

Pain Perception during Laser in Situ Keratomileusis

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Purpose: To compare pain severity during laser in situ keratomileusis (LASIK) between first- and second – eye surgery in a Pakistani population.

Material and Methods: This was a prospective cohort study. 31 individuals eligible for LASIK in both eyes were recruited at a laser clinic between June 2012 and November 2015. All underwent surgery using microkeratome and CustomVis Solid state laser. After completion of the procedure, patients rated severity of their pain during Lasik on a 4 – point scale (e.g. none, mild, moderate, severe pain) for each eye separately. Wilcoxon signed – rank test was used to compare pain severity between first- and second – eye surgery.

Results: A total of 31 patients (62 eyes) were enrolled in the study. 16 (51.6%) patients perceived more pain in the second eye and 6 (19.4%) in the first one. There were 9 (29.0%) ties. The Wilcoxon signed – rank test showed a statistically significant change in pain perception in the second eye ($Z = -2.343$; $P = 0.019$).

Conclusions: Patients undergoing LASIK perceived more pain in the second eye. Larger studies are needed to investigate this finding further, and to identify factors influencing this change in pain perception.

Laser in situ keratomileusis (LASIK) is a common refractive surgical procedure performed worldwide.¹ It is a relatively painless procedure compared with its predecessor; photorefractive keratectomy.² It is generally performed under topical anesthesia. During this procedure, a significant proportion of patients report a certain degree of pain which can vary significantly between the two eyes. In a study by El Rami et al.³, patients (n = 154) reported more pain during LASIK in the second eye. The mean pain score during second eye surgery was 0.93 ± 0.51 compared with 0.63 ± 0.35 in the first eye. In addition, 74% patients perceived more pain in the second-eye, 2% reported more pain in the first eye and 24% reported equal pain in both eyes.

Pain perception can vary across cultures, space and time⁴. The purpose of the current study was to compare pain severity during LASIK between first- and second-eye surgery in a Pakistani population.

MATERIAL AND METHODS

This prospective cohort study involved all patients aged ≥ 18 years who underwent bilateral LASIK by a single surgeon in the same setting (Laser Vision Center, Karachi) during June 2012 to November 2015. Standard pre-LASIK screening was performed on each patient. Informed consent was taken regarding the procedure and participation in the study.

Both eyes of each patient underwent LASIK sequentially during a single session. Both eyes were anesthetized using topical anesthesia: 1 drop of proparacaine hydrochloride 0.5% every 5 minutes. After the laser system was calibrated, each patient was placed in the supine position and draped. Povidone iodine 5% was instilled in the conjunctival sac and irrigated with saline solution.

Corneal marker was applied. In each eye, a corneal flap with a nasal hinge was prepared with the

Table 1: Comparison of mean pain scores between first - and second - eye surgery (n = 62)

Surgery	Mean Pain Score	Standard Deviation	Minimum	Maximum
First Eye	0.74	0.73	0	2
Second Eye	1.16	0.73	0	2

Nidek MK-2000 microkeratome. After the flap was lifted, a scanning laser system (CustomVis, Australia) was used with a frequency of 300 Hz and wavelength of 213 nm for ablation. After the completion of each bilateral procedure, patients were asked to complete a questioner pertaining to the timing and severity of pain during LASIK. They were asked to rate severity of pain on a 4-point scale (0 = no pain; 1 = mild pain; 2 = moderate pain; 3 = severe pain). Postoperatively, eye lubricants (artificial tears), corticosteroid eye drops (fluorometholone 0.1%) and topical antibiotic (moxifloxacin 0.5%) were advised as per protocol.

All data were entered and analyzed using SPSS software (version 19.0 for Windows). Continuous variables were expressed as means and standard deviations, whereas categorical variables as frequencies and percentages. Wilcoxon signed-rank test was used to compare pain severity between first- and second - eye surgery. A *P* value of < 0.05 was taken as statistically significant.

RESULTS

A total of 31 patients (62 eyes) were enrolled in the study. Twelve (38.7%) were males and 19(61.3%) were females. In 23 patients, right eye was operated first while in the other 8 the left. Overall, 16 (51.6%) patients perceived more pain in the second eye. Only 6 (19.4%) patients perceived more pain in the first eye. There were 9 (29.0%) ties (Figure 1). The Wilcoxon signed-rank test showed a statistically significant change in pain perception in the second eye ($Z = -2.343$; $P = 0.019$). The mean pain score was 0.74 ± 0.73 in the first eye and 1.16 ± 0.73 in the second eye (Table 1). In a subgroup analysis of patients who underwent their left eye LASIK first, the mean pain score for the second eye was 1.25 ± 0.71 .

In terms of severity of pain, the frequency (%) of no, mild and moderate pain in the first eye was 13 (41.9%), 13 (41.9%), and 5 (16.1%), respectively. For the second eye, these values were: 6 (19.4%), 14 (45.2%), and 11 (35.5%).

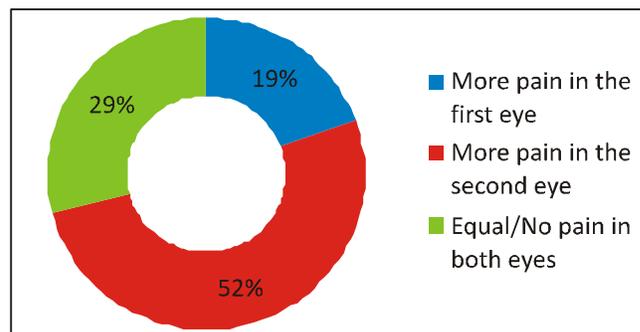


Fig. 1: Doughnut chart showing proportion of patients perceiving more pain in the first or second eye (n = 62 eyes)

DISCUSSION

Our study indicates that patients undergoing LASIK reported more pain in the second eye. These findings are consistent with El Rami et al³. In our study, half of the patients (51.6%) perceived more pain in the second eye while only 6 (19.4%) reported more pain in the first one. In their study,³ 74% and 2% patients perceived more pain in the second eye and the first eye, respectively. 24% reported equal pain in both eyes.

It remains unclear why patients perceived more pain in the second eye.³ Ursea et al,⁷ suggested that during second-eye surgery, patients were generally more aware of the ongoing procedure, which might explain their enhanced pain perception. Their study was focused on pain in cataract surgery though.

LASIK is routinely performed under topical anesthesia. The main site of anesthetic action is the nerve cell membrane where it blocks axonal sodium channels hence eliminating propagation of action potential. Anesthetic effect begins within 30 seconds of administration of eye drops and persists for 10-20 minutes.⁵

Noxious stimuli to ocular nocicepters result in hypersensitization to inflammatory and pain mediators released in the extracellular space such as

bradykinin, histamine, neurotrophins and cytokines. These cause changes in membrane permeability of ions leading to lowering of the membrane threshold potential of potential of a neuron.⁶ It can be postulated that in response to noxious stimuli during LASIK in the first eye, inflammatory and pain mediator levels increase in both eyes resulting in hyper-sensitization and hyperalgesia experienced by the second eye. Measuring levels of these mediators/neurotransmitters can provide reasonably strong evidence to support the above hypothesis.

In conclusion, our study supports the results of EL Rami et al.³ that patients undergoing LASIK perceive more pain in the second eye. Further studies are needed to identify factors associated with change in pain perception.

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