BRIEF REPORTS

Comparison of Corneal Sensitivity and Tear Function Following Epi-LASIK or Laser In Situ Keratomileusis for Myopia

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PURPOSE: To compare the effect of Epi-LASIK or Laser In Situ Keratomileusis (LASIK) on corneal sensitivity and tear function.

DESIGN: Prospective, non-randomized comparative clinical trial.

METHODS: Seventy-nine eyes (Group A) underwent Epi-LASIK and 61 eyes underwent LASIK (Group B) for the treatment of myopia. Matching parameters between the groups were age and attempted correction. Corneal sensitivity, tear break-up time (BUT), and Schirmer test II were evaluated before and at one, three, and six months after the procedure.

RESULTS: Corneal sensitivity and BUT were decreased at one month in Group A ($P < .001$) to be restored by the third month ($P = .71$ and $P = .58$, respectively). In Group B, corneal sensitivity and BUT were reduced postoperatively ($P < .001$). There was a significant difference in corneal sensitivity between the two groups at all postoperative intervals. Schirmer test II was not significantly decreased postoperatively in Group A. In Group B, it was decreased at one and three months and restored by the sixth month.

CONCLUSION: Epi-LASIK-treated eyes had faster rehabilitation of corneal sensitivity and tear function than LASIK-treated eyes. (Am J Ophthalmol 2006;142:669–671. © 2006 by Elsevier Inc. All rights reserved.)

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A TRANSIENT DECREASE OF CORNEAL SENSITIVITY HAS been reported after both laser in situ keratomileusis (LASIK) as well as surface treatments for the correction of ametropias.[1–5] This decrease has been associated with dry eye symptoms.[4–6] Restoration of tear production coincides with recovery of corneal sensitivity[4–6] and is faster after photorefractive keratectomy (PRK) as compared with LASIK.[1,2] Epipolis-LASIK (Epi-LASIK) is a recently described surface photorefractive procedure.[7] The purpose of this study is to evaluate the effect of Epi-LASIK on corneal sensitivity and tear function and to compare it with the respective effect of LASIK.

In this prospective study, 79 eyes of 51 patients (Group A) underwent Epi-LASIK, while 61 eyes of 35 patients underwent LASIK (Group B) for the treatment of low myopia and myopic astigmatism in compliance with our

TABLE 1. Mean Corneal Sensitivity of Epi-LASIK (A) and LASIK (B) Groups During Follow-up

	Preop	1 Month	3 Months	6 Months
Group A	5.70 (range 5 to 6)	5.16 (range 3 to 6) ($P < .001$)	5.69 (range 4 to 6) ($P = .71$)	5.77 (range 5 to 6) ($P = .01$)
Group B	5.74 (range 5 to 6)	4.75 (range 1.5 to 6) ($P < .001$)	5.34 (range 4 to 6) ($P < .001$)	5.49 (range 3.5 to 6) ($P = .008$)
P	.68	.002	<.001	0.032

P values in parentheses represent statistical significance of corneal sensitivity changes at each postoperative interval as compared with preoperative values (Wilcoxon signed ranked test). *P:* power of statistical differences between the two groups at each postoperative interval (Mann-Whitney test).

Preop = preoperative; Group A = Epi-LASIK-treated eyes; Group B = LASIK-treated eyes.

TABLE 2. Mean Break-up Time Changes (sec) in the Epi-LASIK (A) and LASIK (B) Groups

	Preop	1 Month	3 Months	6 Months
Group A	10.10 ± 1.95 (range 8 to 15)	8.48 ± 2.30 (range 3 to 20) ($P < .001$)	10.80 ± 4.49 (range 4 to 20) ($P = .58$)	10.81 ± 4.14 (range 5 to 20) ($P = .30$)
$CI_{0.95}$	$9.53 \leq \mu \leq 10.68$	$7.60 \leq \mu \leq 9.36$	$8.99 \leq \mu \leq 12.62$	$8.97 \leq \mu \leq 12.65$
Group B	10.27 ± 2.62 (range 8 to 17)	6.41 ± 3.25 (range 1 to 14) ($P < .001$)	7.10 ± 2.61 (range 3 to 13) ($P < .001$)	7.53 ± 2.86 (range 3 to 16) ($P < .001$)
$CI_{0.95}$	$9.38 \leq \mu \leq 11.16$	$5.17 \leq \mu \leq 7.65$	$6.09 \leq \mu \leq 8.12$	$6.49 \leq \mu \leq 8.56$
P	.61	.007	.0004	.001

P values in parentheses represent statistical significance of BUT (break-up time) changes at each postoperative interval as compared with preoperative values (paired Student *t* test). *P* values at the bottom line represent statistical differences between the two groups at each postoperative interval (independent samples two-tailed *t* test).

$CI_{0.95}$ = 95% confidence intervals; Preop = preoperative; Group A = Epi-LASIK-treated eyes; Group B = LASIK-treated eyes.

TABLE 3. Mean Schirmer Test II Changes (mm) in the Epi-LASIK (A) and LASIK (B) Groups During Follow-up

	Preop	1 Month	3 Months	6 Months
Group A	13.93 ± 3.77 (range 6 to 20)	14.10 ± 6.16 (range 4 to 30) ($P = .86$)	15.88 ± 4.46 (range 4 to 22) ($P = .12$)	14.91 ± 4.03 (range 9 to 22) ($P = .31$)
$CI_{0.95}$	$12.55 \leq \mu \leq 15.32$	$11.71 \leq \mu \leq 16.49$	$14.03 \leq \mu \leq 17.72$	$13.16 \leq \mu \leq 16.65$
Group B	12.50 ± 5.61 (range 6 to 26)	9.51 ± 5.15 (range 2 to 20) ($P = .007$)	10.88 ± 4.08 (range 3 to 20) ($P = .03$)	12.13 ± 3.88 (range 5 to 20) ($P = .21$)
$CI_{0.95}$	$10.59 \leq \mu \leq 14.40$	$7.55 \leq \mu \leq 11.47$	$9.23 \leq \mu \leq 12.53$	$10.68 \leq \mu \leq 13.58$
P	.23	.003	<.001	.01

P values in parentheses represent statistical significance of Schirmer test changes at each postoperative interval as compared with preoperative values (paired Student *t* test). *P* values at the bottom line represent statistical differences between the two groups at each postoperative interval (Independent samples two-tailed *t* test).

$CI_{0.95}$ = 95% confidence intervals; Preop = preoperative; Group A = Epi-LASIK-treated eyes; Group B = LASIK-treated eyes.

Institutional Review Board. Inclusion criteria were age older than 18 years, stable refraction, no previous refractive surgery, no ocular or systemic disease that could affect the epithelial healing, tear break-up time (BUT) of no less than 10 seconds, and Schirmer test II of no less than 6 mm preoperatively. Each patient received the same treatment in both eyes and signed an informed consent.

Central corneal sensitivity (Cochet-Bonnet aesthesiometer),[1–5] BUT at biomicroscopy, and Schirmer test II (after instillation of one drop of propacaine hydrochloride 0.5%) were measured preoperatively and at one, three, and six postoperative months. Epi-LASIK was performed with the use of Centurion Epi Edge Epikeratome (Norwood Abbey, Australia).[7] The LASIK flaps were created with the use of MII disposable head (Moria II Antony, France) and Carriazo Pendular 130 μm plate (Schwind eye-tech-solutions, Germany) microkeratomes. Allegretto 200 Hz (Wavelight Laser Technologie AG, Erlangen, Germany) laser was used for all treatments, which attempted to emmetropia. All treatments were uneventful.

The statistical analysis was performed with the SPSS 9.0 (SPSS Inc, Chicago, Illinois, USA). Wilcoxon signed-rank and Mann-Whitney tests were used to evaluate changes of corneal sensitivity and Student *t* test to evaluate changes of BUT and Schirmer test II.

The two groups matched regarding age ($P = .56$, two-tailed Student *t* test) and attempted correction ($P = .20$, two-tailed Student *t* test). The mean preoperative spherical equivalent in Group A was -5.1 ± 1.15 diopters (range -3.00 to -7.50 diopters) and in Group B -5.37 ± 1.13 diopters (range -1.875 to -6.875 diopters).

The mean flap thickness in eyes of Group B was 126.4 ± 30.66 μm (range 72 to 185 μm, MII, n = 28, 127 ± 30 μm, pendular, n = 33, 129 ± 21 μm).

All patients completed six months of follow-up. Corneal sensitivity decreased after the treatment in both groups of eyes (Table 1). Table 2 summarizes the changes in BUT in the two groups during the follow-up period. Schirmer test II changes during the follow-up are shown in (Table 3).

Corneal denervation plays a key role in the transient tear dysfunction that complicates the postoperative course of photorefractive patients.[3,4] Corneal sensitivity and tear function are reported to be restored by the third[1,2] to sixth month[3] after PRK, whereas it may take up to 16 months to attain normal values after LASIK.[4] The few studies that compare matched age and attempted correction groups agree that the recovery of corneal sensitivity and tear function is faster after PRK as compared with LASIK.[1–3] Moreover, favorable results were reported[5] regarding tear film function after laser epithelial keratomileusis as compared with PRK.

Our results showed that corneal sensitivity and tear film function recovered faster in the epi-LASIK–treated eyes. Corneal sensitivity and BUT scores attained baseline levels by the third month after epi-LASIK and were depressed even at six months after LASIK. Furthermore, Epi-LASIK was shown not to have any effect on basic tear secretion during the follow-up period. Schirmer test II scores were restored at six months after LASIK and remained lower at all intervals as compared with those of epi-LASIK–treated eyes. Patients' subjective evaluation by means of questionnaires may have revealed subjective differences between the two groups.

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Time to Resolution of Corneal Edema After Long-Term Contact Lens Wear

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PURPOSE: To evaluate corneal thickness changes after soft contact lens (SCL) removal in laser in situ keratomileusis (LASIK) candidates.

DESIGN: Observational case series.

METHODS: A total of 100 eyes daily wearing SCL for at least six months were evaluated. The central corneal thickness (CCT) was measured by pachymetry immediately after lens removal and then repeated daily until it became stable.

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