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Long-term results of laser in situ keratomileusis for myopia

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Abstract

Laser in situ keratomileusis (LASIK) is still the most popular refractive surgery in the world. The aim of the study is to assess the long term clinical outcomes of LASIK in treating patients with different types of myopia. Pre- and postoperative distance visual acuity, refractive spherical equivalent (SE) and clinical examinations of dry eye disease were recorded. Values obtained at baseline and controls were compared with each other. While preoperative mean uncorrected distance visual acuity (UDVA) of low and moderate myopic patients was 0.1±0.07 on Snellen eye chart, and it was 0.86 ±0.11 at the 6th month and 0.92 ±0.05 at the 3rd year. At the last control examination, the percertages of manifest refractive SE in the range of ±0.50D and ±1.00D were 78.3%, 88.3%, respectively. The mean UDVA of high myopic patients was 0.03 ±0.02 preoperatively, and it was 0.84 ±0.16 at the 6th month and 0.69 ±0.21 at the 3rd year. UDVA at 3 years was significantly decreased compared with 6 month postoperatively.(p=0.01) At the last control examination of this group, the percentages of manifest refractive SE in the range of ±0.50D and ±1.00D were 48.3%, 66.1 %, respectively. These also decreased from 6 month to 3 years postoperatively.The mean tear break-up time and schirmer-1 values, which decreased in the postoperative first year visits of the patients, were close to the preoperative values at the last control. There were no statistically significant difference between the preoperative and 3rd year comparisons.(all p>0.05) In conclusion, LASIK is an effective and safe procedure in patient with myopia, preoperative higher SE is a predictor of low postoperative efficacy.

Keywords: Cornea, Myopia, laser in situ keratomileusis, visual outcome, dry eye disease

Introduction

Myopia is a refractive anomaly which is a global public health issue. Glasses and contact lenses are the most preferred options for good vision in daily life. Although glasses are safe and effective methods for correction of myopia and myopic astigmatism, many patients are looking for others due to the difficulty of using glasses from a personal and social perspective. Contact lens is an alternative, but it has some disadvantages and may also cause ocular complications. Dry eye desease, discomfort, corneal infiltrates and giant papillary conjunctivitis are the most common complications of contact lenses [1]. Refractive surgery is a permanent solution which is an attractive option for many patients.

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Refractive surgery is an area that has developed rapidly in ophthalmology. The last century witnessed the development of refractive surgery, starting with manual methods such as refractive cornea shaping and curved incisions [2]. After years of radial keratotomy for myopia, Tokel et al. performed photorefractive keratectomy (PRK) on myopic eyes in 1983 using a 193 nm argon fluoride laser [3]. PRK is an effective, safe and predictable procedure for correcting different types of myopia. However, over time, problems such as postoperative pain, corneal haze, and myopic regression have emerged as disadvantages of PRK [4]. In refractive surgery, Pallikaris defined the LASIK procedure in 1989 [5]. The most important reasons for preferring LASIK over PRK are reduced post-operative pain, rapid visual rehabilitation, and minimized possibility of regression. Furthermore, the decrease in some complications in long-term follow-ups has made the LASIK procedure more popular [6]. However, some limitations remain, such as postoperative myopia regression and dry eye development [7]. The patient usually perceives dry eye symptoms immediately after surgery which are usually temporary. However, some may be more severe than others and may harm vision quality [8].

Even if different and new surgical techniques emerge, LASIK refractive surgery remains on the agenda. This study aimed to examine the change in refractive errors, visual acuity change, and possible complications in the long term follow-up of myopic cases who underwent LASIK surgery.

Material and Methods

Local Ethics Committee (Cemil Tascioglu City Hospital Ethic Committee ref no: 2022/259) allowed this study. The records of 98 patients who received myopia and/or myopia astigmatism diagnosis and had a LASIK refractive surgery between September 2008 and June 2014 at the ophtalmology departments of Okmeydani Training and Research Hospital were retrospectively analyzed through the hospital's electronic database.

A comprehensive ophtalmologic examination that including corrected and un corrected visual acuity (UDVA), manifest, fogging and cycloplegic refractions testing on Snellen eye chart, slit lamp examination of the anterior segment and retina assessment with pharmacological mydriasis. Schirmer 1 and tear break-up time (TBUT) tests were also applied to the patients before the operation and in the control examinations. Pentacam (Oculus,Wetzlar, Germany) was used for corneal topography measurements of patients. Only the individuals with myopia and myopic astigmatism included in our research. Inclusion criteria consisted no contact lens wear 3 weeks before surgery, stable refraction, an age of 22 years or older, with astigmatism of <1.50 Diopter(D) and best corrected visual acuity of at least 0.7 on Snellen chart. Individuals with a record of a concurrent systemic diseases such as diabetes mellitus or hypertension, any ocular diseases or any history of ocular trauma were also aliminated from the investigation.

All surgeries were performed by two surgeons using the same protocol and technique. After topical anesthesia, Automated Corneal Shaper Microkeratome (Moria, Antony, France) was utilized to make corneal flap. LASIK was performed with the MEL 80 (Carl Zeiss Meditec, Jena, Germany) excimer laser system. Postoperatively, diclofenac 0.1% (Voltaren, Novartis) and tobramycin (Tobrex, Alcon Lab., Ft Worth, Texas) eye drops associated with preservative free tear substitutes were used 4 times per day for 3 weeks. Fluorometholone 0.25% was applied 4 times daily for a 3 weeks based on refraction and intraocular pressure.

One hundred and seventy six eyes were divided into two groups according to the degree of preoperative spherical equivalent (SE). Group 1 eyes had mild and moderate myopia (0 to -6.00D) ; group 2 eyes had high myopia (more than -6.00). Postoperative examination were performed at 1 day, 1 week, 1 month, 3, 6, 12 and 36 months. UDVA , best corrected visual acuity by manifest refraction, slit lamp biomicroscopy, Schirmer-1 test, TBUT and cornea topography were performed during all visits.

Statistical Analysis

For statistical analysis, the chi-square test was employed to compare the frequencies and percentages of the groups. The Kolmogorov-Smirnov test was used in the analysis of the normal distribution, and the follow-up paired t test was performed to compare the mean values of the variables for the groups. The results were displayed as mean ± standard deviation. SPSS for windows was used to conduct all statistical analysis. (Version : 21.0) Statistics were considered significant at $p< 0.05$.

Results

This study investigated the examination records of 176 eyes of 98 patients.The ages were between 22 and 45, and the mean age was 29.23±4.67. There were 97 eyes in group 1 and 79 eyes in group 2. No statistically significant difference was present between the groups in the comparion of gender and mean age. (p=0.08, p=0.07 respectively) (Table 1)

Table 1. Patient demographics of the 176 matched eyes that underwent LASIK treatment for different degrees of myopia

Characteristic	Group1 (Mean±SD)	Group2 (Mean±SD)
Age (years)	28.13±5.27	29.88±6.15
Gender (% female)	%61.1	%57.3
Manifest spherical equivalent (D)	- 4.29±0.52 D	-7.89±1.10 D
Cylinder (D)	-0.65±0.37 D	-0.74±0.48 D
Corneal thickness (µm)	546.62±33.29 µm	534.38±41.32 µm
UDVA (Snellen Chart)	0.1±0.06	0.03±0.02
Schirmer's 1 (mm)	20.41±4.26 mm	19.12±7.06 mm
Tear break-up time (sec)	10.2±1.8 sec	9.8±2.2 sec

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The mean SE of the refractive error in the preoperative examinations of the patients in group 1 was 4.29±0.52 D. Later, it was -0.35±0.18 D, -0.38 ±0.16 D, and -0,41±0.46 D in the postoperative 6th month, 1st year, and 3rd year, respectively. There was no statistically significant difference in the mutual comparison of the values from the controls.(all p>0.05) In group 2, the mean SE of the refractive error in the preoperative examinations of the patients was -7.89 ±1.10 D. Then, it was -1.07± 0.24 D, -1.13 ± 0.36 D, and -1.41±0.48 D in the postoperative 6th -month, 1st -year, and 3rd -year, respectively. In the mutual comparison of the values in the controls, statistically significant differences were presented between the 3rd -year and 6th -month , 3rd -year and 1st -year values.(p=0.04, p=0.03, respectively) (Figure 1).

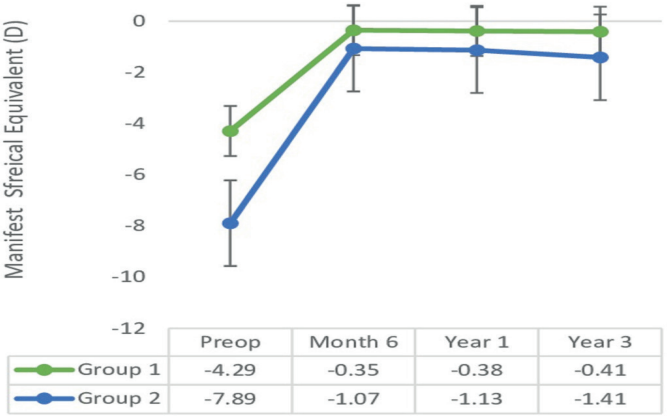

Figure 1. Mean value of SE preoperatively and 6 months, 1 and 3 years after

In the last control examination of the first group (in the 3rd -year), the percentages of manifest refractive SE in the range of ±0.50 D, ±1.00 D and ±2.00 D were 78.3%, 88.3%, and 97.9%, respectively. In the last control examination of the second group (3rd -year), the percentages of manifest refractive SE in the range of ±0.50 D, ±1.00 D and ± 2.00 D were 48.3%, 66.1%, and 84.4%, respectively. (Figure 2)

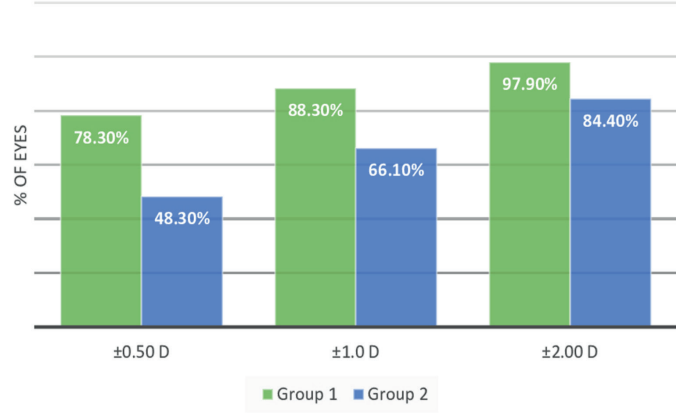

Figure 2. Percentages of eyes within ±0.50 D, ±1.00 D and ±2.00 D (in terms of SE) at 3 years after LASIK surgery

In group 1, the mean preoperative UDVA of the patients on Snellen chart was 0.1 ±0.06, while it was 0.86±0.11, 0.91 ± 0.06, and 0.92±0.05 in the postoperative 6th-month, 1st-year, and 3rd- year, respectively. There was no statistically significant difference in the mutual comparison of the values obtained in the controls.(all p>0.05). In group 2, the mean UDVA in the preoperative examination of the patients was 0.03±0.02, while it was 0.84±0.16, 0.81±0.12, and 0.69±0.21 in the postoperative 6th month,1st year, and 3rd year, respectively.In the mutual comparison of the values obtained in the controls, there were statistically significant differences between the 3rd-year and 6th-month , 3rd-year and 1st-year values.(p=0.03, p=0.04, respectively) (Figure 3)

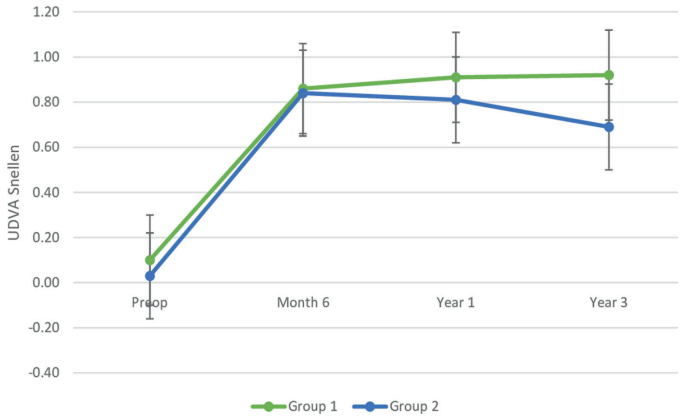

Figure 3. Time course of mean UDVA on Snellen chart after LASIK surgery. Errors bars represent the standard deviation

In group 1, the mean preoperative UDVA of the patients on Snellen chart was 0.1 ±0.06, while it was 0.86±0.11, 0.91 ± 0.06, and 0.92±0.05 in the postoperative 6th-month, 1st-year, and 3rd- year, respectively. There was no statistically significant difference in the mutual comparison of the values obtained in the controls.(all p>0.05). In group 2, the mean UDVA in the preoperative examination of the patients was 0.03±0.02, while it was 0.84±0.16, 0.81±0.12, and 0.69±0.21 in the postoperative 6th month,1st year, and 3rd year, respectively.In the mutual comparison of the values obtained in the controls, there were statistically significant differences between the 3rd-year and

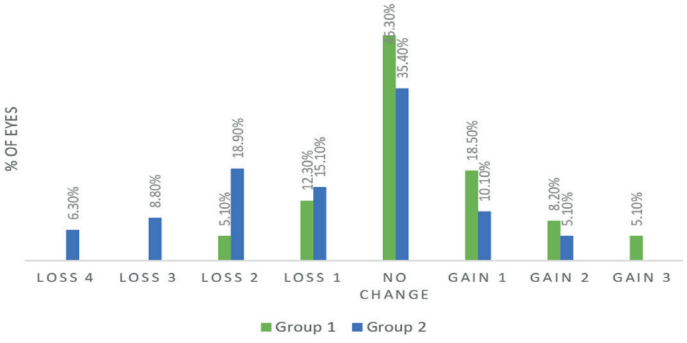

Figure 4. Gained and lost lines according to the comparison of 3rd-year and 6th-month control of UDVA on Snellen chart

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The mean preoperative TBUT was 10.2±1.8 sec. in group 1, it was 7.1 ± 2.9 sec, 9.4 ± 2.4 sec, and 10.1±2.3 sec in the 6th-month, 1st-year, and 3rd-year of the control examinations, respectively. After comparing the control visits and pre-LASIK values, only the 6th-month control value was statistically significantly lower (p=0.03, p=0.06, p=0.12, respectively). The mean preoperative Schirmer-1 test was 20.41±4.26 mm, while it was 14.11 ± 5.18 mm, 16.37 ± 6.26 mm, and 19.91±3.84 mm in the 6th-month, 1st-year, and 3rd-year, respectively. After comparing the control visits and pre-LASIK values, the values at the 6th-month and 1st-year controls were statistically significantly lower (p=0.03, p=0.04, p=0.08, respectively). In group 2, the mean TBUT was 9.8±2.2 sec, while it was 7.2±1.9 sec, 9.1 ± 2.1 sec, and 9.6±0.9 sec in the 6th month, 1st year and 3rd year, respectively. In the control visits and the pre-LASIK values, only the 6th-month control value was statistically significantly lower (p=0.03, p=0.06, p=0.11, respectively). While the mean preoperative Schirmer-1 test was 19.12±7.06, the mean postoperative Schirmer-1 test was 15.93±4.17, 18.06 ± 3.75, and 18.32±6.12 in the 6th-month, 1st-year, and 3rd-year, respectively. In comparing the control visits and pre-LASIK values, only the 6th-month control value was statistically significantly lower.(p=0.03, p=0.06, p=0.09, respectively) (Figures 5,6). In the first year controls, there were complaints of dry eye symptoms in eight casesin group 1 and eleven cases in group 2. In the controls, dry eye were presented in two cases in group 1 and four cases in group 2.

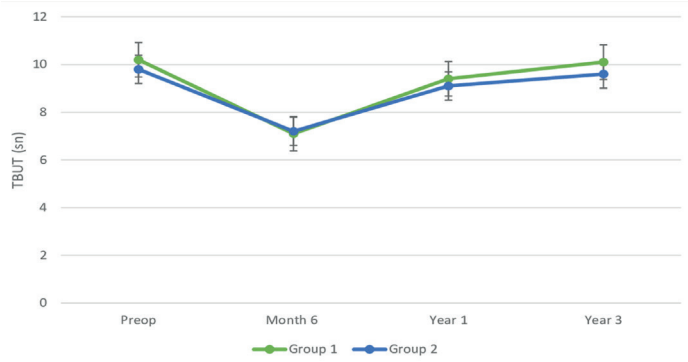

Figure 5. Time course of mean TBUT

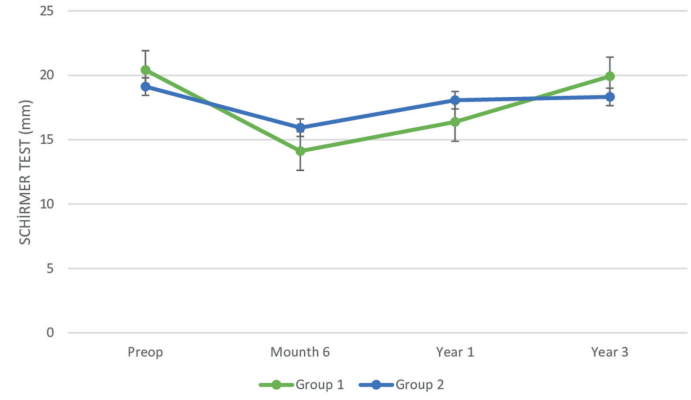

Figure 6. Time course of mean Schirmer-1 test

Intraoperative and postoperative complications

Only four eyes (2.2%) had complications during the operation. These were limbal hemorrhage in two eyes (1.1%), epithelial defect during microkeratome transition in one eye (0.5%), and free flap in one eye (0.5%). Among the most common early complications in the postoperative period, forign materials were presented in four eyes (2.2%), diffuse lamellar keratitis (DLK) in two eyes (1.1%), and flap wrinkles in three eyes (1.6%). After the necessary surgical treatment and medical follow-up, there were no subjective complaints about the quality of vision. Corneal ectasia development and vitreoretinal complications did not appear in any of the cases. In the late postoperative period, the epithelial invasion was present in eleven eyes (6.2%). In 10 of these eyes, no progression to the central region was present, and therefore, there was no intervention. In one eye, progression to the central region was present in the 6th month, and the epithelium was cleaned by removing the flap.

Discussion

Refractive surgeries provide patients with refractive errors with a permanent corrective solution beyond glasses or contact lenses. Therefore, optimizing the results of these elective surgeries and avoiding complications are crucial. In the literature, Goes applied LASIK to eyes with low astigmatism values and mild-moderate myopic refractive error. He found that 60 of 68 eyes (88%) had a Snellen score of 0.9 or above, a spherical refractive error of 0.13 ±0.30 D, and 65 of 68 eyes (96%) had a targeted refractive correction of ±0.50 D during the 1-year follow-up period. One of the results of this study using the Mel 80 device, was that at one month, 17% of eyes and at one year, 13% of eyes gained two lines or more in visual acuity . Starting from the first month until the first year, all of the eyes were stable [9]. The results by O'Doherty et al. at the end of the fifth year in myopic eyes administered LASIK are also interesting. In their study, the percentage of preoperative mean SE refractive error was 81% in 49 eyes with -4.85 D, while it was within ±1.00 D in the second postoperative month and 85% in the 5th year. The rate of UDVA at 20/40 or above was 88% at 2 months, while it was 89% at 5 years. Moreover, UDVA increased by 51% in the fifth year compared to the 2nd month, while it continued at the same level in the other eyes. At the end of the fifth year, an average of -0.50 D myopic regression was present [10]. The results obtained from our study show that LASIK surgery gives effective, stable, and reliable results in low and moderate myopic errors. As a result of the 3-year follow-up, manifest refractive SE was - 0.48±0.46, while it was in the range of ± 0.50 D in 78.3% of the cases. At the end of 3-year follow-up, the mean UDVA was 0.92±0.05 on Snellen chart, and when the 6th-month control was compared, there was no change in the visual acuity in 45 (46.3%) of 97 eyes. However, 31 (31.9%) cases had a visual acuity gain, and 18 (18.4%) lost line on Snellen chart. At the end of the follow-up period, no patients required retreatment in this group. Refractive error and vision results were consistent with

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the literature. Ikeda et al. noted that conventional LASIK offered good safety outcomes in mild and moderate myopic patients during the 12-year observation period. As a result of the 12-year follow-up, while mean manifest refractive SE was -0.68±0.26 D, 87.3% of the cases were in the range of ± 1.00 D. In comparing the results of the last visit and the follow-up results of the first year, there was no change in UDVA on Snellen chart in 23% of the cases, while only one Snellen line of UDVA loss noted in approximately 67% of the cases [11]. Kim et al. found UDVA on Snellen chart mean 0.92±0.05 as a result of 3-year follow-ups, and manifest refractive SE was -0.68±0.26 D. At the end of the follow-up, low and moderate myopic group 59.3% of the cases were detected in the range of ± 0.50 D and 81.3% in the range of ±1.00 D [12].

The disadvantage of many corneal refractive surgeries is refractive unstability on the long term, especially in the high myopia group. In the literature, long term results after excimer laser procedures differ in eyes with high myopic refractive error. Alio et al. showed that at ten years, manifest SEs of 82 (42%) of 196 eyes were within ±1.00 D, and 119 (61%) were within ±2.00. Myopic regression decreased with time in eyes that did not undergo retreatment, with a mean rate of -0.25±0.18 D per year [13]. Lin et al., in their series of 66 cases with a mean SE of - 8.15 ± 0.94 D before the operation, noted that mean manifest refractive SE was -0.64 ± 0.95 D. As a result of the follow-up, the mean rate of patients with UDVA over 20/20 was 62.1% on Snellen chart, while 61% of cases were within ± 0.50 range and 82% were within ±1.00 range [14]. Ikeda et al. found the mean SE was -0.53 D at the end of the first year and -1.40 D at the end of the 12th year in their series of 38 cases with a mean preoperative SE - 8.15 ± 0.94 D. At the end of the first year, the average value of UDVA of patients over 20/20 on Snellen chart was 61%, while 82% of the cases were in the ± 1.00 D range. At the end of the 12th -year, the mean value UDVA of patients over 20/20 on Snellen chart was 22%, and 66% of the cases were in the ± 1.00 D range. They noted that conventional LASIK surgery offered good safety outcomes during the 12-year observation period. However, its efficacy and predictability gradually decreased due to myopic regression from corneal steeping [11]. In our results, the mean percentages of manifest refractive SE in the range of ± 0.50 D and ± 1.00 D in the 3rd-year control of advanced myopic patients were 68.3% and 76.1%, respectively. And the mean manifest refractive SE was -1.41±0.18 D in the last control. The mean UDVA of the patients was 0.81±0.16 and 0.76±0.21 in the postoperative 6th-month and 3rd-year, respectively. In UDVA, the loss rates were one line in 12 (15.1%) , two lines in 15 (18.9%), three lines in 7 (8.8%), and four lines in 5 (6.3%) of 79 eyes. No patient had a retreatment laser application for up to 3 years. In the advanced myopia group there were only 6 eyes with indication for retreatment. It is difficult to say that only one mechanism explains the regression that develops after LASIK in myopic eyes. Many possible explanations are present on this subject. High myopic eyes may respond differently to LASIK surgery than low myopic eyes due to a higher corneal elasticity and relatively thinner sclera. Additionally, different mediators have roles in wound healing in these eyes, which show that not only epithelial changes influence myopic regression [15].

Kim et al. stated in their study that LASIK may be safe and effective on a large myopic population, but over time myopic regression occurs. Lower preoperative best corrected visual acuity and higher preoperative SE can predict low postoperative efficacy [16]. Ikeda et al. reported that LASIK offered good safety outcomes in highly myopic eyes during their 12-year observation period, however the predictability and efficacy gradually decreased with time because of myopic regression [11]. Kato et al. showed that postoperative refraction progressed statistically significantly one year after LASIK in patient with high myopia [17]. Although the exact etiology remains unclear, potential mechanisms leading to myopia regression after LASIK are as follows: stromal synthesis, keratocyte proliferation, axial elongation, corneal forward shift, epithelial hyperplasia, corneal hydration, and nuclear sclerosis [18-24]. In study of Xia et al., patients with high myopia who underwent small incision lenticule extraction (SMILE), mean residual refractive error was observed -0.02 D in the 6th-month and this value remained at the end of the 3rd-year. In the femtosecond assisted LASIK group, residuel refractive error was mean -0.15 D in the 6th-month and it progressed to an average of -0.43 D at the end of the third year. As a result of their 3-year follow-up, the mean of UDVA on Snellen chart in the SMILE group was 92.3% and above, while it was 89% in the femtosecond assisted LASIK group [25]. The systematic comparative meta-analysis study published by Fu et al focused on the results of femtosecond assisted LASIK and SMILE applied in myopic patients. There were no statistically significant differences in the results of these two procedures for patients with moderate and low myopia. However, in the high myopia group, the postoperative corrected distance visual acuity values of those who underwent SMILE were statistically significantly higher than femtosecond assisted LASIK group [26]. Yu et al. suggested that, in vivo, the excimer laser used in LASIK released more cytokines and chemokines than those released in SMILE. LASIK collected more inflammatory cells in the surgical site.[27] SMILE surgery seems to be an appropriate alternative in selected cases in the high myopic patient group.

Due to the formation of corneal flaps in LASIK, various problems may be experienced in the flap, cornea interface, and stroma. The most common problems are subconjunctival hemorrhage, epithelial defects, suction loss, foreign body, diffuse lamellar keratitis, thin flaps, buttonhole flaps, free flaps, flap decentralization, and flap wrinkles [7]. In our study, only 4 eyes (2.2%) had complications during the operation. These were limbal hemorrhage in 2 eyes (1.1%), epithelial defect during microkeratome transition in 1 eye (0.5%), and free flap in 1 eye (0.5%). Ablation continued normally in the eye that developed a free flap intraoperatively, the flap was repositioned without sutures, and the patient was followed up with a contact lens for a while. Among the most common early complications

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in the early postoperative period, foreign bodies were found in 4 eyes (2.2%), diffuse lamellar keratitis in 2 eyes (1.1%), and flap wrinkles in 3 eyes (1.6%). After the necessary surgical treatment and medical follow-up, there were no subjective symptoms related to visual quality in these cases. In the late postoperative period, the interfacial epithelial invasion was presented in eleven eyes (6%). In these eyes, epithelial invasion mostly appeared in the periphery, and since only one of them had epithelial invasion toward the center and increased astigmatism, the flap was removed and washed in the 3rd month. In the long-term results of our study, no corneal ectasia and retina complications such as retina detachment, choroidal neovascular membrane, macular hole, retinal hemorrhage, and endophthalmitis were found.

Last but not least, dry eye syndrome is still the most frequent complication of LASIK [28]. After flap making combined with excimer laser photoablation the cornea is denervated, and its sensitivity decreases. Therefore, the neural impulse originating from the ocular surface and stimulating the lacrimal gland is disrupted, and tear secretion is significantly reduced [29]. This induces a decrease in tear secretion, tear film quality, epithelial wound healing and blinking rates. Tear secretion returns to its normal level as the nerves begin to regenerate in the dense cornea during the recovery period. Post refractive dry eye syndrome is an immediate issue because of patients' visual comfort and quality of life dictate their overall satisfaction [30]. In their study on dry eye detection after LASIK, Toda et al. found a significant decrease in the results of TBUT and Schirmer tests from the postoperative 1st to the 6th month than the preoperative period. However at the end of the first year, these values were close to preoperative values. They pointed out the significance of using artificial tears for patients for a long time after the operation [31]. Paiva et al. found no statistically significant difference in the dry eye ratio in their comparison between the groups determined according to nasal and superior approaches while forming a corneal flap. They found a statistically significant difference in the test results they applied for dry eye in both groups compared to the preoperative results. Hence, they reported that the risk of dry eye syndrome is correlated with high myopia and the depth of laser treatment [32]. In our study, Schirmer-1 and TBUT tests were low in the first postoperative controls. There was no statistically significant difference in comparison with preoperative values in the controls at the end of the third year. Subjective dry eye complaints were recorded in only 6 cases in the patient files. Xia et al. found significantly longer TBUT values and lower OSDI scores in the SMILE group than in the femtosecond assisted LASIK group at 1st and 3rd months postoperatively. Their data also showed a faster recovery of ocular surface damage in the SMILE group than in the femtosecond assisted LASIK. It should be attributed to the slight cornea nerve damage and a more regular corneal surface during the new flapless technique of SMILE [25]. Li et al. demonstrated that patients in the SMILE group had greater central corneal sensitivity scores and less corneal staining than patients in the femtosecond assisted LASIK group [33]. Ganesh et al. showed statistically significant lower incidence of dry eyes in the SMILE group than in the LASIK group. They noted that although postoperative dry eye syndrome has decreased since the introduction of the femtosecond laser for flap creation; in SMILE procedure, the anterior stromal nerve plexus was signifcantly less disrupted than in femtosecond assisted LASIK [34].

One of the limtations of the study is its retrospective design. Since retrospective research may include several biases, such as information bias and selection bias, there may be some minor errors. Secondly, the sample size was relatively small. Only consecutive patients who completed thirty-six months of follow-up were presented. We know that our results can not be generalized to hundreds of thousands of patients undergoing excimer laser procedures. Thirdly, patients without astigmatism or with low astigmatism were presented in the study. It may be appropriate to conduct research with high astigmatic value. Lastly, because we conducted the study using patient records, we could not identify all predictive markers in dry eye disease. Two basic parameters were used in the research, but different parameters in the dry eye disease examination can be benefical.

Conclusion

In summary, primary LASIK surgery is effective and safe in treating myopia and myopic astigmatism refractive errors throughout the thirty six months observation period. However, our findings show that if the amount of myopic correction is large, myopic regression occurs in several cases after LASIK. Further randomized prospective studies over longer follow-up periods in patients with high-level myopia might be beneficial.

Conflict of interests
The authors declare that there is no conflict of interest in the study.

Financial Disclosure
The authors declare that they have received no financial support for the study.

Ethical approval
Local Ethics Committee (Cemil Tascioglu City Hospital Ethic Committee ref no: 2022/259) allowed this study.

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