell density and percentage of hexagonal cells in patients who were contact lens wearers may be related to the discontinuance of contact lens use after LASIK.

Key Words: LASIK, corneal endothelium, contact lens
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First described by Pallikaris et al [1], laser *in situ* keratomileusis (LASIK) has become a widely used procedure to correct myopia. It combines the creation of a corneal flap with a microkeratome and excimer laser ablation of the underlying corneal stroma. Several studies have reported that LASIK has good efficacy and predictability for treating myopia [2–4]. However, its safety has not been well established.

One major concern about LASIK is its effect on the corneal endothelium. Previous studies have reported contradictory results on corneal endothelial cell density after LASIK [4–10].

In this study, we evaluated the effects of LASIK on corneal endothelium density, percentage of hexagonal cells, and coefficient of variation (CV) of cell size.

PATIENTS AND METHODS

Consecutive patients undergoing LASIK between April and October 2000 were enrolled in this prospective study. All patients who underwent LASIK were aged 18 years or older, had visual acuity correctable to 20/40 or better, normal topography, normal anterior segment by slit-lamp microscopy, normal posterior pole by dilated funduscopy, did not have glaucoma, ocular hypertension, or systemic collagen vascular disease, and were not pregnant or using systemic corticosteroids. Patients were eligible for inclusion

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in this study when they had a best corrected visual acuity of 20/20 or more and not more than 1.50 D of astigmatism. All operations were performed by the same surgeon (SHT) using the VISX Star S2 (VISX Inc, Santa Clara, CA, USA) and an automated microkeratome (Automated Corneal Shaper, Chiron Vision Irvine, CA, USA). After LASIK, topical fluorometholone 0.1% (FML, Allergan, Irvine, CA, USA) and ciprofloxacin 0.3% (Ciloxan, Alcon Laboratories, Fort Worth, TX, USA) were instilled four times daily during the first postoperative week.

Endothelial specular microscopy was performed preoperatively and 1 month postoperatively using a noncontact specular microscope (Konan NONCON-ROBO SP8000, Konan Medical Corp, Fairlawn, NJ, USA).

Patients were assessed as a whole group and in subgroups of contact lens wearers and patients who had never worn contact lenses.

Results

This prospective study comprised 87 eyes from 45 patients (15 men, 30 women). Mean age was 29.9 ± 6.1 years (range, 18–47 years). Mean preoperative spherical equivalent refractive error was –8.59 ± 3.61 D (range, –1.25 to –20.5 D). The mean cell density and percentage of hexagonal cells were significantly increased 1 month after LASIK (p = 0.02 and 0.049), but the mean CV of cell size was not significantly changed (p = 0.95) (Table 1).

Contact lens wearers

There were 24 patients (4 men, 20 women; 48 eyes) who were contact lens wearers. Mean patient age was 30.2 ± 5.5 years (range, 19–47 years). Mean preoperative spherical equivalent refractive error was –9.08 ± 4.04 D (range, –1.25 to –20.5 D). One month postoperatively, the mean cell density and percentage of hexagonal cells was significantly increased (p = 0.04 and 0.02) (Table 2). The mean CV of cell size decreased, but the change was not significant (p = 0.79).

Table 2. Mean cell density, percentage of hexagonal cells, and coefficient of variation of cell size in 48 contact lens-wearing eyes preoperatively and 1 month postoperatively

	Preoperative	Postoperative	p
Cell density (cells/mm^2)	2,569 ± 232	2,628 ± 237	0.04
Hexagonality (%)	48.8 ± 5.8	51.1 ± 5.8	0.02
Coefficient of variation	0.499 ± 0.07	0.496 ± 0.07	0.79

Non-contact lens wearers

There were 21 patients (11 men, 10 women; 39 eyes) who did not wear contact lenses. Mean patient age was 29.5 ± 6.8 years (range, 18–47 years). Mean preoperative spherical equivalent refractive error was –7.98 ± 2.95 D (range, –2.25 to –13 D). There was no significant difference in mean cell density, percentage of hexagonal cells, and mean CV of cell size before and after LASIK (all p > 0.05) (Table 3).

Comparison between contact lens and non-contact lens wearers

There were no significant differences between the two groups in age (p = 0.73) and spherical equivalent refractive error (p = 0.16).

Preoperatively, patients who were contact lens wearers had significantly lower mean cell density and percentage of hexagonal cells than patients who had never worn contact lenses (p = 0.02 and 0.001) (Table 4). The contact lens wearers also had a higher CV of cell size, but the difference was not significant (p = 0.35). Postoperatively, there were no significant differences in mean cell density and CV of cell size between the two groups (Table 4). Although the percentage of hexagonal cells increased in patients who were contact lens wearers after LASIK,

Table 1. Mean cell density, percentage of hexagonal cells, and coefficient of variation of cell size in 87 eyes preoperatively and 1 month postoperatively

	Preoperative	Postoperative	p
Cell density (cells/mm^2)	2,617 ± 218	2,666 ± 228	0.02
Hexagonality (%)	50.8 ± 5.9	52.3 ± 6.1	0.049
Coefficient of variation	0.490 ± 0.06	0.489 ± 0.07	0.95

Table 3. Mean cell density, percentage of hexagonal cells, and coefficient of variation of cell size in 39 non-contact lens-wearing eyes preoperatively and 1 month postoperatively

	Preoperative	Postoperative	p
Cell density (cells/mm^2)	2,676 ± 184	2,713 ± 208	0.22
Hexagonality (%)	53.3 ± 5.1	53.8 ± 6.1	0.68
Coefficient of variation	0.479 ± 0.06	0.482 ± 0.06	0.80