The Refractive Surgeon's Rationale

Corneal thickness in LASIK is an issue that will not go away.

BY LEE T. NORDAN, MD

Multimillion-dollar verdicts of medical negligence for post-LASIK ectasia keep the issue of corneal thickness hot in refractive surgery. Pundits are expressing viewpoints ranging from "all LASIK procedures will create ectasia if given enough time" to "LASIK is a legitimate procedure on corneas that are 490µm thick preoperatively." I cannot help but want to share my interpretation of this situation.

BELL CURVES AND CLINICAL EXPERIENCE

Like most other medical statistics, the distribution of corneal thickness follows a bell curve. I believe that this curve is not symmetrical and that the standard deviation is smaller on the thinner versus thicker side of pachymetry. I doubt that anyone knows an exact value of the standard deviation of corneal thickness on the thinner side, but my estimate is 8µm. The corneal thickness is therefore perhaps 530 ±8µm. Regardless of the number, so long as it is reasonable, my point is that three standard deviation units from the mean by definition indicates a statistically abnormal cornea. Any cornea of around 500µm or under is statistically abnormal.

This analysis does not mean a lot except that it happens to correspond very well with clinical experience. Corneas with a preoperative central thickness of 500µm or lower have a far greater chance of developing ectasia after LASIK than do thicker corneas. I suspect that any surgeon who does not believe, accept, or understand the correlation between abnormally thin corneas and a significantly increased chance of ectasia after LASIK is probably not paying much attention to a very important topic.

REASONABLE RISK

Refractive surgeons' mission and responsibility are to improve their patients' UCVA while incurring a reasonable amount of risk. I define *reasonable* as a 1% to 2% chance of a significant complication from a given surgery. Would any surgeon undergo a refractive procedure if the chance of a major complication were 20%? I doubt it. Refractive surgeons are operating on patients who have excellent BCVA, not cataract surgery patients with diminished vision.

I fully support the field of refractive surgery, but patients must be informed of the true risk involved. It is not sufficient for an ophthalmologist to rationalize, "I have told the patient there are risks, and he may accept the risks even if the likelihood of their occurrence is great." Should refractive surgeons proceed with LASIK if they know that a certain risk is 40% likely? I think not. The inherent risks associated with a given surgery must be low enough to be "reasonable" if the informed consent is to be legitimate.

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In my experience, the odds that an eye with a corneal thickness of 500µm will develop ectasia postoperatively are a lot higher than 5%. I would estimate a risk of between 50% and 75%. Surgeons are missing the point if they say, "I have three patients who started with 500-µm corneas when they underwent LASIK 10 years ago, and they are doing fine." What matters most is not the one patient who did well but the chances of a patient's doing poorly.

GUIDELINES WANTED

At several recent summits, corneal experts have addressed corneal thickness and LASIK, but the discussions have been a major disappointment to me. Generally, the conferences have provided a major review of

the literature and a general conclusion about abnormal corneas' being contraindications for LASIK. None has shared specific guidelines, however. Telling LASIK surgeons to "look at all the parameters and get a general feeling about a cornea" is inadequate.

For surgeons who desire clinically useful answers with respect to LASIK and seemingly normal corneas with thin central pachymetry, I submit the following:

- LASIK is contraindicated on "normal" corneas with a central pachymetry measurement of less than 508µm;
- thin-flap LASIK is still LASIK; and
- a PRK-type procedure may be an appropriate alternative, although this procedure also has some inherent complications.

CREDIBILITY

Refractive surgeons are not required to play close to the line of complications. If I underwent LASIK on a cornea that was 490µm thick and developed postoperative ectasia, I would be very angry about how the complication affected my life. My surgeon should have known that the risk of ectasia was beyond a reasonable level.

For me, it strains credibility for a so-called corneal expert to argue that all LASIK should be abandoned when perhaps 10 million patients have been highly satisfied with the procedure during the past 10 years and have not developed significant corneal pathology. The converse, however, is also true. Just as LASIK has many appropriate uses, it also has limitations. Both inexperienced and seasoned prudent refractive surgeons may benefit from examining their rationale for performing LASIK on thin corneas. ■

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WHAT DO YOU THINK?

Do you have a strong opinion on corneal thickness as it relates to the safety of LASIK? Is there another topic in refractive surgery that you would like Lee Nordan, MD, to address? Readers are encouraged to send their comments and ideas to Dr. Nordan at the e-mail address listed on this page.