

How to Cite:

Sindhujadevi, S., Jeyaprakash, B., Ezhilvendhan, K., Bhava, B. S., & Kanna, R. R. (2022). Comparison of outcome of LASIK in mild, moderate and high myopia. *International Journal of Health Sciences*, 6(S8), 5706–5714. <https://doi.org/10.53730/ijhs.v6nS8.13572>

Comparison of outcome of LASIK in mild, moderate and high myopia

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Abstract--Background: Lasik-Laser in situ keratomileusis is by far the predominant refractive procedure in use today. We are beginning to learn both its full potential and its limitations. This includes refining our knowledge about how much refractive error can be corrected with LASIK while maintaining a high quality of vision. Aim: To evaluate and compare the outcome of LASIK performed in patients with mild, moderate and severe myopia using SCHWIND ESIRIS excimer laser system. Methods: A hospital based, prospective, randomized case study was conducted on 78 eyes of 40 patients underwent LASIK with SCHWIND ESIRIS Laser system of which 40 eyes were of low myopia, 28 eyes were of moderate myopia and 10 eyes were of high myopia at Vinayaka Mission Hospital, Salem, between January-2010 to December-2010. Results: Preoperative & postoperative BCVA was compared which was found to be statistically significant, there was no postoperative decrease in vision during the 6 months follow up. There was no incidence of corneal ectasia during the 6 months. There was no retreatment in this study. Importantly the

safety profile of LASIK in the study was found to be excellent. Conclusion: Overall patient satisfaction with the procedure is high with the SCHWIND ESIRIS laser system which is comparable to other sixth generation excimer laser system.

Keywords---LASIK, SCHWIND ESIRIS laser, high myopia.

Introduction

Laser in situ keratomileusis has become the most popular refractive procedure performed today because of its safety, efficacy, quick visual recovery and minimal patient discomfort. In LASIK, an automated microkeratome is used to create a corneal flap. The stromal bed is ablated with excimer laser, depending on the type and amount of refractive error in accordance with the predetermined data that has been entered in the excimer laser system.^[1] Under this precise control the laser reshapes the curvature of the cornea to correct myopia, hypermetropia or astigmatism. The flap adheres to the underlying stroma within 24 hrs. as a result of the endothelial pump. LASIK is performed on an out-patient basis.

The efficacy and success of LASIK depends largely on the type of laser platform in use. Current fifth generation systems use a very rapidly repetitive and extremely small spot laser delivery with automated tracking of the eye movements to ensure precise treatment. Refractive errors which include myopia, hypermetropia, astigmatism are optical defects of the eye that prevent light from being brought to a point focus by cornea, lens onto the retina. These refractive errors are the third leading cause of visual impairment and fifth leading cause of blindness. Uncorrected myopia is responsible for most refractive blindness and visual disability.

Myopia / short sightedness is a refractive error in which the parallel rays of light from infinity come to focus in front of the retina when eye is at rest, thus grossly reducing the vision. Myopia could be axial due to elongation of antero posterior diameter of the eye ball or curvature myopia due to increase in radius of curvature of the cornea; and index myopia due to change in refractive index of lens, cornea, aqueous, vitreous thus increasing dioptric power of the eye. Lasik ablates the central cornea, flattening it and hence the image is brought into focus.

Aims and objectives

Aim

To evaluate and compare the outcome of LASIK performed in patients with mild, moderate and severe myopia using SCHWIND ESIRIS excimer laser.

Objectives

1. To find out the post-operative uncorrected visual acuity.
2. To find out the post-operative spherical equivalent.
3. To find out the post-operative best spectacle corrected visual acuity.

4. To find out the post-operative complications.

Materials and Method

A hospital based, prospective, randomized case study was conducted on 78 eyes of 40 patients underwent LASIK with SCHWIND ESIRIS Laser system of which 40 eyes were of low myopia (up to -6.00 D), 28 eyes were of moderate myopia (-6.25 D to -12.00 D) and 10 eyes were of high myopia (> -12.00 D) at Vinayaka Mission Hospital, Salem, between January-2010 to December-2010.

Inclusion criteria

Mild myopia (up to -6.00 D), Moderate myopia (-6.25 D to -12.00 D) and High myopia (> -12.00 D)

Exclusion criteria

Patients with dry eye, lid disorder that effects the tear layer, corneal thickness < 500 μ m, corneal ectasias (keratoconus, keratoglobus), high irregular astigmatism, previous history of corneal surgeries, cataract, glaucoma, herpes infection, immune compromised, pregnant women, corneal opacities, corneal dystrophies, strabismus, narrow palpebral aperture, diabetic retinopathy, progressive retinal diseases and retinal detachment. A detailed information about history, complaints, occupation of the patients were taken. This included type of visual problem, duration of symptoms, duration of wearing glasses / contact lens, frequency of change of glasses, any prior corneal surgery, trauma, any prolonged use of topical medications, any history of systemic disease.

A complete ocular examination was done for each patient which included uncorrected visual acuity, best corrected visual acuity following cycloplegic refraction, auto refractometer reading, slit lamp examination, conceal topography, ultrasound pachymetry, pupillary size, non-contact tonometry, slit lamp biomicroscopy with +90 D and indirect ophthalmoscopy and aberrometer. Informed consent was taken for all the patients after informing all the risk factors of the procedure.

Post – Operative management

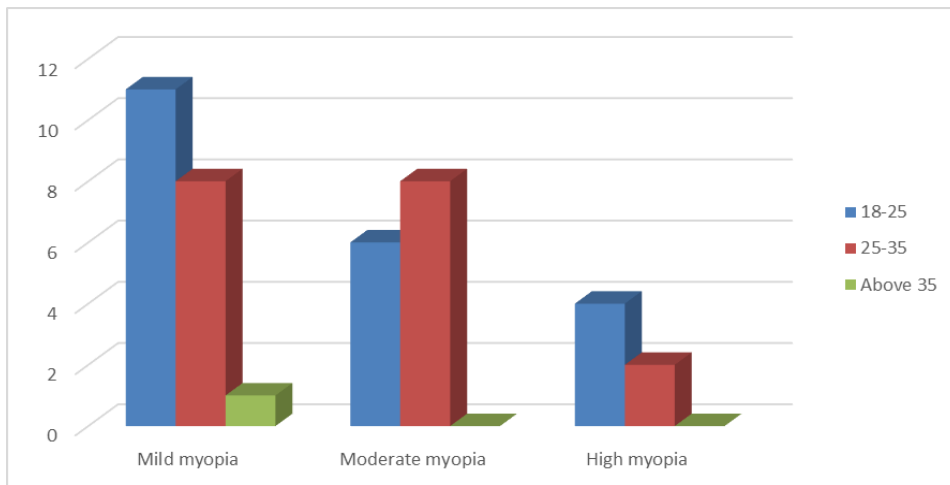
Topical antibiotic drops (Moxifloxacin), FML eye drops 4 times a days and lubricating drops was prescribed 4 times a day.

Follow-up

Follow up was done on 1st post-operative day and subsequently on 1st week, 1st month, 3rd month and 6th month. Through slit lamp examination was done during each visit and visual acuity was recorded. Final refraction was done at 6th month.

Results

Chart 1: Age distribution of patients studied



- The mean age was 26.4
- The maximum number of patients were in the age group 18-35 years

In mild myopia group

- 11 patients were in 18 to 25 years age group
- 8 patients were in 25 to 35 years age group
- 1 patient was in above 35 years age group

In moderate myopia group

- 6 patients were in 18 to 25 years age group
- 8 patients were in 25 to 35 years age group

In high myopia group

- 4 patients were in 18 to 25 years age group
- 8 patients were in 25 to 35 years age group

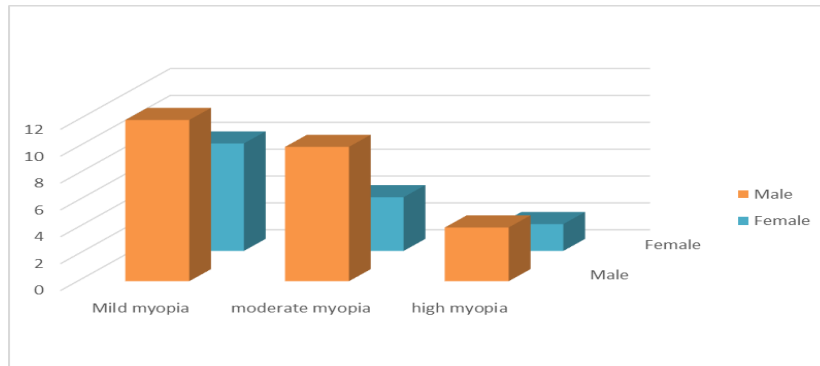
Laterality

- In 38 patients both eyes underwent the procedure.
- In 2 patients only right eye underwent the procedure.

Indications

The most common complaints of the patients during presentation was defective vision, cosmetic.

Chart 2: Gender distribution of patients studied



- In mild myopia group there were 12 males and 8 females
- In moderate myopia group there were 10 males and 4 females
- In high myopia group there were 4 males and 2 females

Table 1: The mean Pre-operative and Post-operative spherical equivalent

	Mild myopia	moderate myopia	high myopia
Pre-operative	-3	-8	-14.75
Post-operative	-0.056	-0.176	-1.36

The mean pre-operative spherical equivalent

- In low myopia -3
- In moderate myopia -8
- In high myopia -14.75

The mean post-operative spherical equivalent

- In low myopia -0.056
- In moderate myopia -0.12
- In high myopia -1.36

This was found to be statistically very significant for all three groups ($p = 0.0069$).

Table 2: The mean Pre-operative and Post-operative UCVA

	Mild myopia	moderate myopia	high myopia
Pre-operative	0.1	0.081	0.05
Post-operative			
1st day	1	1	0.5
1st week	1	1	0.5
1st month	1	1	0.5
3rd month	1	1	0.5
6th month	1	1	0.5

Pre-operative Visual acuity In mild myopia group

30 eyes of 15 patients had UCVA between 6/9 -6/60 and 10 eyes of 5 patients had UCVA of $\leq 5/60$, mean of 0.081

In high myopia group

1 eye had UCVA between 6/9 -6/60 and 10 eyes had UCVA of $\leq 5/60$, mean of 0.05.

Post-operative Visual acuity In mild myopia group

34 eyes of 18 patients had UCVA of 6/6 mean of 1 which is clinically significant.

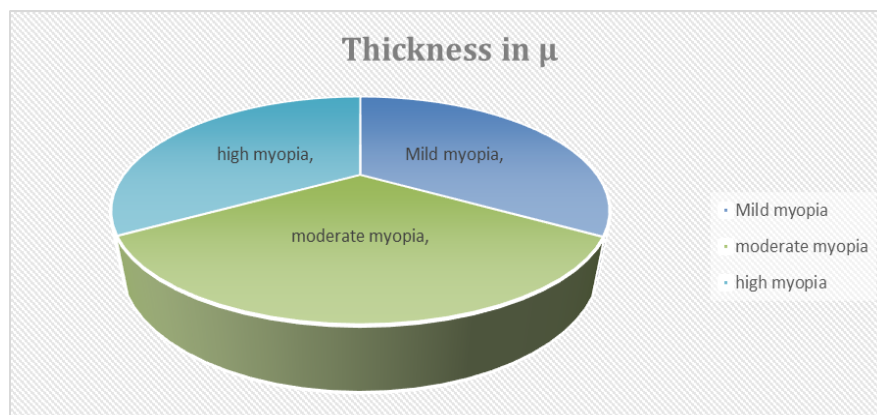
In moderate myopia group

16 eyes had UCVA of 6/6 after 6 months. 6 patients had UCVA between 6/36 and 6/9 which improved to 6/6 with refraction. Mean of 1.

In high myopia group

4 eyes had UCVA of 6/6 after 6 months and 6 eyes had UCVA between 6/9 – 5/60 mean of 0.5

Chart 3: The mean corneal thickness



The mean corneal thickness

- In low myopia 544 μ
- In moderate myopia 539 μ
- In high myopia 542 μ

Table 3: The mean Pre-operative and Post-operative BCVA

	Mild myopia	Moderate myopia	High myopia
Pre-operative	1	1	0.3
Post-operative	1	1	0.5

The mean pre-operative BCVA

- In low myopia 1
- In moderate myopia 1
- In high myopia 0.30

The mean post-operative BCVA

- In low myopia 1
- In moderate myopia 1
- In high myopia 0.30

None of the eyes had any intra-operative complication during the procedure and there was no immediate post – operative complication. There was no deterioration of vision or any late post-operative complications in all the three groups. There was no ectasia of cornea seen post-operatively during 6 months follow up.

Discussion

Overall, many reports have shown excellent medical outcome in terms of predictability, efficacy and safety after lasik. Lasik surgery is still a controversial issue despite almost 20 years of experience and over 12 million patients treated worldwide. In our study when comparing the 6 months postsurgical uncorrected vision with the best corrected pre-surgical visual performance in the 3 groups, patients described themselves as satisfied with the mean presurgical BCVA of being 1 and post-operative mean UCVA of 1 in the moderate myopia group and a mean BCVA of 0.3 and post-operative UCVA of 0.5 in high myopia.

The overall predictability was 100% in the mild and moderate myopia group and > 80% in high myopia group which is comparable to the study conducted by Tahzib NG ² et al,. The uncorrected vision score was directly correlated with the mean post – operative spherically equivalent. Also, predictability was good as in all 3 groups, 90% of the patient were within mean spherical equivalent of -0.056 D range in low myopia group and mean of -0.12 D range in moderate myopia group and mean of -1.368 D range in high myopia group after 6 months follow up. In our study lasik was performed using SCHWIND ESIRIS excimer laser system. Compared to our results other studies conducted on SCHWIND ESIRIS platform showed similar results.

Also, the SCHWIND ESIRIS excimer system was compared to another wave front guided Zyoptik laser system. In a study conducted by Tahzib NG ^[2] et al, using wave front guided Lasik, the mean post-operative UCVA at 6 months was -0.072 ± 0.008 and mean spherical equivalent of -0.11 ± 0.24 D which was comparable to

our study on the SCHWIND ESIRIS system with a mean overall post-operative UCVA of 0.9 and mean post-operative spherical equivalent of -0.29. In another study done by Sujal Shah & Anand Shroff [3] 1357 eyes with myopia between -1 D to -15.5 D. At 12 months follow up

- 863 eyes were within -0.5 D
- 981 eyes were within -1 D of intended correction
- 926 eyes had unaided vision of 6/6.
- 978 eyes had 6/12 or better which was similar to our study.

In a study done by Manns T^[4] et al., mean pre-operative UCVA was -4.41 ± 1.98 . Mean postoperative UCVA at 1 year was -0.14 ± 0.31 D. Standard deviation below 0.5 D, which is comparable to our study. The study result of Ali A Mearza et al., [5] at 6 months postoperative mean decimal UCVA was 0.96 ± 0.22 (range: 0.3 to 1.2) for ESIRIS eyes and 0.98 ± 0.17 (range: 0.6 to 1.2) for ALLEGRETTO eyes ($P=.57$). Mean postoperative spherical equivalent refraction was -0.02 ± 0.28 diopters (D) (range: -0.75 to +0.75 D) for ESIRIS eyes and 0.11 ± 0.91 D (range: -1.00 to +3.88 D) for ALLEGRETTO eyes ($P=.49$). Of the ESIRIS eyes, 20/22 (91%) were within ± 1.00 D of target refraction and 20/22 (91%) were within ± 0.50 D of target refraction. Of the ALLEGRETTO eyes, 20/22 (91%) and 19/22 (86%) were within ± 1.00 D and ± 0.50 D, respectively, of target refraction. No patient lost $>$ or $=2$ lines of BSCVA in either group which was similar to our study result.

Stability

The stability of vision was maintained throughout the 6 months follow up in all the three groups. In high myopia group the pre-operative mean UCVA was 0.5 which was comparable to the 6 months post-operative UCVA of 0.5 which remained stable which is statistically significant. At the patients in the high myopia group maintained their pre-operative BCVA or did better. There were no intra-operative complications in our study. There was no retreatment done on any of the patients. No patients developed corneal ectasia and only 6 % of patients reported dry eyes requiring tear substitute at 6 months. Importantly the safety profile of LASIK in this study is excellent. No eye lost more than one line of BCVA.

Conclusion

The findings in this study, are significant showing good unaided post-operative visual acuity with excellent safety profile. Overall patient satisfaction with the procedure is high with the SCHWIND ESIRIS laser system which is comparable to other sixth generation excimer laser system. The emergence of better laser nomograms, safer microkeratomes, larger optical zones and improved understanding of aberrations and their significance will lead to improvements in patient outcome in future.

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