



Exploring Health Tourism and Corneal Refractive Surgery: Insights From a Single Referral Center

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Abstract

Objectives: The purpose of this study was to compare the characteristics, clinical outcomes, and complications of health tourism patients who underwent corneal refractive surgery with the local patient group.

Methods: This retrospective study analyzed the medical records of 736 health tourism patients and 853 local patients who presented for corneal refractive surgery. Patient demographics, type of laser procedure, visual and refractive outcomes, complications, and follow-up period were recorded.

Results: The mean ages of health tourism patients and local patients were 27.1 ± 5.9 and 26.3 ± 5.3 ($p=0.216$), respectively. The percentage of patients who underwent surgery was significantly higher among health tourism patients (91.0%) compared to local patients (78.2%) ($p<0.01$). There were no significant differences in uncorrected distance visual acuity, corrected distance visual acuity, or spherical equivalent at the 3-month post-operative examination. The median follow-up period for health tourism patients was 1 (1–360) day, while for local patients, it was 360 (30–1080) days ($p<0.001$). The percentage of patients who received laser-assisted *in situ* keratomileusis surgery was significantly higher in the health tourism group (89.9% vs. 82.0%, $p<0.001$). There were no significant differences in perioperative or early post-operative complications.

Conclusion: Health tourism patients were more likely to have undergone surgery and had a significantly shorter follow-up period. This may particularly affect the follow-up of the long-term complications.

Keywords: Complications, Corneal refractive surgery, Health tourism, Laser *in situ* keratomileusis, Photorefractive keratectomy

Introduction

Health tourism involves deliberate travel to another country for specialized medical care. Motivations for seeking medical treatment abroad are numerous, ranging from financial considerations, such as seeking more affordable treatment, to accessing care that is unavailable in their own country.

Evidence regarding risk is often limited and speculative, providing little guidance for decision-making. The reporting can be biased and sensationalist, often produced by individuals with insufficient expertise in such procedures. In addition, concerns arise about the reliability of complication reporting due to the heavy investment in advertising and the association with financial gain.

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Refractive surgery is a widely performed eye procedure throughout the world (1-4). Laser refractive surgery has been shown to have excellent visual outcomes and safety profiles, supported by extensive scientific evidence over the past several decades (5). The impact of refractive surgery on patients goes beyond achieving freedom from glasses. The procedure has been shown to enhance quality of life, work productivity, and daily performance (6).

Studies have published the outcomes of health tourism, particularly in the fields of cosmetic and transplantation surgery (7-10). Health tourism has seen substantial growth in recent years, particularly in Türkiye, with a notable increase in ophthalmic surgical procedures (11,12). Interventions such as refractive surgery, cataract extraction, and corneal transplantation are performed with a high level of surgical expertise. However, the scientific data supporting the long-term outcomes of these procedures remain limited. Due to the relatively short follow-up durations commonly associated with health tourism patients, the potential for post-operative complications cannot be overlooked. This study aims to describe the patient demographics, clinical outcomes, and complications of corneal refractive surgery in health tourism patients at a single referral center and compare them with the local patient group.

Methods

This retrospective study included all patients who were seeking corneal refractive surgery and admitted to Medical Park Florya Hospital between July 2020 and January 2024. The study adhered to the tenets of the Declaration of Helsinki and was approved by the Aydın University Ethics Committee (46-2024) and hospital management. Written informed consent was obtained from the patients. Pre-operative inclusion criteria were age >20 years, myopia and spherical equivalent <-8.00D, astigmatism <-4.00D, hyperopia <+4.00D, minimum residual stromal thickness of 300 microns, <40% tissue altered, and at least 1 year of stable refraction. Exclusion criteria were <480 microns central corneal thickness, suspicious corneal tomography, clinical or subclinical keratoconus, severe ocular surface disease, glaucoma, and cataract.

The patients were divided into two groups: Health tourism and local patients. Health tourism patients are defined as individuals residing outside of Türkiye who travel to the country specifically to receive medical care. Patient demographics, type of surgery, visual and refractive outcomes, follow-up time, and complications were obtained through chart review. The surgeries were performed by the same surgeon, and all patients received either wave front optimized transepithelial photorefractive keratectomy (PRK) with mitomycin C or femtosecond laser-assisted *in situ* keratomileusis (LASIK). The excimer laser utilized in all procedures was the WaveLight EX500 (Alcon Laboratories, Fort Worth, TX,

USA) while the femtosecond laser was the IntraLase (Abbott Medical Optics Inc., Santa Ana, California). A bandage contact lens was placed in all procedures, followed by topical ophthalmic antibiotic drops. Postoperatively, all patients received topical moxifloxacin 0.5% eyedrops (Vigamox, Alcon Laboratories, Fort Worth, TX, USA.) 4 times daily for 1 week. Loteprednol etabonate 0.5% eyedrops (Lotemax, Bausch and Lomb, Rochester, NY, USA) were administered 4 times daily and tapered over 4 weeks in all LASIK procedures. They were also used 4 times daily for 1 month in all PRK procedures, with tapering over a further 4 weeks. In addition, all patients were instructed to use preservative-free artificial tears at least 4 times daily for a minimum of 6 months. All patients were advised to have post-operative follow-up visits at day 1 (LASIK) or 3 (PRK), month 1, month 3, month 6, month 12, and then annually.

Statistical Analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences version 22.0 for Windows (IBM Corp., Armonk, NY, USA). Continuous variables were presented as mean and standard deviation, or median and range. The normality of the data was assessed using the Shapiro-Wilk test. Student's t-test and Mann-Whitney U-test were used to compare continuous variables, while Chi-square test was used for categorical variables. Statistical significance was considered for $p < 0.05$.

Results

The records of 1589 patients were reviewed, of whom 1304 underwent corneal refractive surgery. The health tourism group consisted of 736 (46.3%) patients, while the local group had 853 (53.7%) patients. Figure 1 shows the geo-

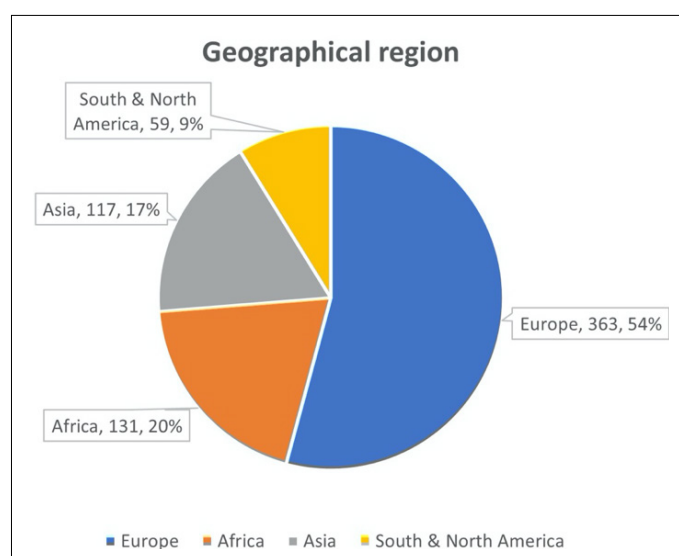


Figure 1. The distribution of patients undergoing corneal refractive surgery for health tourism purposes is categorized by geographical region.

graphic distribution of patients who underwent corneal refractive surgery as part of health tourism. The majority of patients in Europe were from Germany (78.2%), while in Asia, the majority were from the Arabian Peninsula (76.1%). The demographics and characteristics of the patients are shown in Table 1. The surgery rate was 91.0% for health tourism patients and 78.2% for local patients ($p<0.01$). There were no significant differences between the two groups in terms of gender, age, or laterality. The rate of LASIK surgery was significantly higher in the medical tourism group (89.9% vs. 82%, $p<0.001$). At post-operative month 3, there were no significant differences in uncorrected distance visual acuity (0.01 ± 0.03 vs. 0.02 ± 0.04 LogMAR, $p=0.316$), corrected distance visual acuity (-0.01 ± 0.03 vs. 0.01 ± 0.05 LogMAR, $p=0.658$), and standard error (-0.10 ± 0.33 vs. -0.16 ± 0.41 Diopters, $p=0.231$) between health tourism and local patients, respectively. The follow-up period for the health tourism group was significantly shorter, with a median of 1 (1–360) day, compared to the local patients who had a median follow-up period of 360 (30–1080) days ($p<0.001$). Table 2 shows the compliance rates of patients with post-operative examinations. Following the initial post-operative examination, local patients demonstrated significantly higher compliance rates than health tourism patients ($p<0.001$ for all visits).

In terms of complications, 3 patients (0.4%) in the health tourism group and 5 patients (0.8%) in the local group ($p=0.43$) had to switch to the PRK technique due to suc-

tion problems during the operation. On the 1st day after the operation, 6 patients (0.9%) in the health tourism group (four with flap striae and two with diffuse lamellar keratitis) and 2 patients (0.3%) in the local group (due to flap striae) underwent flap re-lifting and interface irrigation ($p=0.18$). Post-LASIK ectasia was detected in one patient (0.2%) in the local group and corneal collagen crosslinking was performed. Eight patients (1.2%) in the health tourism group and 14 patients (2.2%) in the local group ($p=0.15$) underwent enhancement for the residual refractive error after a waiting period of 3 months.

Discussion

Refractive surgery is a frequently performed procedure in health tourism due to high patient satisfaction and perceived low complication rates (13,14). However, it is crucial to communicate post-operative care and management decisions effectively to all patients undergoing these procedures, as most will be leaving the country soon after surgery. Hospitals and intermediary companies have an obligation to provide timely and appropriate treatment for any complications that may arise, although the patient is a tourist.

According to a published article on health tourism in Türkiye, the majority of patients seek ophthalmologic care, with refractive and cataract surgeries being the most commonly performed procedures (12). Most of these treatments are provided in private hospitals, and Istanbul has been identi-

Table 1. Demographics and characteristics of the patients

	Total (n=1589)	Health tourism (n=736)	Local (n=853)	p
Patients who underwent CRS (%)	1304/1589 (82.1)	670/736 (91.0)	634/853 (74.3)	<0.001
Type of surgery (LASIK, %)	1122/1304 (86.0)	602/670 (89.9)	520/634 (82.0)	<0.001
Age (years) (mean $\pm$ SD)	26.7 $\pm$ 5.4	27.1 $\pm$ 5.9	26.3 $\pm$ 5.3	0.216
Gender (Female, %)	789/1304 (60.5)	391/670 (58.4)	398/634 (62.8)	0.103
Laterality (Unilaterally, %)	43/1304 (3.3)	25/670 (3.7)	18/634 (2.8)	0.367
Follow-up (days) (median [min-max])	30 (1–1080)	1 (1–360)	360 (30–1080)	<0.001

P-values were calculated using Student's t-test, Mann–Whitney U-test, and Chi-squared test. CRS: Corneal refractive surgery, LASIK: Laser-assisted in situ keratomileusis.

Table 2. Compliance rates of patients with post-operative examinations

	Day 1 or 3	Month 1	Month 3	Month 6	Month 12
Health tourism patients (%)	670/670 (100)	246/670 (36.7)	102/670 (15.2)	27/670 (4.0)	25/670 (3.7)
Local patients (%)	634/634 (100)	593/634 (93.5)	536/634 (84.5)	521/634 (82.4)	497/634 (78.4)
P-values	1	<0.001	<0.001	<0.001	<0.001

P-values were calculated using Chi-squared test.

fied as the leading destination for health tourists in this context (12). A separate study has identified Türkiye as a prominent destination for health tourism, particularly in ophthalmology (15). The impetus for this trend is attributable to several factors, including its strategic geographic location, cost-effectiveness, perceived safety, and accessible transportation infrastructure (15). Furthermore, government-supported investments have contributed to the strengthening of Türkiye's competitive position in the global health tourism market (15).

In our study, we found that the indication rates for corneal refractive surgery were significantly higher in health tourism patients (91% vs. 78.2%, $p < 0.001$). There appear to be two primary reasons for this. First, some health tourism patients are excluded before arrival due to reports of refractive error and/or corneal topography from their home country. Second, as health tourism patients are often highly motivated to undergo medical procedures and may travel to other countries to do so, it is possible that they may be more willing to take risks even after being informed of the potential dangers. These factors are believed to increase surgery rates. Furthermore, on reviewing the surgical technique rates, we see that the LASIK rate is significantly higher in the health tourism group (89.9% vs. 82%, $p < 0.001$). It is well known that LASIK surgery is more advantageous than PRK in terms of patient comfort and early visual rehabilitation (16). Therefore, LASIK may be a suitable option for health tourism patients seeking both medical treatment and comfort while travelling, unless absolutely contraindicated. In addition, as previously stated, these patients may have a higher likelihood of considering the relative risks of LASIK.

One of the significant issues related to health tourism is the relatively short follow-up time. In our study, the local patients had a median follow-up time that was significantly longer than that of the health tourism patients. Most health tourism patients returned to their home countries after the first post-operative visit and naturally had lower compliance with the post-operative follow-up schedule than local patients (Table 2). This poses a significant challenge for health tourism patients, particularly in detecting long-term complications of corneal refractive surgery. We found no significant difference in perioperative and early post-operative complications between the two groups. Post-LASIK ectasia was observed in one patient in the local group and in none of the patients in the health tourism group. This could be a source of confusion, as post-LASIK ectasia may have been underdiagnosed in health tourism patients who did not adhere to the follow-up schedule. As is known, post-LASIK ectasia can be identified through corneal tomography during routine follow-up, even in the absence of clinical signs. Therefore, it is possible that ectasia in health tourism patients is underdiagnosed due to the short follow-up period.

Comparing enhancement rates between groups, they appear to be slightly lower in the health tourism group, although not significantly. Due to time constraints, most patients in the health tourism group are unable to have a pre-operative cycloplegic refraction. Therefore, in the theory, they may be more likely to be overcorrected than the local patient group, resulting in a lower undercorrection rate and a lower enhancement rate. Furthermore, although all health tourism patients are able to communicate with the surgeon in the post-operative period even if they are not examined, some residual refractive errors may still be underdiagnosed.

To the best of our knowledge, this is the first study that compares and reports outcomes of health tourism for corneal refractive surgery. However, the study has potential limitations. First, the long-term complications of the procedures in health tourism patients are unknown, as many patients return to their home country early. As lenticule extraction surgery was not performed at the clinic where the study was conducted, there are no available data on this procedure.

Conclusion

Health tourism patients were found to have a higher rate of undergoing corneal refractive surgery, likely due to their higher motivation, despite being informed of all associated risks. However, it is important to bear in mind that there are various complications that can occur in such cases and that the post-operative follow-up period is limited. To address this issue, hospitals specializing in health tourism should obtain certification and establish agreements with clinics in patients' home countries to provide follow-up care before their arrival in the destination country. We believe that improving the conditions for health tourism patients will help to reduce the disparities between them and local patients.

Disclosures

Ethics Committee Approval: This study was approved by the Aydın University Ethics Committee (Date:05.06.2024, Number: 46-2024) and conducted in accordance with the tenets of the Declaration of Helsinki.

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