



REFRACTIVE SURGERY

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Tracking trends in LASIK enhancement

LASIK enhancement offers more options, but also involves more choices.

by Rochelle Nataloni

KANSAS CITY, Kan. — Laser in situ keratomileusis (LASIK) enhancement is easier than ever because there are more options, but more complicated than ever because there are more choices. "We can make spherical enhancements by either making the cornea steeper or flatter to make it less or more myopic, and we can take care of astigmatism with either the laser or with an astigmatic keratotomy (AK)," said Daniel S. Durrie, MD. "Now there's another option with the advent of Intacs [KeraVision, Fremont, Calif.], which can be implanted after LASIK to correct an additional 1 D to 3 D of myopic correction."

A survey of one dozen refractive surgeons on the topic of LASIK enhancement uncovered some interesting practices and trends. For instance, several surgeons told *Ocular Surgery News* that in instances where they have re-cut a new flap rather than lifting the original, the second microkeratome cut has created a free wedge of tissue that could cause complications. These surgeons are now leaning toward lifting the original flap as far out as 1 year or longer postop. "I only make a new flap if it's been more than 18 months to 2 years after the primary surgery," said Robert K. Maloney, MD. "The reason I prefer to lift the flap is that sometimes I get little tags of tissue from the microkeratome cutting," he said.

Stephen F. Brint, MD, began noticing that same thing around the time of his interview with *Ocular Surgery News*. "In a small number of cases, I've had a small fragment of tissue from making two cuts. I may start trying to lift the flap out to about 1 year now that I'm seeing other surgeons very successfully lift flaps out to a year. It decreases the chance of having a second interface and it decreases the chance of having a wedge of tissue," Dr. Brint said. "It also leaves you more tissue to remove without infringing on the residual 250 μ m of cornea that we want to leave intact."

TLC surgeon Louis E. Probst, MD, who practices in both the United States and in Canada, has performed about 4,000 LASIK enhancements. He says that the 6-month mark appears to make a difference. "It seems that after 6 months, there's very little chance of having a free wedge of tissue. Below 6 months, the previous flap is not healed [enough], so if the second cut catches the previous cut at the wrong angle, you'll get a free wedge of tissue, and that can definitely affect your result," he said.

Roger F. Steinert, MD, said that one of the under-appreciated virtues of LASIK is the surgeon's ability to perform reliable enhancements at a relatively early stage postoperatively, particularly compared with photorefractive keratectomy where, he pointed out, ongoing wound healing makes enhancements before at least 6 months difficult and unreliable. "I always try to lift the original flap. So far, I have been able to lift flaps as far as 18 months postoperatively," Dr. Steinert said. "Re-cutting has the danger of double cutting the original flap, resulting in wafers of tissue, or worse, and nearly impossible subsequent problems with irregular astigmatism," he said.

Surgeons such as Dr. Brint and Trevor Woodhams, MD, said that in instances where they do elect to re-cut a new flap, they take care to use a plate that creates a plane well beneath the original. Dr. Woodhams and Peter S. Hersh, MD, said they successfully lift original flaps 2 years after primary surgery. Dr. Hersh said he only needed to re-cut one flap in his past 100 enhancements.

Enhancement rate

Surgeons describe their LASIK enhancement rate in a variety of ways. For instance, Richard L. Lindstrom, MD, and David R. Hardten, MD, said that of patients about 1% per diopter of correction end up 20/40 or worse and desire an enhancement. The actual enhancement rate, though, is about 2% per diopter of the original correction, because often patients with 20/30 or better vision want an enhancement. In other words, at a -8 D correction, about 8% would want an enhancement because their vision was 20/40 or worse and about 8% would want an enhancement even though their vision was 20/30, 20/25 or even 20/20. On the hyperopic side, Dr. Lindstrom's and Dr. Hardten's enhancement rate for 20/40 or worse vision is two times the refractive error, or 8% in +4 hyperopes.

The average incidence of enhancement among those surveyed ranges from as low as 4.8% to as high as 15%. Several reported enhancement rates at or around 25% in hyperopic patients. Dr. Woodhams said his enhancement rate varies depending on the degree of preoperative refractive error, toleration of anisometropia in monovision and visual demands of the patient. "I tend to be rather more aggressive about enhancements because I have had LASIK myself and I know firsthand the difference between 20/20- with plano/-1.00 and 20/20+ with plano/sphere," he said.

Stabilize first

Surgeons all said they wait until the patient has achieved refractive stability before performing an enhancement. Dr. Hardten waits 1 month per diopter of original correction in myopic patients and 2 months per diopter of original correction in hyperopic patients. Dr.

Probst also bases his decision on when to enhance on the degree of refractive error. "I generally prefer to wait 2 months, but if it was a very small LASIK correction like a -1 or -2, then generally they stabilize more quickly, so it would be possible to enhance earlier at 4 to 6 weeks. For a greater than 3 D correction, I like to wait a full 3 months, and for greater than 8 D, I like to wait 4 months," he said.

Most said they wait at least 3 months before considering an enhancement, and some like Mark P. Leshner, MD, will not perform an enhancement until the refraction is stable at two separate visits 1 month apart. Dr. Woodhams waits only 2 months and said he typically finds that the refraction is reliably stable sooner than that. In a recent study, Dr. Hersh found that 93% of patients are stable after 3 months, whereas 75% are stable after 1 month. "Waiting 3 months allows us to be confident that the eye is relatively stable refractively, yet close enough to the original procedure for patient satisfaction," he said.

James J. Salz, MD, who does not perform bilateral LASIK, begins considering enhancement at 4 weeks, and usually does it at 8 weeks. "I like to have two refractions 2 weeks apart that are the same," he said. Dr. Salz's rationale for refusing to do bilateral LASIK does not have anything to do with the rare risk of infection or complications. It is based purely on patient satisfaction. "I don't do bilateral surgery because I'm never sure that I'm going to get the outcome that I think I'm going to get because every eye heals differently. Even when I get the outcome that I want and they see well, [there's no guarantee] that they'll be satisfied with the quality of their vision," he said. "There are plenty of LASIK patients out there who are unhappy with their results, but I never have a patient who is bilaterally unhappy."

The majority of those surveyed said they rely strictly on the laser to perform enhancements. Some rely on AK in cases of mixed astigmatism, and one surgeon, Karl G. Stonecipher, MD, uses a two-incision AK in cases where 0.75 D or less of correction is needed. "It's simple and it works great," he said. Others interviewed for this article said it has been clearly shown that any surgical procedure performed on the cornea after LASIK can induce a haze response to the flap. Dr. Stonecipher said, "I've got 3 years follow-up on these patients, and it's not a problem."

Dr. Probst said he did about 50 AKs in cases of mixed astigmatism prior to the availability of scanning lasers. "What I found is that AK is very unpredictable. You can go anywhere from getting a good result to no result at all. Also, many of the cases of astigmatism after LASIK are due to slightly decentered ablations or slightly irregular patterns in the central area of the visual axis. Those are very difficult to treat with AK, and much easier to fix with a laser, but often you need a scanning laser to treat the mixed pattern," he said. Dr. Maloney said the only time he will do an AK following LASIK is if there is more than 4 D of astigmatism. "Otherwise, I correct astigmatism strictly with the laser, because I find the laser is more accurate. Even in mixed astigmatism, I'll do an astigmatic treatment to make the patient a spherical hyperope and then treat the hyperopia," he said.

The use of the Intacs intrastromal corneal ring segments over LASIK does not appear to interest any of the surgeons surveyed. A few indicated that the technology could be useful for patients whose corneas are too thin for additional LASIK but who need a few additional diopters of myopic correction.

Charging for enhancements

Ten of the 12 surgeons interviewed provide enhancements as part of the global LASIK fee; two charge a nominal fee of around \$100 for miscellaneous staff time and equipment. In cases where it is another surgeon's patient who needs an enhancement, and the procedure appears to be uncomplicated, the surgeons usually counsel the patient to return to the original surgeon. "Many times I just have to explain to them that the situation is pretty normal and maybe they just didn't understand some of the issues," Dr. Salz said.

Complicated cases are a different story. In instances where there is a referring surgeon, a fee is almost always charged, and it is either paid by the patient or by the referring surgeon depending on the situation. In complicated cases, Dr. Probst charges a higher fee than normal, and he is not alone. "I do eight LASIKs per hour," he said. "In a case where I'm dealing with an unhappy patient with a complicated case whose primary surgery was performed elsewhere, I may spend an hour just talking to him or her," Dr. Probst said.

Dr. Durrie is the sole example of a surgeon who does not charge to perform an enhancement for an unhappy patient coming from another practice. "I don't because I see it as a chance to make a happy patient, and happy patients send their friends in. The more happy refractive surgery patients out there, the better," he said.

Although enhancements are inevitable, avoiding the need or reducing the number remains a goal. Tracking outcomes and constantly redefining algorithms based on findings appears to be the key. At press time, Dr. Brint was preparing to switch to a new software program (Holladay/Kezirian Refractive Consultant Software, see article on page 35). "Instead of just looking at preop and postop refractions, this system looks at K-readings, pachymetry, humidity and temperature, among other things, and decides for each individual surgeon what their key factors are," Dr. Brint said. "Virtually every variable is taken into account, and it continues to redefine the surgeon's nomogram."

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