Minisection: Outcomes Studies

Functional outcomes and patient satisfaction after laser in situ keratomileusis for correction of myopia

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PURPOSE: To determine subjective patient satisfaction and self-perceived quality of vision after laser in situ keratomileusis (LASIK) to correct myopia and myopic astigmatism.

SETTING: Department of Ophthalmology, Academic Hospital Maastricht, Maastricht, The Netherlands.

METHODS: A validated questionnaire consisting of 66 items was self-administered by 142 consecutive patients. Seven scales covering a specific aspect of quality of vision were formulated. Aspects included global satisfaction, quality of uncorrected and corrected vision, quality of night vision, glare, daytime driving, and night driving. Main outcome measures were responses to individual questions and scale scores, and correlations with clinical parameters including refractive outcome, uncorrected visual acuity, best corrected visual acuity, ablation depth, and scotopic pupil–optical zone disparity were obtained.

RESULTS: The mean score for the overall satisfaction was 4.1 $\pm$ 0.71 (SD) (scale 0 to 5.0). A total of 92.2% of patients were satisfied or very satisfied with their surgery, 93.6% considered their main goal of surgery achieved, and 92.3% would choose to have LASIK surgery again. Satisfaction with uncorrected vision was 3.03 $\pm$ 0.71. The mean score for glare was 3.0 $\pm$ 0.9. At night, glare from lights was believed to be more important than before surgery by 47.2%. Glare from oncoming car headlights after surgery was reported by 58.4% and was believed to be more bothersome for night driving than before surgery by 52.8%. Night driving was rated more difficult than before surgery by 39.4%, whereas 59.3% had less difficulty driving at night. There was a significant correlation between the uncorrected vision score and the postoperative spherical equivalent ($r = 0.245$) and postoperative astigmatism ($r = 0.265$). There was no correlation between the glare or night vision scores and the degree of correction, the amount of ablation depth, or the disparity between the scotopic pupil and the optical zone.

CONCLUSIONS: Self-perceived uncorrected vision after LASIK surgery for the correction of myopia and myopic astigmatism appears to be very good and is related to the postoperative residual error. Although the majority of patients postoperatively experienced glare, particularly with driving at night, this was not related to the pupil-optical zone disparity or degree of correction.

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Studies of the medical outcome of laser refractive surgery for the treatment of ametropia, including myopia and astigmatism, have shown great success.[1,2] Likewise, patient satisfaction after laser in situ keratomileusis (LASIK) reportedly ranges from 82% to 98%.[3–6] Despite the high success rate, quality of vision problems after refractive surgery techniques such as photorefractive keratectomy (PRK) and LASIK have been reported in many clinical studies.[6–13] Glare and halos and subsequent night vision complaints are among the prime problems reported by patients. These may be attributed to a loss of contrast sensitivity or low-contrast visual acuity.[6,14,15] Reports have linked the relationship between the ablation zone and the dim light pupil size to night vision complaints early after refractive surgery.[8] Many surgeons have recommended that LASIK should not be performed in patients whose pupil is larger than the treatment optical zone.[16,17] Pupil size has long been suspected to be a direct cause of night vision complaints,

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a hypothesis based on optical theory.[10] Recent studies have found that pupil size is indeed a significant predictor of glare and halos after LASIK, especially in the first postoperative month, yet they have shown that pupil size is not a significant variable 6 or 12 months after treatment.[8] It appears that pupil size only partially explains the differences in reports of quality of vision after LASIK.[8–13]

The necessity for a more precise assessment of subjective quality of vision and patient satisfaction after refractive surgery has increased with the discovery of persistent night vision complaints. The aim of this study was to determine subjective patient satisfaction and self-perceived outcomes after LASIK surgery for the correction of myopia and myopic astigmatism. Possible determinants of postoperative visual complaints such as refractive status, the ablation depth, the pupil size, and the disparity between pupil size and the optical zone were investigated.

PATIENTS AND METHODS

The questionnaire used in the study is a psychometric instrument that was developed and validated by Brunette et al.[1,2] and has been used to evaluate patient satisfaction after PRK and to assess postoperative visual symptoms. The questionnaire was translated into Dutch from the original English. The instrument has proven to be reliable by a high level of internal consistency with Cronbach α coefficients superior or equal to 0.83. For analysis purposes, the 66 items on the questionnaire were grouped into 7 distinct scales that were self-administered by patients. Scale scores increased with satisfaction, ranging from 1 (very dissatisfied) to 5 (very satisfied). Each of the 7 scales covered a specific aspect of quality of vision including global satisfaction, quality of uncorrected and corrected vision, quality of night vision, glare, daytime driving, and night driving. The entry of all data from the questionnaires was performed by 1 independent physician (N.T.) not involved in the treatment or follow-up of the patients.

All treatments were performed by a single surgeon (R.N.) at the Academic Center for Refractive Surgery, University Eye Clinic of Maastricht. Patients had standard LASIK (PlanoScan; Bausch & Lomb) or wavefront-guided LASIK (Zyoptix). Included patients had at least stable myopia for 2 years and were examined preoperatively and at 1 day and 1, 3, and 6 months and then at 6-month intervals. Preoperatively and postoperatively, subjective and objective refractions, slitlamp microscopy, applanation tonometry, fundus examination, and corneal topography (Orbtek Orbscan II, version 3.10.31) were assessed. Scotopic (dim light) pupil size was measured with the handheld Colvard pupillometer (Oasis Medical).[16,18] It uses light amplification technology that enables the examiner to focus the iris and pupil by moving the pupillometer slightly forward and back. Patients had a 1-minute dark adaptation before measurements and were then asked to fixate on an infrared light-emitting diode that emits red light at very low levels. A millimeter ruler was superimposed by a reticle in the device. The largest horizontal scotopic pupil diameter was estimated with a precision of 0.1 mm. Illumination conditions were no more than 0.15 lux throughout the examination room. The pupil–optical zone disparity, which is defined as the difference between the scotopic pupil size and the optical zone of the laser treatment, was calculated.

Patients who were treated from January 2001 to December 2003 received a questionnaire by regular mail, including a brief accompanying letter indicating the aim of the study. Patients with a minimum of 4 months of follow-up and a stable postoperative refraction were included in the study. Investigational review board approval was obtained from the Academic Hospital Maastricht, The Netherlands.

For statistical purposes, uncorrected (UCVA) and best corrected (BCVA) visual acuity in logMAR of the best eye were used for calculations, which means the lower the value, the better the vision. Correlations between the scale scores and clinical parameters were assessed with the Pearson r coefficient of correlation and the Spearman rank correlation (SPSS for Windows, SPSS Inc). The strength of the correlation between 2 variables was defined as strong ($r \geq 0.60$), moderate ($0.30 \leq r < 0.60$), or weak ($0.10 \leq r < 0.30$). All values in the text are mean $\pm$ standard deviation (SD).

During the surgical technique, in a first step, a flap with a diameter of 9.5 mm and a thickness of 160 µm was created with a superior hinge with a Hansatome microkeratome. The ablation was performed using the 193 nm 217z scanning-spot excimer laser system with a combined 2.0 mm and 1.0 mm spot in the Zyoptix group. The PlanoScan was treated with a 2.0 mm scanning spot. The PlanoScan and Zyoptix software programs were used for the standard and wavefront-guided treatments, respectively. Before each treatment, the laser was calibrated by a fluence test and the eye-tracking system was tested. The radiant exposure was 0.2 J/cm^2 in the treatment plan, and the repetition frequency of the laser was 120 Hz. After the photoablation, the lamella was repositioned and the interface floated with a balanced salt solution. Ofloxacin 0.3% (Trafloxal) and fluoromethalone 0.1% (FML Liquifilm) drops were used 4 times a day for 2 days. Sodium hyaluronate 0.18% drops (Vislube) were given 4 times day for 1 week.

RESULTS

A total of 142 patients were included in the study. Population characteristics are listed in Table 1. The mean patient age was 43 $\pm$ 10.0 years (range 21 to 67 years). The mean follow-up for the medical outcome was 11 $\pm$ 4.29 months (range 4 to 36 months). Tables 2 through 7 show the scores for all 7 quality of vision scales. The mean interval for the self-administration of the questionnaire was 24.06 $\pm$ 11.01 months (range 4 to 36 months). Of the patients, 48.6% self-administered the questionnaire within the first 2 years and 51.4% within the third year after surgery.

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Table 1. Population characteristics.

Characteristic	Mean ± SD or Patients (%)	Median	Range
Age (y)	43.0 ± 10.0	42.0	21.0 to 67.0
Follow-up time medical outcome (mo)	10.5 ± 4.29	12.0	4.0 to 36.0
Before surgery (n = 142)			
Mean SE (D)	−4.96 ± 2.15	−5.0	−9.13 to −0.50
Simulated keratometry values (D)	—	—	—
Steep meridian	44.10 ± 1.73	—	—
Flat meridian	42.78 ± 1.66	—	—
Mean BCVA 20/20 or better (%)	80	—	—
BCVA between 20/20 and 20/40 (%)	100	—	—
BCVA 20/40 or worse (%)	0	—	—
Mean pupil diameter (mm)	5.9 ± 0.84	6.0	3.1 to 7.50
At the last follow-up (n = 142)	—	—	—
Visual acuity in the best eye (n = 142)			
UCVA 20/20 or better (%)	73.0	—	—
UCVA between 20/20 and 20/40 (%)	99.3	—	—
UCVA 20/40 or worse (%)	0.7	—	—
Loss of 1 line of BCVA (%)	11.3	—	—
Loss of 2 lines of BCVA (%)	1.4	—	—
Refraction (n = 142)			
Mean SE (D)	−0.17 ± 0.36	0.0	−1.0 to 0.75
Mean SE within 1.00 D of emmetropia (%)	97.0	—	—
Mean SE within 0.5 D of emmetropia (%)	86.8	—	—
Simulated keratometry values (D)			
Steep meridian	40.0 ± 2.05	—	—
Flat meridian	39.1 ± 2.01	—	—

BCVA = best corrected visual acuity; SE = spherical equivalent; UCVA = uncorrected visual acuity

Patient Satisfaction and Self-Perceived Outcomes

The most frequently reported motivations for desiring surgical correction were to be less dependent on glasses (12.5%), intolerance to contact lens wear (8.3%), and problems handling contact lenses (7.2%).

Table 2. Global satisfaction scale score.

Global Satisfaction	Result	Range
Mean score ± SD*	4.1 ± 0.7	1.2 to 5.0
Main goal achieved (%)	93.6	—
Satisfied with result (%)	92.2	—
Surgery was good choice (%)	92.3	—
Would do the surgery again (%)	92.3	—
Expected quality of vision achieved (%)	88.0	—
Independence of correction considered best result (%)	76.1	—
Improved quality of life at work (%)	27.2	—
Improved quality of social life (%)	37.0	—
Improved quality of family life (%)	23.3	—

*Scores 0 through 5 (5 meaning totally satisfied)

Global Satisfaction

The mean score for the overall satisfaction was 4.10 ± 0.71 (5 meaning totally satisfied). The majority of patients (93.6%) reported that their main goal had been achieved and they would be willing to have the surgery again if given they could do it all over again (92.3%). Global satisfaction did not show a correlation with patient age.

Quality of Daytime Vision Without Correction

The mean score for all patients was 3.03 ± 0.71; uncorrected distance vision was characterized as slightly or much better than preoperative corrected vision by 40% of patients. Symptoms reported to be more frequent than before surgery included blurred vision (33.1%), sensitivity to smoke (27.4%), distortion of fine details (21.8%), a double outline of images (7.7%), and ghost images (7.0%). Uncorrected near vision was characterized as slightly or much better than the preoperative corrected near vision by 9.3% of patients.

Table 3. Uncorrected vision scale score.

Uncorrected Vision	Result	Range
Mean score ± SD*	4.1 ± 0.7	1.1 to 5.0
Uncorrected distance vision better than preoperative corrected vision (%)	40.0	—
Uncorrected distance vision same as preoperative corrected vision (%)	29.3	—
Uncorrected distance vision worse than preoperative corrected vision (%)	30.7	—
Uncorrected near vision better than preoperative corrected vision (%)	9.3	—
Uncorrected near vision same as preoperative corrected vision (%)	53.6	—
Uncorrected near vision worse than preoperative corrected vision (%)	37.1	—
Newspaper headlines more easily read without correction after surgery (%)	9.3	—
Computer screen more easily read without correction after surgery (%)	14.8	—

*Scores 0 through 5 (5 meaning totally satisfied)

Table 4. Corrected vision scale score.

Uncorrected Vision	Result	Range
Mean score ± SD*	2.95 ± 1.08	1.0 to 5.0
Wearing glasses for distance vision on a regular basis (%)	13.4	—
Wearing contact lenses for distance vision on a regular basis (%)	1.4	—
Wearing near vision correction on a regular basis (%)	23.2	—

*Scores 0 through 5 (5 meaning totally satisfied)

Table 5. Night vision scale score.

Uncorrected Vision	Result	Range
Mean score ± SD*	3.1 ± 0.7	1.4 to 4.5
Night vision considered same or better than before surgery (%)	66.2	—
Night vision considered worse or much worse than before surgery (%)	33.8	—
Halos (before/after) (%)	28.1/52.8	—
Perception of stars around lights (before/after) (%)	18.3/30.2	—
Distortion of details (before/after) (%)	18.3/26.0	—
Double outline of images (before/after) (%)	6.3/9.1	—
Ghost images (before/after) (%)	4.2/5.6	—

*Scores 0 through 5 (5 meaning totally satisfied)

Table 6. Glare scale score.

Uncorrected Vision	Result	Range
Mean score ± SD*	3.0 ± 0.9	1.1 to 4.9
Glare from lights at night increased compared with before surgery (%)	47.2	—
Glare from oncoming headlights considered bothersome before surgery (%)	40.9	—
Glare from oncoming headlights considered bothersome after surgery (%)	58.4	—
Glare after surgery considered more bothersome than before surgery (%)	52.8	—

*Scores 0 through 5 (5 meaning totally satisfied)

Table 7. Driving scale score.

Uncorrected Vision	Result	Range
Mean score ± SD*	3.0 ± 0.9	1.1 to 4.9
Driving permit (%)	96.5	—
Daytime driving score of 5 (totally satisfied) (%)	62.3	—
Night driving score of 5 (totally satisfied) (%)	8.0	—
More difficulty with night driving than before surgery (%)	40.9	—
Less difficulty with night driving than before surgery (%)	51.0	—

*Scores 0 through 5 (5 meaning totally satisfied)

Quality of Daytime Vision With Correction

The mean score for patients wearing glasses for quality of daytime vision was 2.95 ± 1.08. Wearing glasses or contact lenses for distance vision on a regular basis was reported by 13.4% and 1.4% of patients, respectively. Near vision correction was used by 23.2%.

Quality of Night Vision

The mean score for night vision was 3.1 ± 0.7. Night vision was considered worse or much worse than before surgery by 33.8% of patients.

Glare

The mean glare score was 3.0 ± 0.9. After surgery, 47.2% of patients experienced more glare from lights at night than before surgery.

Driving

The mean score for daytime and night driving was 4.5 ± 1.1 and 3.2 ± 1.3, respectively. Among the patients with a driving permit, only 8.0% reported a night driving score of 5.0 after surgery. After surgery, 40.9% of patients reported experiencing more difficulty with night driving than before surgery.

Correlations Between Satisfaction Scales and Clinical Parameters

Visual Acuity

The mean postoperative logMAR UCVA in the best eye at the time of the questionnaire was −.027 ± .11 and showed a correlation with overall satisfaction, the uncorrected vision score, the night vision score, and the driving scores (Table 8).

Table 8. Correlation coefficients between clinical parameters and satisfaction scales.

	Scales						
Clinical Parameter	Overall Satisfaction	Uncorrected Vision	Corrected Vision	Night Vision	Glare	Day Driving	Night Driving
Age (y)	−0.066	−0.276*	0.102	0.023	−0.036	−0.142	−0.027
Visual acuity in the best eye‡							
UCVA (LogMAR)	−0.169†	−0.297*	−0.235	−0.182†	0.011	−0.299*	−0.199†
BCVA (LogMAR)	0.014	−0.161	−0.096	−0.166†	−0.083	−0.130	−0.129
Refraction							
Mean postoperative SE	0.148	0.245*	0.088	0.121	−0.009	0.272*	0.179†
Postoperative astigmatism	0.129	0.265*	0.203	0.114	−0.052	0.259*	0.195†
Simulated keratometry values							
Preoperative steep meridian	0.159	0.108	−0.084	0.108	−0.152	0.002	0.048
Preoperative flat meridian	0.151	0.124	−0.001	0.159	−0.148	0.060	0.144
Postoperative steep meridian	0.016	−0.017	0.100	0.054	−0.221	−0.119	0.176
Postoperative flat meridian	0.059	0.000	0.096	0.103	−0.169	−0.087	0.204
Pupil							
Pupil size	−0.127	0.044	−0.048	−0.020	0.040	−0.056	0.033
Pupil–optical zone disparity	−0.150	−0.071	−0.124	−0.059	0.027	−0.083	−0.069

BCVA = best corrected visual acuity; SE = Spherical equivalent; UCVA = uncorrected visual acuity
*$P < .05$
†$P < .01$ level
‡Visual acuities are in LogMAR, which means the lower the value, the better the vision

Refraction

The mean postoperative spherical equivalent (SE) was –0.17 ± 0.36 diopters (D). Of the patients, 86.8% were within ±0.5 D and 97.0% within ±1.0 D of emmetropia. There was no correlation between the satisfaction scores and the degree of preoperative SE. A significant correlation was found between the SE at the last follow-up and the uncorrected vision score and the driving scores (Figure 1). The mean refractive astigmatism value at the last follow-up showed a correlation with the uncorrected vision score (Figure 2) and the driving scores. The mean preoperative and postoperative simulated keratometry values of the steep and flat meridians were 44.10 ± 1.73 D and 42.78 ± 1.66 D, respectively, and 40.0 ± 2.05 D and 39.1 ± 2.01 D, respectively. There were no significant associations between these keratometry values and the satisfaction scores. The mean preoperative and postoperative topographical astigmatism values did not correlate with the glare or night vision scores.

Ablation Depth

The mean ablation depth used during surgery was 90.7 ± 37.0 µm. No significant correlation was observed between the night vision score and the ablation depth ($r = -0.55$; $P = .515$) or between the glare score and the ablation depth ($r = 0.083$; $P = .328$).

Pupil Size and Pupil–Optical Zone Disparity

Mean scotopic pupil sizes were 6.0 ± .83 mm. No significant correlation was found between the scotopic pupil size or the pupil–optical zone disparity and any of the satisfaction scores (Figures 3 and 4).

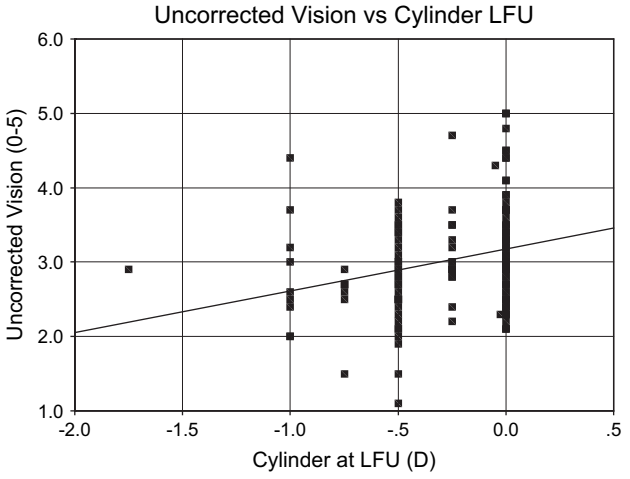

Figure 2. Uncorrected vision score versus postoperative astigmatism value at the last follow-up (LFU); $r = 0.284$, $P = .001$.

Wavefront-Guided LASIK Group

In the separate small group of 11 binocular wavefront-guided LASIK patients, the mean postoperative logMAR UCVA in the best eye at the time of the questionnaire was −0.072 ± 0.08. The mean postoperative SE was −0.11 ± 0.24 D and showed a correlation with the global satisfaction score ($r = 0.66$; $P = .026$). The mean preoperative and postoperative simulated keratometry values of the steep and flat meridians were 43.96 ± 2.24 D and 42.57 ± 2.37 D, respectively, and 38.81 ± 1.98 D and 38.01 ± 2.04 D, respectively. No correlation was found between the glare or night vision scores and the degree of correction, the ablation depth, or the pupil–optical zone disparity.

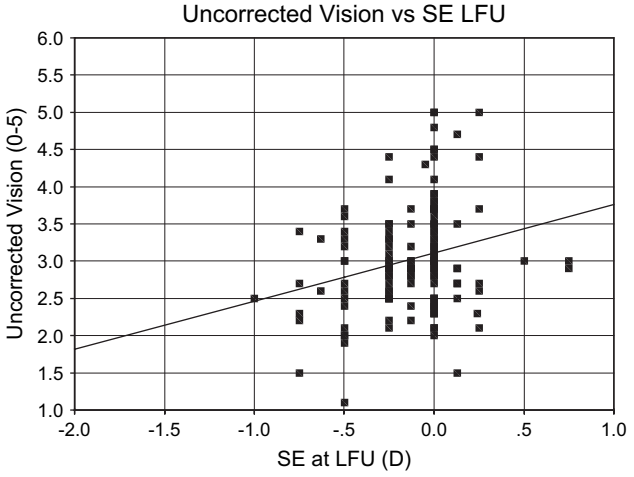

Figure 1. Uncorrected vision score versus postoperative SE at the last follow-up (LFU); $r = 0.245$; $P = .003$.

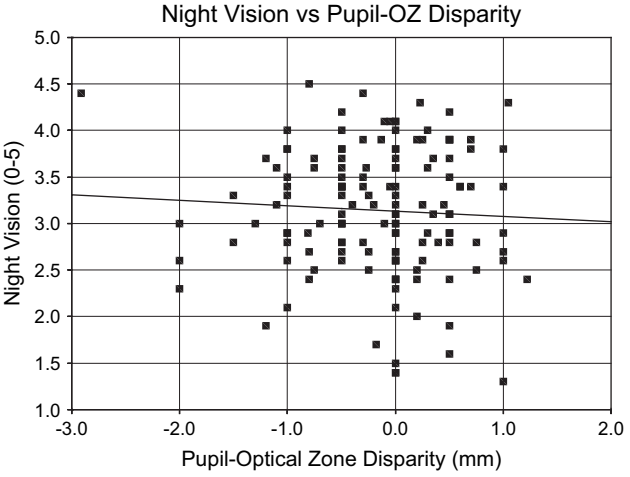

Figure 3. Night vision score versus the pupil–optical zone (OZ) disparity; $r = -0.059$; $P = .488$.

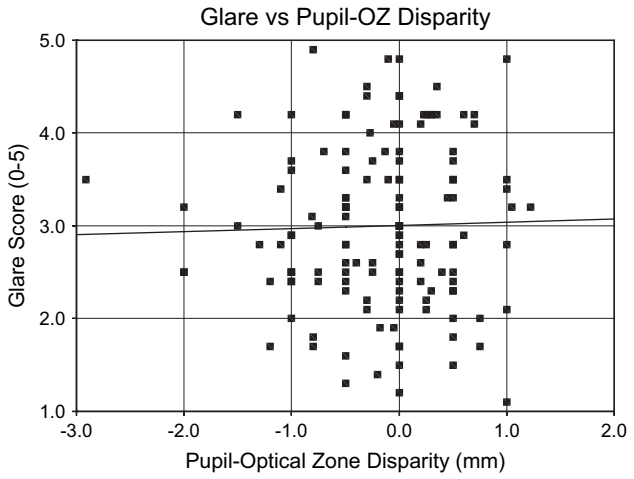

Figure 4. Glare score versus the pupil–optical zone (OZ) disparity; $r = 0.027$; $P = .753$.

DISCUSSION

Overall, many reports have shown excellent medical outcome in terms of predictability, efficacy, and safety after LASIK.[6,19–25] Consequently, this has led to high patient satisfaction rates, which range from 82% to 98% in recent studies.[3–6] Patient satisfaction has been shown to remain high, also beyond the initial 6-month follow-up period.[26]

Our study likewise showed an excellent medical outcome with a good predictability and 86.8% of eyes within $\pm$0.5 D and 97.0% within $\pm$1.0 D from emmetropia. The mean score for the overall satisfaction was 4.10 $\pm$ 0.71 on a scale of 0 to 5 (a score of 5 meaning that the patient was totally satisfied). More than 90% of patients said that their main goal of surgery had been achieved and would make the same decision if they could do it again. We observed direct correlations between subjective quality of vision scale scores and clinical parameters. The uncorrected vision score was directly correlated with the mean postoperative SE and the mean postoperative refractive astigmatism. In general, patients were more satisfied with a postoperative SE close to emmetropia. Similar findings have been shown in a previous study.[1,2]

Our study did not show a relationship between increased age and decreased overall satisfaction. However, similar to previous findings, there was a relationship between increased age and lower uncorrected vision scores.[4,6,10]

Despite excellent medical outcome results and high patient satisfaction, quality of vision problems such as night vision complaints, glare, and halos remain a problem. These problems have been reported in many clinical studies after refractive surgery, occurring in between 12% and 57% of patients.[2,6,10,11,27,28] Night vision complaints and problems from glare often diminish after the first 6 postoperative months.[8,10] In our study, patients also appeared to have significant night vision complaints presenting as glare and affecting night driving. But, despite the high score of night vision complaints, 92.3% of patients reported that they would choose the same type of surgery again if they had to make their choice a second time. A possible explanation is that this is the result of a gradual adaptation to a new condition. Patients who wore rigid gas-permeable contact lenses and glasses before surgery might show an easier acceptance and an increased level of tolerance to glare and halos (57% of patients reported to have worn rigid gas-permeable contact lenses at least 6 months preoperatively).[2] Another hypothesis is that patients get used to their altered night vision, with a consequential decrease in reported night vision complaints as shown in a previous study in which night vision complaints decreased significantly over the first postoperative year.[10]

Our study used a self-administered questionnaire that was sent to patients by an independent physician without verbal encouragement. We believe that self-administered tests, rather than physician-administered tests enable a more objective view of patient satisfaction and quality of vision. When a test is administered by a physician, results may be biased and patients might feel compelled to always answer in the affirmative.[2]

A limitation of our study was the lack of a more uniform postoperative interval for administering the questionnaire. Patient perception changes over time because of psychological factors and corneal healing. In addition, a longer follow-up makes it more difficult for a patient to accurately compare his or her preoperative and current quality of vision. A more proper analysis would have been made through administering the questionnaire preoperatively and again at a uniform postoperative interval.

Previous studies have designated the pupil size as a significant predictor of glare and halos after LASIK, especially in the first postoperative month.[8,17,29] However, 6 months postoperatively, pupil size was no longer found to be a significant predictor.[8] Large pupils tend to increase the exposure of corneal aberrations, which can reduce visual acuity in LASIK patients as well as in untreated patients.[30,31] Smaller pupils have been associated with improved vision in patients after refractive surgery and in untreated patients.[32] Although a thorough literature review on PRK and LASIK strongly suggests that a large pupil in combination with a small optical zone is a dominant factor leading to increased night vision complaints,[33] recent data show that the correlation between pupil size and night vision complaints or between night vision complaints and the pupil–optical zone disparity is much less critical than previously thought.[2,6,8–10,12,33] Similar to these studies, our study of primarily conventional treatments and a small subset of wavefront-guided treatments also showed no

significant correlation between pupil size and glare or night vision complaints.

Therefore, we believe that the precise role of pupil size and its exact relation to night vision complaints remains unknown and controversial. Although pupil size quantification has been described by various investigators, further development and standardization of preoperative pupil size measurements are imperative to better define the exact role of pupil size in night vision complaints.[2,9,10,16,18,33–35] Objective quantification of night vision complaints also needs further elaboration, which remains difficult and presents challenges and limitations concerning the precise analysis of its nature. Previous investigators have questioned whether the risk for night vision complaints is really attributable to LASIK or whether the general population has the same prevalence of night vision complaints. Questions have also arisen as to the possible roles of changes in the transition zone and of central neural adaptation in the slow decrease of night vision complaints.[2,36] Finally, the contribution of flap size and centration issues related to night vision complaints has been questioned.[6,9,10,12]

In contrast to an earlier study, our study found no correlation between the glare or night vision scores and the preoperative and postoperative corneal curvatures.[6] We did show a correlation between the uncorrected vision score and the postoperative SE and refractive astigmatism values: The lower the postoperative residual refractive error, the happier our patients were with their self-perceived uncorrected vision.

Interestingly, our results show that the mean score for patients wearing glasses for quality of daytime vision (2.95 ± 1.08) was slightly lower than the mean score for night vision for all patients (3.1 ± 0.7). This might be explained partially by the fact that these patients' expectations were not fulfilled, ie, to be spectacle independent postoperatively, and therefore rated their satisfaction with their daytime vision as less.

Our findings show high patient satisfaction after LASIK surgery for the correction of myopia and myopic astigmatism. We show that this can be achieved when we aim for a postoperative SE close to emmetropia in combination with low residual postoperative astigmatism. No relation was found between the glare or night vision scores and the degree of correction, ablation depth, or pupil–optical zone disparity. We agree with previous investigators that further investigation of the objective quantification of pupil size and the assessment of night vision complaints is needed.

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