

Long-term follow-up after laser vision correction in physicians: Quality of life and patient satisfaction

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PURPOSE: To evaluate the satisfaction and quality of life after laser vision correction (LVC) exclusively in a physician population.

SETTING: Cole Eye Institute, Cleveland Clinic, Cleveland, Ohio, USA.

DESIGN: Cohort study.

METHODS: A 12-question survey targeted toward physicians and the unique qualities of their experience with refractive surgery was sent to physicians who had refractive surgery at the Cole Eye Institute between 2000 and 2012. In conjunction, the visual outcomes and clinical information of physicians who received the survey were reviewed.

RESULTS: Two hundred twenty-six physicians (439 eyes) met the inclusion criteria for our study. One hundred thirty-two physicians (58%) responded to the survey and reported an overall satisfaction rate of 95.3%. Respondents included surgeons (28.0%), physicians who perform procedures but not surgery (43.2%), and physicians who do not perform procedures or surgery (28.8%). Of the physicians, 84.8% reported an improvement in the quality of vision compared with the corrected preoperative vision, 39.0% reported that their ability to perform procedures accurately had improved and 1.6% said they believed their ability to perform procedures was less. Ninety-six percent reported they would have the procedure again. Visual outcomes showed high levels of surgical predictability, efficacy, and safety.

CONCLUSION: Despite high visual demands, physicians having LVC had a high percentage of good visual outcomes, satisfaction, and quality-of-life improvements.

Financial Disclosure: No author has a financial or proprietary interest in any material or method mentioned.

J Cataract Refract Surg 2014; 40:395–402 © 2014 ASCRS and ESCRS

It is estimated that almost 1 million patients have laser vision correction (LVC) each year in the United States.¹ With high indices of safety and predictability^{2–5} and levels of patient satisfaction greater than 95%,⁶ LVC is considered among the most successful elective procedures. The safety and efficacy are great enough that all branches of the U.S. military and National Aeronautics and Space Administration have now embraced LVC as a way to improve performance. Still, there remains a perception that physicians are suspicious of this surgery and that physicians themselves do not have LVC, when in truth the experience of physicians who have had LVC is unknown. Such a perception can have pernicious effects on patients,

rendering those who could benefit from meaningful improvement in their vision and quality of life reluctant to seek treatment. Moreover, physicians themselves may benefit from vision correction and it is conceivable that by improving vision and quality of life for the physician, LVC may also contribute to better patient care.

The objective of this study was to evaluate satisfaction and quality of life after LVC exclusively in the physician population and to determine whether the satisfaction rate was similar to that in the general population. To our knowledge, this study is the first to exclusively evaluate refractive surgery in a physician population.

PATIENTS AND METHODS

Design and Study Population

This retrospective study comprised all physicians who had LVC at the Cleveland Clinic Cole Eye Institute by the same surgeon (R.R.K.) over the past 12 years. This included staff physicians, residents, and outside (non-Cleveland Clinic) physicians. Laser vision correction was performed by photorefractive keratectomy (PRK) or laser in situ keratomileusis (LASIK) with a mechanical microkeratome or a femtosecond laser for flap creation. The study was approved by the Cleveland Clinic's Institutional Review Board.

Exclusion criteria included a history of refractive surgery performed at another center, inability to obtain contact information for the patient, and a history of ocular surgery or disease unrelated to refractive surgery. Patient charts were reviewed to identify patients meeting the inclusion criteria and collect contact information and data for surgical outcomes. If contact information from the chart was no longer valid, an effort was made to contact the patient through Cleveland Clinic staff and alumni directories or through an Internet search.

Survey Instrument

A 12-question survey was developed to evaluate patient satisfaction and quality of life after refractive surgery (Figure 1). The survey was adapted from components of validated refractive surgery surveys^{7,8} to reflect topics particular to physicians (ability to perform procedures accurately, frequency of visual concerns at work, limitations in practice due to vision), and questions generally included in refractive surgery surveys (residual need for glasses/contact lenses, need for surgical enhancement, circumstances in which vision is a challenge, difficulty with visual side effects) including overall satisfaction, quality of vision, and willingness to repeat the procedure. A link to the online questionnaire was sent in an e-mail explaining the purpose of the study to each patient. Questionnaire responses were

recorded anonymously by the Internet survey site.^A Data were transferred to a spreadsheet (Excel, Microsoft Corp.) for further analysis.

RESULTS

A chart review identified 226 patients (429 eyes) who met the study's inclusion criteria. Table 1 shows the patients' characteristics. Basic preoperative and postoperative refractive characteristics are also presented for reference in regard to the common metrics of efficacy, predictability, and safety for refractive surgery studies. Of the 226 emails sent, 132 physicians responded (58% response rate) and 128 (97%) completed the full survey.

Figure 2 shows the responses to questions regarding specialty, satisfaction, quality of vision, and impact of vision on work. Broadly categorized, the specialties of 132 respondents included 37 (28.0%) surgical specialties, 57 (43.2%) specialties involving procedures, and 38 (28.8%) clinical/other specialties. The mean score for satisfaction was 4.62 on a scale of 1 (very dissatisfied) to 5 (very satisfied). Overall, 122 (95.3%) of 128 respondents reported being satisfied or very satisfied, and 121 (96.0%) of 126 said that knowing what they know now, they would choose to have the surgery again. One hundred eight (84.3%) said their quality of vision after surgery was improved compared with their vision before surgery, with or without glasses/contact lenses. Few physicians responded that vision after refractive surgery limited their ability to work as a physician (Figure 2). Twenty-seven (21.1%) of 128 physicians said their vision was a concern at work always or very often, while 99 (77.4%) reported it was never a concern or was a concern only occasionally. Regarding the ability to perform procedures accurately after surgery, 126 (98.4%) of 128 physicians said they found procedures to be easier or about the same as before. None found performing procedures to be impossible after refractive surgery.

Patients reported their vision was most challenging when driving at night (46/127 [36.2%]), reading or doing near work (28/127 [22.0%]), driving when there is glare from oncoming headlights (27/127 [21.3%]), driving when it is raining (24/127 [18.9%]), or not challenging at all (36/127 [28.3%]). In every category of ocular symptoms (Table 2), fewer than 50% of patients said they experienced any trouble at all, with the most frequently reported items being eyes feeling irritated (64/128 [50.0%]), glare (55/128, [43.0%]), halos (53/128 [41.4%]), and seeing in dim light (45/128 [35.2%]). There was no category for which more than 14 (10.9%) of the 128 patients reported moderate symptoms, and severe symptoms were only reported

Submitted: June 20, 2013.

Final revision submitted: August 13, 2013.

Accepted: August 20, 2013.

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Supported by an unrestricted grant from Research to Prevent Blindness, New York, New York, USA.

Presented at the ASCRS Symposium on Cataract, IOL and Refractive Surgery, San Francisco, California, USA, May 2013.

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1. **What is your medical specialty?**
Ophthalmic surgery; heart or vascular surgery; neurosurgery; orthopedic surgery; ear, nose, and throat surgery; general surgery or other surgical specialty, intensive care; emergency medicine; anesthesiology; interventional radiology (vascular, neuro, oncology or other); clinical specialty (I do not perform surgeries or procedures); clinical specialty (I do not perform surgeries, but I perform procedures that require precision); pathology
2. **If you do not wear spectacles or contact lenses SINCE your refractive surgery (LASIK, PRK etc.), please do NOT answer questions 2 and 3 and go directly to the question 4. If you occasionally still wear spectacles and/or contact lenses SINCE your refractive surgery, please answer this question and estimate how many hours per day you wear them on average. Ordinary sunglasses DO NOT count as spectacles.**
(0-24) hours/day and (0-7) days/week for spectacles and for contact lenses
3. **Please specify under what circumstances; pick the best choice or maximum 3 choices.**
Socializing; at work; watching TV or movies; working on computer; reading and near work; driving at night; driving when it's raining; driving with glare from oncoming headlights
4. **How satisfied have you been with your current vision WITHOUT glasses or contact lenses?**
Very satisfied; satisfied; neither satisfied nor dissatisfied; dissatisfied, very dissatisfied; not applicable
5. **How good is your quality of vision compared to your vision before refractive surgery with glasses/contact lenses or without correction?**
Much better; better, about the same; slightly worse, worse
6. **My vision is a concern at my work:**
Never; occasionally; fairly often; very often; always; don't know/not applicable
7. **How much has your vision after refractive surgery limited your ability to work as a physician?**
Not at all; a little bit; a moderate amount; a lot; don't know/not applicable
8. **Since your refractive surgery, your ability to perform procedures accurately is:**
Much easier; better; about the same; more difficult, impossible
9. **When is your vision most challenging?**
Performing surgery; reading or near work; working on computer; watching TV or movies; driving at night, driving when it's raining; driving when there is a glare from oncoming headlights; during sports; not a challenge
10. **How bothered have you been by each of the following items: Your eyes feeling irritated; eyes being sensitive to light; pain in your eyes; changes in your vision during the day; glare (reflections off shiny surfaces, snow); seeing a halo around lights; seeing in dim light; judging distance when going up or down steps (stairs, curbs); your depth perception**
(For each of the above items) No trouble at all; a little trouble; moderate trouble; severe trouble; so much trouble that I did not do the activity; not applicable
11. **Given your experience and knowledge of your outcome, would you repeat the procedure again?**
Yes; no; if no, could you explain why (with text box for free text)
12. **Since your first refractive surgery in The Cole Eye Institute, have you undergone any enhancement procedure or additional surgery for your eyes in another place?**
Yes; no; if yes, please specify the number and what type of surgery you had (with text box for free text)

Figure 1. Survey questions and response options.

Table 1. Patient characteristics.

Characteristics	Value
Age (y)	
Mean \pm SD	38.7 \pm 7.5
Range	27, 61
Female sex, n (%)	84 (37)
Follow-up (mo)	
Mean \pm SD	19.9 \pm 24.4
Range	0, 123
Preop refractive error (D)	
SE in hyperopic eyes (n = 9)	
Mean \pm SD	+1.25 \pm 1.01
Range	+0.125, +3.25
SE in myopic eyes (n = 420)	
Mean \pm SD	-4.50 \pm 2.16
Range	0.00, -11.50
Patients desiring monovision, n (%)	43 (19)
LASIK, eyes (%)	382 (89)
PRK, eyes (%)	47 (11)
Uncorrected vision (surgical efficacy)*, eyes (%)	
UDVA 20/20 or better	293 (78)
UDVA 20/40 or better	364 (97)
UDVA worse than 20/40	11 (3)
Refraction (surgical predictability)*, eyes (%)	
Within \pm 0.5 D of target	300 (80)
Within \pm 1.0 D of target	360 (96)
Greater than 1.0 D from target	15 (4)
Corrected vision (surgical safety)*, eyes (%)	
No change in CDVA	322 (86)
Loss of 1 line CDVA [†]	50 (13)
Loss of 2 lines CDVA [†]	3 (1)

CDVA = corrected distance visual acuity; LASIK = laser in situ keratomileusis; PRK = photorefractive keratectomy; SE = spherical equivalent; UDVA = uncorrected distance visual acuity

*Includes only patients with 3 or more months of follow-up (375 eyes).

[†]Final CDVA in cases losing any lines of vision was always 20/30 or better.

for eyes feeling irritated, sensitivity to light, changes in vision during the day, and pain in the eyes.

Eight patients (6.2%) reported having an enhancement. Continued use of spectacles was reported by 28 patients (21.9%), 3 of who also used contact lenses. Of those 28 patients, 8 (28.6%) required spectacles or contact lenses for more than 2 hours per day, although 18 (64.3%) needed them on a daily basis. Even though patients were able to indicate multiple circumstances under which glasses were required (Figure 1, question 3), they tended to fall into 1 of 2 groups: 19 (67.9%) of /28 reported needing correction for near/reading and 11 (39.2%) reported needing correction for driving under difficult conditions (driving at night, in the rain, or with glare from

headlights). Three patients reported needing correction in both situations. The 6 patients who reported needing spectacles for "doing your job" and the 4 patients requiring them for intermediate vision "working on computer" were in the group that reported needing correction for near/reading. The 5 patients requiring glasses for watching television or movies (distance tasks) also reported needing correction for driving in difficult situations, putting them in the second group. Overall, those who reported continued use of spectacles were less satisfied, with 22 (78.6%) of 28 being satisfied or very satisfied. This did not vary between the groups who needed glasses for near/reading and those who needed them for driving. The 3 dissatisfied and 1 very dissatisfied patient reported a continued need for correction; conversely, 99 patients (99.0%) who reported spectacle independence were satisfied (1 patient was neither satisfied nor dissatisfied).

In general, ophthalmologists had similar responses to the rest of the physicians; 8 reported being satisfied or very satisfied and 1 reported being neither satisfied nor dissatisfied, while none reported dissatisfaction. When comparing uncorrected vision with corrected vision before surgery, 7 reported their vision was much better or better, 1 reported it was about the same, and 1 reported it was worse than before. None reported any decrease in their ability to perform their work. Four reported their ability to perform procedures was about the same while the other 5 felt performing procedures was much easier or better. Eight of the 9 ophthalmologists would repeat the procedure, while 1 would not due to discomfort from dryness and irritation.

DISCUSSION

When evaluating refractive surgery, ophthalmologists are traditionally concerned with postoperative uncorrected visual acuity (vision without glasses) and safety (no decrease in the vision with glasses after surgery compared with before). In regard to these concerns, the outcomes in Table 1 are similar to those found in large clinical trials of LVC.²⁻⁵ However, visual acuity alone does not adequately illustrate the magnitude of the changes that occur after refractive surgery. The measurement of patient satisfaction is an important index regarding the efficacy of a refractive operative procedure. Patient satisfaction can also be considered a multidimensional reflection of whether surgery has met the patient's physical, emotional, and financial expectations and whether the patient has benefitted physically and/or psychosocially from the procedure.⁹

The response from physicians in our study was highly positive; 96.0% of physicians would repeat the procedure. Total satisfaction was 95.8%, with

Q1. Type of Specialty – no. (%)	
Clinical (Without procedures)	35 (26.5%)
Clinical (With procedures)	30 (22.7%)
Anesthesiology	17 (12.9%)
General surgery or other surgical specialty	14 (10.6%)
Ophthalmic surgery	9 (6.8%)
Orthopedic surgery	6 (4.5%)
Heart or vascular surgery	4 (3.0%)
Intensive care	4 (3.0%)
Emergency Department	4 (3.0%)
Ear nose and throat surgery	3 (2.3%)
Pathology	3 (2.3%)
Interventional Radiology	2 (1.5%)
Neurosurgery	1 (0.8%)
Total:	132 (100%)

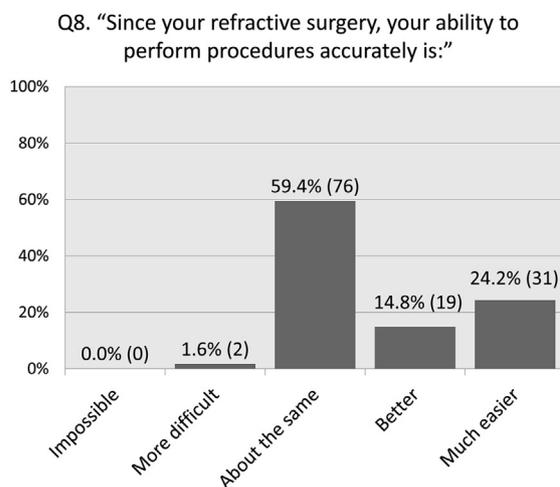
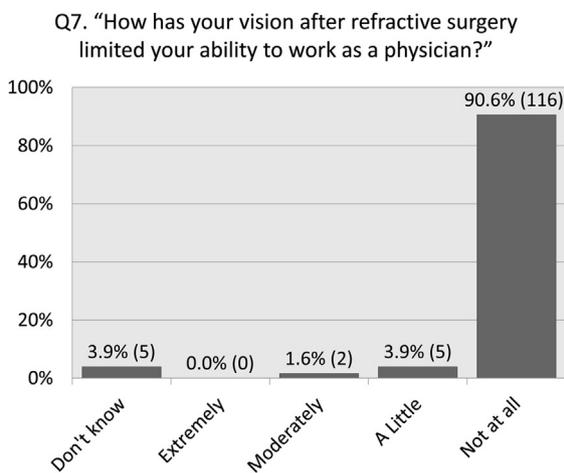
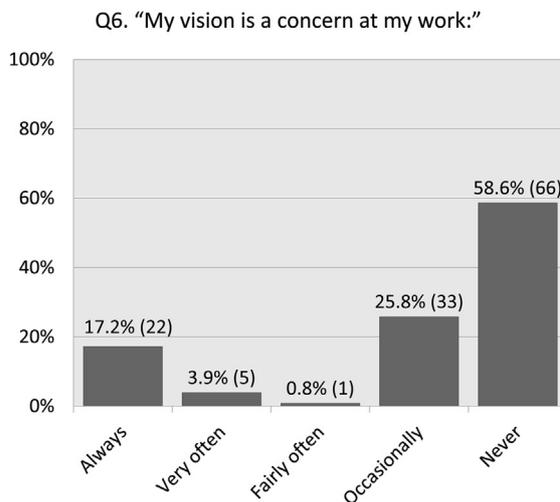
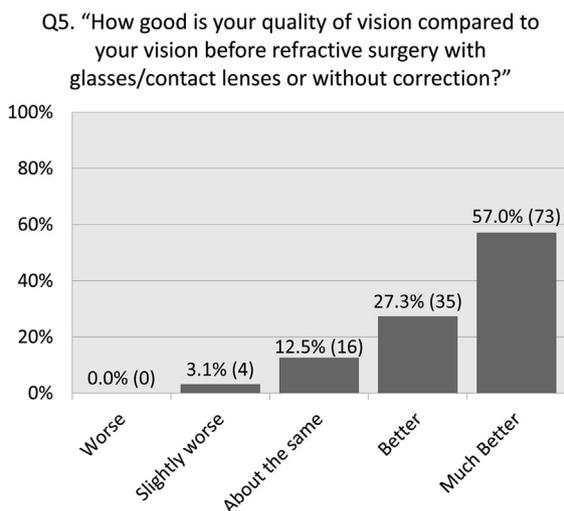
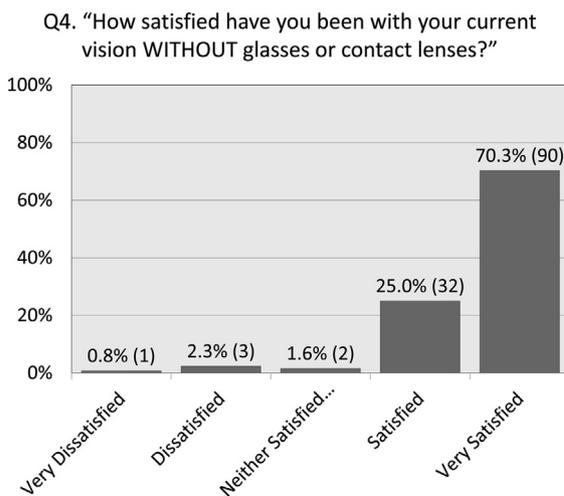


Figure 2. Survey question responses from 128 respondents for all questions except as noted. The horizontal axis in each graph represents the percent of responses. Data labels over each bar represent percentage of responses and in parentheses the number of responses for each answer.

Table 2. Patient responses to question 10: "How bothered have you been by each of the following items?" (n = 128).

Response	Number of Responses (%)				
	No Trouble At All	A Little Trouble	Moderate Trouble	Severe Trouble	Not Applicable
Your eyes feeling irritated	64 (50)	52 (41)	10 (8)	2 (2)	0
Eyes being sensitive to light	90 (70)	29 (23)	5 (4)	3 (2)	1 (1)
Pain in your eyes	118 (92)	8 (6)	0	1 (1)	1 (1)
Changes in your vision during the day	99 (77)	26 (20)	0	2 (2)	1 (1)
Glare (reflections off shiny surfaces, snow)	72 (56)	47 (37)	8 (6)	0	1 (1)
Seeing a halo around lights	75 (58)	38 (30)	14 (11)	0	1 (1)
Seeing in dim light	83 (65)	30 (23)	14 (11)	0	1 (1)
Judging distance when going up or down steps	121 (95)	6 (5)	0	0	1 (1)
Your depth perception	113 (88)	14 (11)	0	0	1 (1)

70.3% being very satisfied and 25.0% satisfied with the results. Ninety-seven percent reported the same or better vision than before surgery. Only 2 respondents (1.6%) said their work was more difficult to perform accurately due to their vision, while no respondent reported it being impossible to perform. Although many reported their vision to be challenging when driving or doing near work, these issues are not exclusive to post-refractive surgery patients and often are the result of presbyopia or lens changes from aging. Similarly, the most common bothersome ocular symptoms noted by our respondents (irritated eyes, glare, halos) are also commonly reported in the general public, are not necessarily secondary to the refractive procedure, and may have been present before surgery.

Of note, respondents felt their ability to perform procedures accurately was about the same (59.4%), better (14.8%), or much easier (24.2%). Not only does this speak to the safety of the procedure for physicians but it also points out a potential benefit for enhancing patient care. Freed of spectacles and contact lenses and with the sharpness of vision provided by LVC, 39.0% of physicians found they could perform procedures much easier or better. Although this is only a perception, it is not unreasonable to think that greater facility, better vision, and more confidence for the physician performing a procedure could translate into improved patient outcomes.

The weaknesses of our study include data limited to a single surgeon and a single site. The Hawthorne effect (tendency of survey respondents to feel more positively about a subject due simply to the extra attention) and cognitive dissonance (a greater likelihood to have positive feelings about a result in an attempt to be consistent with and justify one's choice in having surgery) should be considered,¹⁰ although the skepticism and objectivity of physicians may mitigate these

effects to some degree. Although our survey is based on validated surveys, it is not validated in itself. This was necessary because we wanted to focus on issues particularly important to physicians for which there is no validated survey. However in retrospect, invalidated survey questions can be difficult to interpret, leading to inconsistent answers. For instance, question 6, "My vision is a concern at my work," could be interpreted as "My vision is important at my work" or "My vision is a problem at my work." It is thus unclear what the response "always" means in this case. In question 8, every respondent answered about their ability to perform procedures accurately, even though in question 1 nearly a third of respondents stated they are in a specialty that does not perform surgery or procedures. Despite these inconsistencies, most questions came directly from validated surveys or were close adaptations of validated survey questions, so a reasonable amount of clarity and consistency was maintained for this study.

The strengths of our study are the maintenance of the patients' anonymity, the sizeable number of patients enrolled and a relatively good survey response rate, the diversity of represented medical specialties, and the broad range of perspectives from patients just months after surgery to those expressed more than a decade later.

Of highest concern is the small proportion of physicians who said they were dissatisfied or reported a decrease in their quality of life or work. These responses are particularly important to help identify areas in which LVC can be detrimental to a physician. Although we could not reach out to those individuals due to the anonymity of the survey, we identified the surveys with concerning responses for closer study (Table 3). The 5 physicians who would not have the procedure again included the single patient who was

Table 3. Satisfaction, concerns and reasons, and whether the physician would repeat the procedure by specialty.

Specialty	Visual Satisfaction	Reason for Concern	Comment
Ophthalmology	Neither satisfied nor dissatisfied	Severe irritation and light sensitivity	Would not repeat
Clinical (no procedures)	Dissatisfied	Still require spectacles	Would not repeat
Heart/vascular surgery	Very dissatisfied	Difficulty performing surgery	Would not repeat
Clinical (no procedures)	Very satisfied	Felt surgery not needed	Would not repeat
Ear, nose, and throat	Satisfied	Vision problems with reading and surgery	Would not repeat
Clinical (performs procedures)	Dissatisfied	Better vision, but continued need for spectacles	Would repeat
Clinical (no procedures)	Dissatisfied	Better vision no difficulty at work, but difficulty with night driving	Would repeat

very dissatisfied due to difficulty performing surgeries and procedures, 1 dissatisfied patient because of the continued need for glasses, 1 patient who was neither satisfied nor dissatisfied but reported severe irritation and dryness, and 2 satisfied patients, 1 who felt the surgery was “not needed” and another who was frustrated because “current vision problems are not correctable with glasses.” In this last case, it is unclear whether the vision problems were provoked by refractive surgery or preceded the surgery and were simply unimproved by it. Two of these 5 were the only patients to report more difficulty performing procedures. There were 2 dissatisfied patients who would have the procedure. Only 3 other patients reported uncorrected vision to be slightly worse than their vision with correction before surgery, and these patients still reported satisfaction and willingness to have the surgery again. In general, a residual need for glasses or contact lenses was not associated with greater likelihood of lower satisfaction. Reports of severe trouble from side effects were very low (0% to 2.3% depending on the side effect). Eight patients reported needing surgical enhancement, yet only 1 reported dissatisfaction and unwillingness to have the procedure again, as detailed above.

Due to the anonymity of the survey, patient responses and satisfaction could not be correlated with clinical or surgical data, such as PRK versus LASIK, laser used, femtosecond laser versus microkeratome, treatment algorithm, or visual outcomes. This was intended for 2 reasons. First, we believe that anonymity will encourage frank and honest survey responses. Second, our aim was not to study the correlation between treatment or outcomes and satisfaction, which has been examined in other publications. Rather, we wanted to study a topic that has not been examined before; that is, the physician's experience with refractive surgery. In this way, we hope the results will speak to a wider audience of physicians.

As physicians, we recognize that our attitudes shape patient perception and choice. An unfairly suspicious

attitude toward a treatment can bias our patients and colleagues against that treatment, preventing potential benefits from being realized. In an effort to dispel this suspicion, we offer this first report of the physician experience with LVC. The results show that physicians benefit from the same high level of satisfaction and improvements in quality of life and vision as the general public. In particular, the concerns and needs of medical professionals were not negatively affected by surgery and, in fact, LVC may be of particular benefit to physicians and other health care professionals.

WHAT WAS KNOWN

- Nearly 1 million patients have corneal refractive surgery each year in the United States, with satisfaction rates greater than 95% in most published reports. Still, it remains unknown whether physicians have the same high levels of satisfaction and improvement in their quality of life given the demands particular to their work.

WHAT THIS PAPER ADDS

- Laser vision correction surgery performed in physicians was successful.
- Many physicians reported that performing their work was easier after LVC, a result that may have consequences for improving patient care.

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