

## Advancements in Laser Eye Surgery Through Sectional Study

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### ABSTRACT

**Background:** Laser in situ corneal surgery (LASIK) This technique has been considered as the most widespread and most widely performed refractive intervention in eye surgery in the world, which may show a high satisfaction index among patients after surgery. **Objective:** This study aimed to evaluate the results of vision quality for patients suffering from myopia and astigmatism after LASIK surgery. **Patients and methods:** We conducted a cross-sectional study of 74 patients ages 28-54 who suffered from myopia and astigmatism who underwent LASIK surgery. This study extended from February 16, 2022, to September 9, 2023. This study determined the importance of LASIK surgery in improving the visual function of patients in the long term in terms of satisfaction and happiness after surgery, functional improvement, and achieving the expected quality of vision. **Results:** Our results found that the percentage of males, which included 47 patients, was greater than that of females, which included 27 patients. The data for both surgery time were  $(22.46 \pm 0.8)$  minutes, and corneal thickness was  $(498 \pm 4.0)$  microns, recovery time was  $(3.6 \pm 2.4)$  days. Our outcomes found that the surgery to be a good option, and it was 98%. The main goal was achieved. It was 96%. They were satisfied with the result. It was 95.40%. Happiness after LASIK was 99%. **Conclusion:** LASIK surgery has shown that the surgical procedure is the most healing, the quickest to perform, and the safest, which increases functional improvement and which contributes significantly. Great quality optical resolution. Our results confirm that there is great patient satisfaction with LASIK surgery, which is attributed to the quality of this surgery, which improves visual ability in a safer and more accurate way.

**KEYWORDS:** LASIK surgery; Patient Satisfaction; Quality of Life; Myopia and Astigmatism Outcomes.

## INTRODUCTION

During 2015, about 3.4 million interventions were carried out worldwide, including in the USA [1]. The USA and the Asian continent are the areas with the largest number of interventions [2]. 62% of the cases performed with the LASIK technique have been associated with complications during and after the intervention. [3]

Alternatively, the surface refractive surgical technique known as laser subepithelial keratomileusis (LASEK) consists of lifting the epithelium with the application of 20–25% alcohol for subsequent ablation, preserving the tissue and then repositioning the epithelial flap [4-6]. With respect to other surface surgical techniques, such as photorefractive keratectomy (PRK), this procedure reduces postoperative pain and the production of epithelial opacities and, at the same time, offers faster visual recovery. [7]

In comparison with the LASIK technique, the number of complications related to the use of the microkeratome is reduced, resulting in better visual quality in low to moderate myopies [8,9]. In addition, it has been reported that at least 96% of patients achieve visual acuity levels of 20/40 or better [10]. The visual result of 20/20 after three months of surgery has been obtained in 64% of cases [11]. Among the main factors that influence the postoperative visual result are the amount of ametropia to be treated, the depth of the ablation, the pre-surgical corneal thickness, and the haze formation. [12,13]

The development of the excimer laser in 1983 expanded the world of Refractive Surgery with procedures such as photorefractive keratectomy (PRK) and, later, in situ laser keratomileusis (LASIK) [14]. Currently, Refractive Surgery motivates multiple congresses and publications around the world with dizzying development and remarkable technological advances. [15]

Refractive error can be explained as an ocular condition in which the light rays entering the eye are not focused on the photoreceptor lamina of the fovea on the retina, resulting in blurred vision [16]. Of the refractive vices, myopia, hyperopia, and astigmatism are the three most common types, with surgical treatment alternatives that are quite consolidated nowadays. [17]

Refractive errors account for more than half of the low vision and blindness in the world [18]. In Australia, refractive errors account for 62% of people with low vision and 4% of people with blindness. The prevalence of myopia in the United States of America, Western Europe, and Australia is 25.4%, 26.6%, and 16.4%, respectively [19]. Globally, it is estimated that about 1.6 billion people in the world have myopia [20]. The World Health Organization has estimated that uncorrected refractive error is responsible for low vision in 153 million people and blindness in 5 million people worldwide. [21]

## Patients and methods

A cross-sectional study was conducted to evaluate the outcomes of LASIK surgery for patients. Seventy-four patients suffering from myopia and astigmatism were recruited, which extended from February 16, 2022, to September 9, 2023. Demographic data was collected for patients between the ages of (28-54),

which included age, gender, causes, refraction, and professional and economic status. This study recorded clinical data for LASIK surgery, which included surgery time, corneal thickness, healing time, and follow-up duration.

The main symptoms distributed to all patients were identified, and their impact on visual function was determined, which included Light sensitivity, Gritty eyes, Painful eyes, and Dry eyes. Functional improvement was evaluated by comparison between before and after surgery. Moreover, this study showed the identification of visual parameters of vision, which were compared between before and after surgery, where the patient data included myopic field and hyperopic field, and others, which included showing the spherical equivalent for eyes with myopic field, as well as showing the spherical equivalent for eyes with hyperopic field.

Regarding postoperative results, LASIK surgery identified postoperative complications in terms of dry eyes, glare or halos around lights, night vision problems, and fluctuation vision. An evaluation and measurement of the extent of the visual phenomena that disturb the patient’s vision was conducted, and the evaluation criteria included all, which are there are visual phenomena, no pain, slight pain sometimes, very painful, and severe pain. In addition, this study showed the identification of data through which all functional developments and improvements in visual vision were recorded. The degree of patient satisfaction with LASIK surgery and the quality of the surgery were also evaluated, which included all of whom the surgery was a good option, the main goal was achieved, satisfaction with the result, and happiness after LASIK, understanding the LASIK procedure before surgery, improving quality of life, achieving the expected quality of vision.

**RESULTS**

**Table 1:** Demographic characteristics outcomes for patients who underwent in LASIK surgery.

Characteristics	Number of patients [74]	Percentage [%]
<b>Age, mean [SD]</b>	41.5 ± 13.6	
<b>Sex, N [%]</b>		
Males	47	63.51%
Females	27	36.49%
<b>Causes</b>		
Excessive near-work	32	43.24%

Limited outdoor activities during childhood	24	32.43%
It may occur due to an eye injury, surgery, or disease	18	24.32%
<b>Refraction</b>		
Sphere	-3.64 ± 1.8	
Astigmatism	0.88 ± 0.68	
Spherical equivalent	- 3.73 ± 1.72	
<b>Occupation status</b>		
Employed	48	64.86%
Unemployed	26	35.14%
<b>Economic status, \$</b>		
300 – 600	32	43.24%
601 – 900	24	32.43%
901 – 1200	18	24.32%

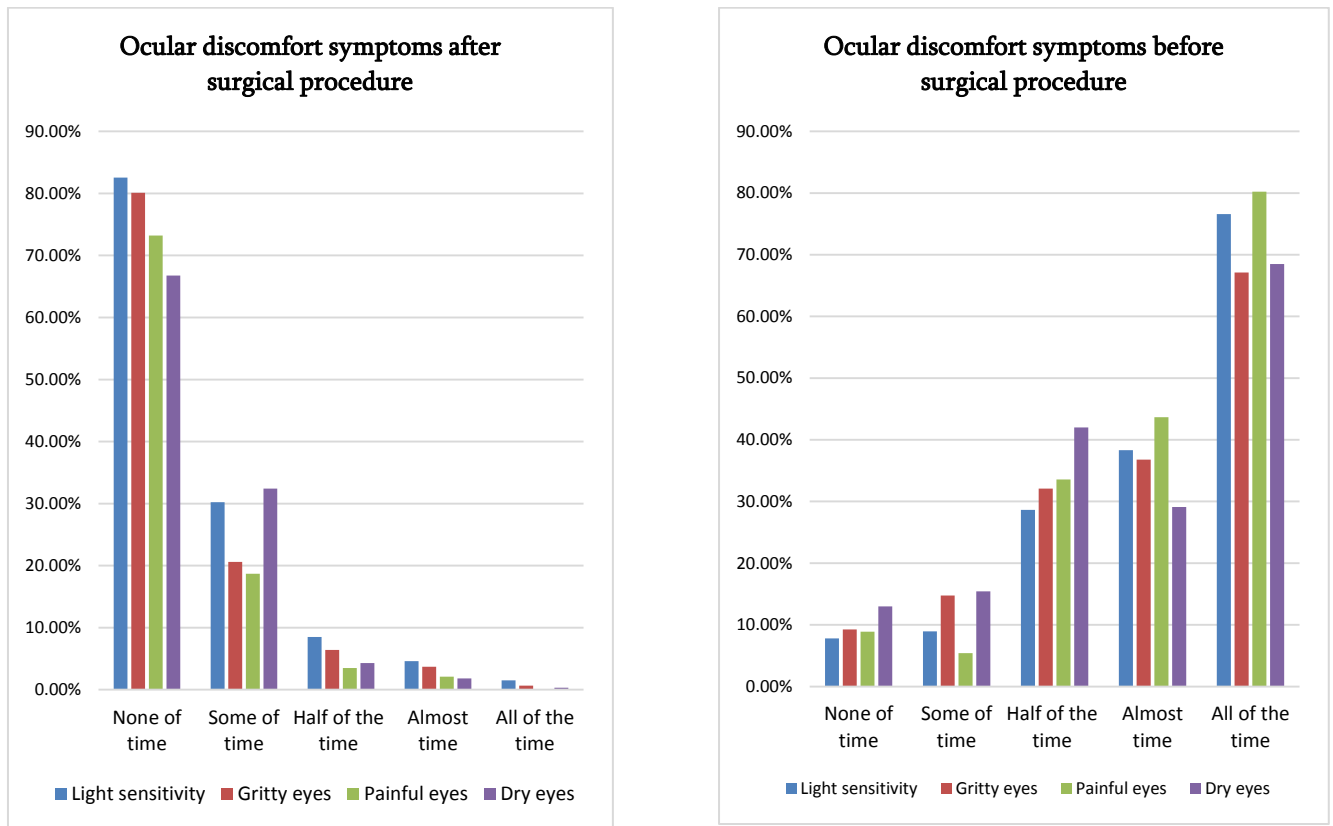
**Table 2:** LASIK surgery data.

Parameters	Mean [SD]
Operative time [min]	22.46 ± 0.8
Corneal thickness, microns	498 ± 4.0
Recovery time, Days	3.6 ± 2.4
Follow-up time, months	5.8 ± 0.2

**Table 3:** Clinical data outcomes of patients with preoperative and post-operative.

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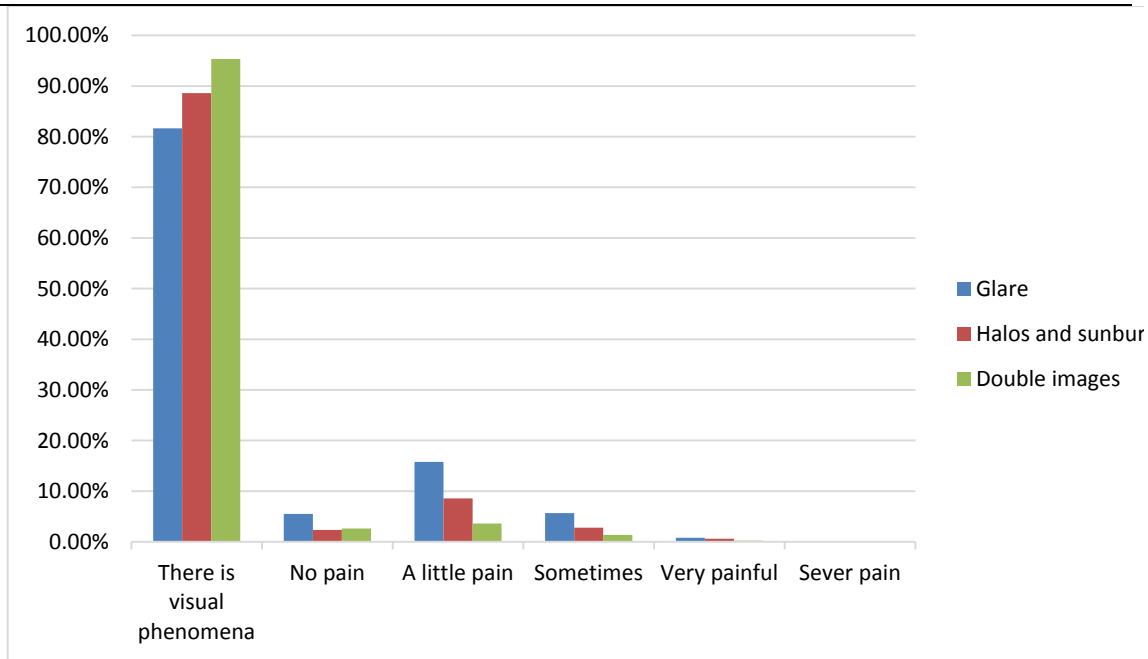
Parameters	Mean ± SD
<b>Pre-operative</b>	
Sphere	- 1.62 ± 2.71
Myopic sphere	- 2.86 ± 1.80
Hyperopic sphere	+ 2.10 ± 1.042
Cylinder	- 0.71 ± 0.70
MSE	- 2.011 ± 2.72
Manifest the spherical equivalent of eyes with the myopic sphere	- 3.20 ± 1.81
Manifest the spherical equivalent of eyes with the hyperopic sphere	+ 1.74 ± 1.13
Corrected distance visual acuity	- 0.078 ± 0.684
<b>Post-operative</b>	
Sphere	0.11 ± 0.563
Cylinder	- 0.31 ± 0.33
MSE	- 0.055 ± 0.50
Monocular uncorrected distance visual acuity	- 0.011 ± 0.142
Binocular uncorrected distance visual acuity	- 0.079 ± 0.11



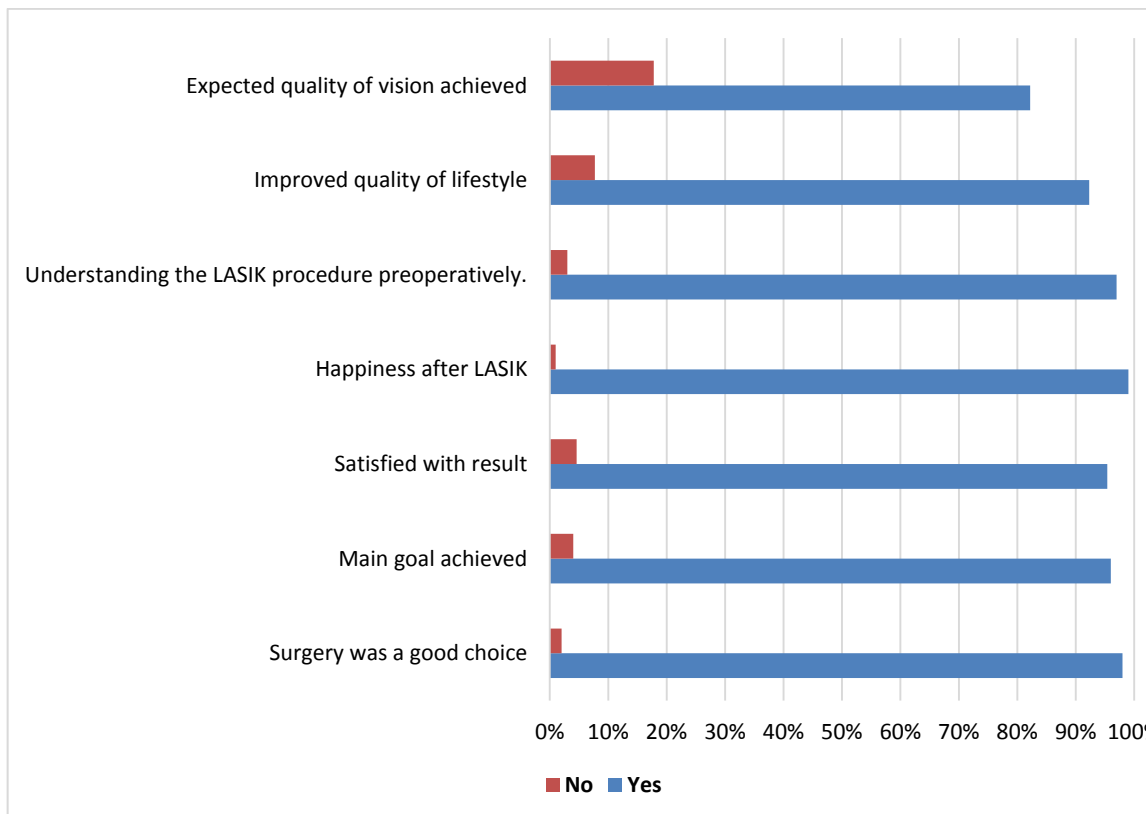
**Figure 1:** Identify ocular discomfort symptoms in terms of preoperative and postoperative.

**Table 4:** Post-operative complications outcomes.

Complications	Number of patients [74]	Percentage [%]
Dry eyes	1	1.35%
Glare or halos around lights	2	2.70%
Night vision problems	2	2.70%
Fluctuating vision	1	1.35%
<b>Total</b>	<b>6</b>	<b>8.11%</b>



**Figure 2:** Measure of the extent to which visual phenomena bothersome the patient's vision.



**Figure 3:** Assessment satisfaction score of patients on the LASIK surgery.

## DISCUSSION

This study recorded demographic data for patients undergoing LASIK surgery in terms of age, which found that the majority of older ages are those who suffer most from visual vision problems. In terms of gender, our results found that the percentage of males included 47 patients, which was more than the percentage of females, which included 27 patients. In terms of the causes resulting from poor vision and astigmatism, where we found excessive near work with 32 patients, and limited outdoor activities during childhood in 24 patients, or caused by an eye injury, surgery, or disease in 18 patients, the results of refraction found in Sphere were  $(-3.64 \pm 1.8)$  and astigmatism was  $0.88 \pm 0.68$ . In terms of professional status, our results found that the employed participants were 48 patients, and non-employees were 26 patients. The economic status was determined as (\$300 - \$600) were 32 patients and (\$601 - \$900) were 24 patients. (\$901-\$1200) were 18 patients.

Our study recorded the results of LASIK surgery, which included data on surgery time was  $(22.46 \pm 0.8)$  minutes, corneal thickness was  $(498 \pm 4.0)$  microns, healing time was  $(3.6 \pm 2.4)$  days, and follow-up time was  $(5.8 \pm 0.2)$  months. Moreover, the symptoms of ocular discomfort were measured in terms of preoperative and postoperative symptoms, as the results of postoperative symptoms showed a high improvement in visual function, specifically in both Light sensitivity, which was 82.55%, and Gritty eyes, which was 80.10%, which indicates the absence of pain most of the time. While before surgery, discomfort or pain was most common in both Light sensitivity, which was 76.60%, and Gritty eyes, which was 67.13%. Post-operative clinical complications were recorded in 6 patients, and they were more common: Glare or halos around lights, which included two patients, and Night vision problems, which included Two patients.

This study evaluated the degree of satisfaction and quality of life of patients and the achievement of this vision through a questionnaire that was conducted to measure the rate of patients' satisfaction with surgery, where they found surgery to be a good option, and it was 98%, the main goal was achieved was 96%, and they were satisfied with the result was 95.40%, happiness after LASIK It was 99%, understanding of the LASIK process before surgery was 97%, improving quality of life was 92.30%, and achieving the expected quality of vision was 82.20%.

Most studies have agreed that LASIK surgery is the safest refractive surgery and that it has a significant impact on improving the rate of light-focusing abilities on the retina, which results in an improvement in the rate of vision for patients [22]. Another study showed that LASIK surgery has great effectiveness on patients in terms of operation time and speed of recovery due to its rapid and effective results with a significant improvement in vision after the procedure, which allows for improvement of visual acuity and a decrease in the occurrence of complications, negatively affecting patients after surgery [23]. Regarding functional improvement, this Spanish study on LASIK surgery found its effect in demonstrating accuracy in visual abilities, with many patients recording excellent visual acuity of 20/20, which is attributed to achieving a high satisfaction rate with LASIK surgery and enhancing comfort and quality of life. [24]



## CONCLUSION

This study indicates that the improvement of visual function parameters causes an improvement in overall functional performance, which results in a significant improvement in the quality of life of patients after surgery, with very high patient satisfaction with LASIK surgery. According to the questionnaire conducted on patients, many myopic patients face a high risk of visual impairment due to night driving or glare before surgery. However, LASIK surgery showed a high improvement in visual function, which is attributed to a significant reduction in the presence of complications and symptoms and a reduction in their impact on the field of vision.

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