Original Article

Outcome of Laser in Situ Keratomeliusis (Lasik) in Low to High Myopia: Review of 200 Cases

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Purpose: To evaluate the visual outcome and complications of Laser in situ Keratomeliusis (LASIK) in low to high myopia (-2 to-10 Diopters).

Material and Methods: A retrospective, non comparative analysis of 200 patients records was done who had Lasik procedure for myopia at Laser Vision Center, Karachi, from Oct. 2004 to Sept. 2006. Inclusive criteria were myopia between -2 to -10D and astigmatic not more than 0.5 D. Visual acuity at 1 month and 6 month and complication where recorded at six months.

Results: 200 patients (400 eyes) were included in this study. 70 patients (140 eyes) were male while 130 patients (260 eyes) were female. Patients' age ranged between 19-50 years with mean age at 34 years. All patients had myopia between -2.0DS to -10.0DS with astigmatism of no more than 0.5D. Pre operatively, 373 eyes had best spectacle corrected visual acuity (BSCVA) of 6/9 or better. At six months post LASIK, 346 eyes (92.7%) gained their vision back without correction, thirty eight (9.5%) eyes had one line decrease on Snellen's acuity chart. No eye was recorded with decreased vision of more than a line. Dry eyes were found to be the most common problem followed by glare and myopic regression.

Conclusion: Results indicated that LASIK prove it as a safe and acceptable procedure for the treatment of low to high myopia with no serious side effects.

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Spectacles and contact lenses are the primary choice of refractive error correction among myopic patients, but in past decade refractive surgery has gained interest even among successful contact lens wearers[1]. In the history of refractive surgery, an important development has occurred in the use of excimer systems offering the possibility to change the anterior corneal refractive power through a controlled stromal ablation[2]. Laser In Situ Keratomeliusis (LASIK) is the most commonly performed technique for surgical correction of myopia and myopia with astigmatism[3]. The procedure is performed by the Excimer Laser by removing the tissues with liberation of sufficient energy with a specific wavelength (193nm) to interrupt the tissue's intermolecular bundles in a short time in order to avoid any harm to the surrounding tissues[4].

The LASIK technique inflicts two surgical traumas: the microkeratome cut and the stromal ablation by the excimer laser. Due to the surgical trauma, tissue repair and a healing process will be induced[2]. LASIK proved to have a less aggressive healing process (cicatrisation) and consequently less complication in relation to other mechanical surgeries such as radial keratotomy[4].

This retrospective study was carried out at the Laser Vision Centre, Karachi and was designed to make a description on the result of LASIK in view of its visual outcome and complications.

MATERIAL AND METHODS

The study was conducted on 200 selected patients fulfilling the inclusion criteria and followed for a minimum of six months period between October 2004 to September 2006.

The inclusion criteria were stable myopia for at least one year, contact lens wearing intolerance, age between 18-50 years, central corneal thickness of 500-600 microns, patients with keratometric readings between 38-48 diopters and absence of progressive myopia. Patients with severe dry eyes, chronic lid, conjunctival and corneal diseases, cataracts, glaucoma, uveitis or history of retinal detachment were excluded.

Each patient had bilateral myopia between -2.0 and -10.0 diopters with astigmatism of no greater than -0.5D.

Detailed history and complete eye examination of anterior and posterior segment was performed. Special attention was given to the status of tear film and cornea. Schirmer's test was performed in suspicious cases and results recorded. Ultrasonic Pachymetry (ECHOPACH-Phakosystem Inc. Canada) was done on each eye to see the central corneal thickness (CCT) and corneal topography (EyeSys 2000–USA) was performed to check any corneal curvature abnormalities. All patients under went dilated fundus examination for the presence of any peripheral retinal lesions or breaks, which can be sealed through Argon Laser photocoagulation prior to LASIK. Refractive stability was established by reviewing previous examination records[3].

A counseling session was carried out with each patient and attendants regarding patient's expectations with the procedure, surgical outcome, chances of residual myopia, regression, dry eyes and glare etc[5].

Prophylactic Argon laser photocoagulation was performed, either 360 degrees or locally to surround the lesion, according to the nature and extent of retinal pathology. Only those patients were selected whose corneal thickness was sufficient to carry out the procedure. Contact lenses were discontinued for at least one week prior to the surgery. Initially, topical Ofloxacin (Exocin-Allergan Pakistan) and then fourth generation flouroquinolone, Moxifloxacin 0.5% (Vigamox- Alcon USA) was routinely used for the surgical prophylaxis[6].

All surgeries were performed by the same surgeon using topical anesthesia (Alcaine – Alcon Belgium). After scrubbing the eye with 5% povidone iodine, sterile draping was applied. Fornix was irrigated with balanced salt solution and secretions were wiped through sterile brush. A marker with gention violet was applied on the cornea for flap repositioning. Microkeratome suction ring size was decided according to the corneal curvature. All LASIK procedures were performed with a flap thickness of 160 microns and at least 250 microns of residual stromal bed. Corneal flap was created with MK 2000 microkeratome (Nidek – Japan) making hinge on the

nasal side. The flap was lifted on the hinge with the help of special cannula and the stromal bed was dried with fine brush to prevent under correction as laser energy will be otherwise utilized to dry the wet stromal bed. Eye was centered and the patient was instructed to focus on the green light. Excimer laser (Summit Apex Plus SVS – USA) was programmed with a 6.0 mm treatment zone diameter and then ablation was applied in the centre of the cornea. At the end of laser emission, stromal bed and under surface of the flap was irrigated with balanced salt solution (BSS) to wash away any debris. The flap was re-posited back in position aligning the marker lines applied pre-operatively.

Antibiotic and steroid eye drops were instilled at the end of the procedure.

Eyes were rechecked on slit lamp after 15 minutes to confirm the flap position and absence of debris under the flap. Patients were told about the precautions to be taken in next 12 – 24 hours. In addition to antibiotic eye drops, Prednisolone 1% (Predforte – Allergan Pakistan) and artificial tears (Tears Naturale II – Alcon Belgium) were advised to be used onwards for one, three and six weeks post operatively. Use of lubricants was encouraged as needed throughout the study. All cases were examined next day, one week, one month, three months and then six months post LASIK. Visual acuity and intra ocular pressure (IOP) were checked at every visit.

RESULTS

200 patients (400 eyes) underwent uneventful LASIK surgery. All patients were operated on both eyes.70 patients (140 eyes) were male while 130 patients (260 eyes) were female (Table I) (Fig. 1).

Pre-LASIK, best spectacle corrected visual acuity (BSCVA) of 6/6 was achieved by 324 eyes. 49 eyes reached 6/9, 19 were up to 6/12 and 8 eyes were improved to 6/18 (Table 2) (Fig. 2).

Table I. Patients Data (n=400)

	No. of Patients	**No. of eyes**
Male	70	140
Female	130	260

Table 2: Preoperative vision (n=400).

Pre Lasik BSCVA	**No. of eyes**
	n (%)
6/6	324 (81)
6/9	49 (12.2)
6/12	19 (4.75)
6/18	08 (02)
6/24	Nil

One day post-LASIK, 249 eyes reached the unaided vision of 6/6, 77 eyes achieved visual acuity of 6/9, 44 eyes achieved 6/12 vision, 26 eyes improved to 6/18 and 04 eyes improved to 6/24 vision on Snellens' quotation.

At one month, 272 eyes were 6/6, 67 eyes reached 6/9 vision, 50 eyes saw 6/12, 09 eyes were able to read up to 6/18 while vision of 02 eyes remained on 6/24.

Final visual acuity recorded at six months showed, 286 eyes establishing vision at 6/6. The numbers of eyes at 6/9 were reduced to 60. Forty eyes reached 6/12 vision, 12 eyes achieved 6/18 and 02 eyes gained maximum vision of 6/24 (Table 3).

We came across a number of side effects during the follow up period. Incidence of mild to moderate dry eyes was highest as it developed in 212 eyes (53%), more in female than in male patients. Recovery period of dry eyes was 3 – 5 months (mean 4 months). All patients were kept on Tears Natural II eye drops during the recovery period. Frequency of artificial tears or lubricant drops was decided according to the intensity of the problem.

The second common side effect was glare which developed in 114 (28.5%) eyes. It reduced in intensity over the period of 6 – 7 months.

30 eyes (7.5%) developed myopic regression of -0.50 to -2.75 diopters (mean -1.62 D) within eight weeks of LASIK. Microstriae[7] were seen in 22 cases (5.5%) which were visually insignificant.

22 eyes (5.5%) showed response to the steroid eye drops and developed raised IOP. This was managed by minimizing the frequency of steroids or withdrawal of steroid drops while adding the topical beta blockers to lower the IOP within normal limits.

Irregular astigmatism of -1.0 DC to -2.0 DC was found in 4 eyes (1%) and 4 eyes (1%) had hyperopic shift of +0.50DS to +1.0 DS. Bacterial keratitis was seen in both eyes of a single patient (Table 4).

Table 3: Post LASIK visual acuity (n=400)

Post Lasik Visual Acuity	No. of eyes At One Day n (%)	No. of eyes At One Month n (%)	No. of eyes At Six Months n (%)
6/6	249 (62.25)	272 (68)	286 (71.5)
6/9	74 (18.5)	67 (16.75)	60 (15)
6/12	44 (11)	50 (12.5)	40 (10)
6/18	26 (6.5)	09 (2.25)	12 (03)
6/24	04 (01)	02 (0.5)	02 (0.5)

Table 4. Incidence of side effects (n=400)

Side Effects	No. of eyes n (%)
Dry eye	212 (53)
Glare	114 (28.5)
Myopic regression	30 (7.5)
Raised intraocular pressure (IOP)	22 (5.5)
Microstriae	2 (5.5)
Astigmatism	04 (01)
Hyperopic shift	04 (01)
Bacterial keratitis	02 (0.5)

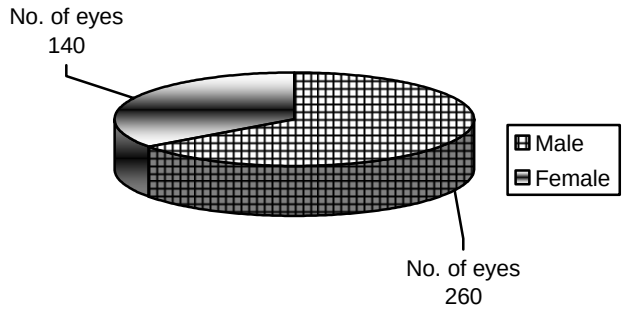

Fig. 1:

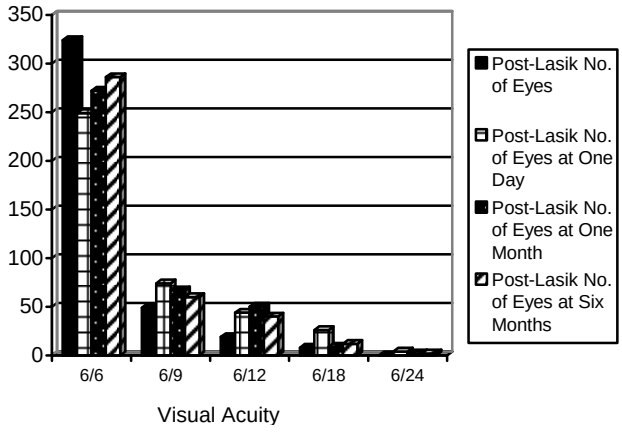

Fig. 2:

DISCUSSION

Over the last decade many reports have shown excellent outcome in terms of predictability, efficacy and safety after LASIK. In our clinical trial, results of LASIK were satisfying and encouraging although a number of patients complained of few problems but overall the visual outcome was satisfactory for the patients.

In our study of 200 cases (400 eyes), 373 eyes with pre operative BSCVA of 6/9 or better, 346 eyes retained their vision without correction at six months post LASIK. This shows success in 92.7% cases who were satisfied with their visual outcome after the LASIK procedure. Out of 400 eyes, 38 (9.5%) eyes had one line decrease on Snellen's chart. No eye was recorded with a decreased vision of more than a line. Balazsi et al [8]reported that at six months after LASIK, uncorrected visual acuity was 6/9 or better in 94.6% eyes. Their study also indicated that 11.3% eyes showed 1 line decrease in vision after six months of LASIK.

Most common side effect of LASIK was found to be dry eyes in our series. This is because of neurotrophic epitheliopathy as a result of the serving of corneal nerves with the keratome blade, decrease in conjunctival and corneal sensitivity and a change in the tear lipid layer[9]. In our study, 53% of cases developed dry eyes within one week after the procedure. This was reduced to 40% at six weeks and most of the patients stopped their lubricants between 3-5 months as they had minimum or no symptoms of dry eyes.

De Paiva et al[10] found the incidence of dry eyes at 47.06% in a series of patients one week after LASIK which reduced to 41.18% at one month. Artificial tears were found to be most commonly used treatment for dry eyes[11].

In our series 28.5% patients complained of glare after surgery at night, especially from oncoming car headlights. Tahzib et al[12] showed that 52.8% of their patients were victim of glare after LASIK and believed to be more bothersome for night driving. Previous studies have designated the pupil size as a significant predictor of glare and halos after LASIK especially in first post operative month. However, six months postoperatively, pupil size is no longer found to be a significant predictor[13]. Tahzib et al [12]further added that precise role of pupil size and its exact relationship to night vision complaint remain unknown and controversial.

Regression is more prevalent in patients with high myopia and this should not be confused with progressive myopia. Careful review of the patient's ocular history may reveal this condition and these patients should be counseled properly. We came across 7.5% of patients during the study follow up, having regression of -0.50 DS to -2.75DS. Chayet et al[14] reported almost the same incidence of regression in their study involving 7.6% of total patients in their series at the end of the third month.

It is important to keep patients profession and life style in consideration before carrying out LASIK to avoid such problems as glare etc. The computer users for longer periods of time must be informed about dry eyes. Likewise, people dependent on night life or driving at night times should also be made aware regarding glare.

The decrease in vision of 1 line on Snellen's chart is mainly because of myopic regression but other factors like astigmatism and hyperopic shift (overcorrection) are also responsible for this problem.

CONCLUSION

LASIK is an internationally acceptable modality for the treatment of myopia at present time.

Although there are certain side effects such as dry eyes and glare but fortunately these complains are transient in nature and usually settle down within six months post LASIK. In our series of 200 patients, 92.7% of all patients achieved good vision without any need for glasses. We advise a thorough discussion with the patient and his/her family to make them fully aware of the possible outcome of LASIK including certain unwanted symptoms. We feel counseling plays an important role in negating patients fear for serious complications as well as discouraging patient's unreal expectation about the out come of the procedure.

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