

Refractive Surgery Returns to the Surface

A new surface ablation technique with the Epi-K yields excellent visual results, fast visual recovery, and great postoperative comfort.

BY H. L. "RICK" MILNE, MD

I recently came full circle in my experience with surface ablation. Approximately 1 year ago, I completely replaced PRK in my practice with Epi-LASIK by way of the Moria Epi-K epithelial separator (Moria, Antony, France). At that time, I was already performing Epi-LASIK on approximately one-third of my laser refractive surgery patients. Furthermore, I enthusiastically predicted that I would soon begin to convert more of my refractive surgical practice to surface procedures with the Epi-K (Figure 1).



Figure 1. The Moria Epi-K.

After treating and following nearly 100 eyes, however, I became somewhat disillusioned with the standard Epi-LASIK technique in which the viable epithelial flap is retained. I now perform what I term *advanced surface treatment*—essentially Epi-LASIK with the flap removed—on 95% of my laser refractive surgery patients and choose LASIK for only approximately 5%.

This article describes the reasons for my decision as well as the changes in my technique.

DR. MILNE'S EARLY EPI-LASIK EXPERIENCE

The visual acuity of the first 100 eyes I treated with the

Epi-K and for which I retained the epithelial flap was very good. Few enhancements were needed. Moreover, my patients were more comfortable postoperatively than with PRK, and most were able to return to work sooner.

Three of these initial patients, however, experienced a delay in their visual recovery, and they developed what looked like a map-dot-fingerprint dystrophy across their central corneas. After discussions with colleagues, I came to believe that this dystrophy was the result of epithelial regrowth over or under the viable epithelial flap. Although the complication eventually resolved in all three cases, the patients endured 3 to 6 months of reduced visual acuity before their epithelia returned to a normal thickness. My eagerness to perform Epi-LASIK therefore began to wane.

Nevertheless, I remained interested in performing surface ablation for a number of reasons. First, it eliminates the potential for flap-related complications. Surface ablation also allows patients with thin corneas or tear dysfunction to undergo laser vision correction. Finally, studies have shown better results from wavefront-guided surface versus LASIK procedures¹ (Figure 2).



Figure 2. Picture of a patient's Bowman's layer after epithelial removal during PRK, 10 years after LASIK. The eye appeared normal at the slit lamp before PRK. This wrinkled appearance of Bowman's is typical after LASIK. The wrinkling may explain some of the increased higher-order aberrations post-LASIK.

Raymond Stein, MD, of Toronto, has suggested removing the epithelial flap.² At first, the idea did not make any sense to me. Once I tried Dr. Stein's method, however, I quickly realized that it just might transform my Epi-LASIK experience. Because the epithelium adjacent to the removed epithelial flap made with the Epi-K is fully adherent and not traumatized by alcohol or brush debridement (Figures 3 and 4), the cornea re-epithelializes quickly without pushing dead, devitalized cells to the center of the cornea. With PRK, surgeons would typically see pseudodendrites in the center of the cornea for 1 week or more, but the new technique avoids them entirely.



Figure 3. Picture of epithelium after alcohol removal.

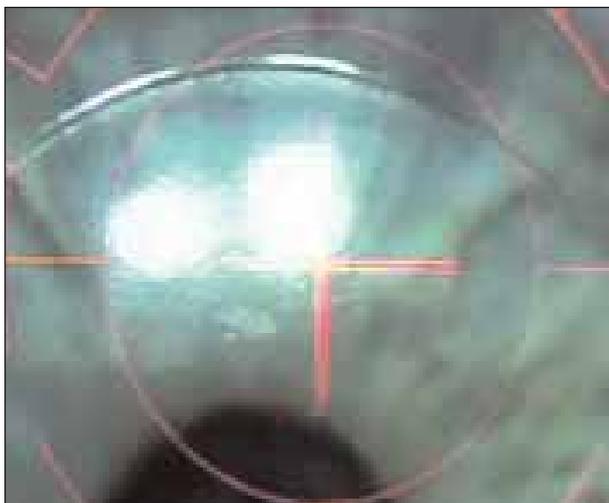


Figure 4. The appearance of epithelium after epi-K removal.

ADVANCED SURFACE ABLATION WITH Epi-K

I now set the Epi-K stop at 9mm and proceed with epithelial separation as usual. This stop effectively creates a free cap in approximately one-third of patients. In

the rest, a small tag or hinge may remain that I can easily peel off with a blunt instrument after removing the Epi-K head.

Since making the transition, I have not encountered any problems with the map-dot-fingerprint-appearing cornea as I had when retaining the flap. In addition, the smoothness and speed of the epithelial regeneration is clinically impressive compared to my earlier experience, and it is certainly faster when compared to PRK or LASEK.

I analyzed the outcomes in my first 100 eyes (55 patients) treated with this new technique. I was particularly interested in whether the epithelium had healed by the first postoperative visit, the patients' visual acuity at the first postoperative examination and at 1 month or later, and their use of postoperative pain medication. I used the Visx Customvue with iris registration (Advanced Medical Optics, Inc., Santa Ana, CA). I administered mitomycin C (0.02% for 15 seconds) to any eye in which the ablation depth was greater than 75 μ m. Since this analysis, I have treated more than 500 additional eyes with similar outcomes.

I often check a patient's vision 5 minutes after advanced surface treatment, and, impressively, most see better than 20/40 with many already seeing 20/20. I tell patients that their vision will fluctuate but that it looks like they will have a great result (this is how I get an immediate "wow" factor postoperatively).

I perform advanced surface treatments on Thursdays, with the follow-up examinations scheduled for Monday morning, approximately postoperative day 3.5. Of the more than 600 eyes I have treated thus far, only 12 eyes have not been 100% healed by the first postoperative visit. When I see patients on Monday morning, I am able to remove their bandage contact lens, and they are comfortable and functional enough to go back to work that day. Because their surgeries occurred shortly before Christmas, six of my patients' first postoperative visits were 2.5 days after surgery. Their eyes were also fully healed with no devitalized cells in the central epithelium.

In the study cohort, patients' visual acuity at the first postoperative visit averaged 20/40, with a range of 20/20 to 20/70. Binocular visual acuity was 20/30 on average, with all but two patients seeing 20/40 or better bilaterally. In eyes corrected for near, the average was J2. At the 1-month follow-up visit, all patients saw 20/30 or better, and none desired an enhancement. No eye lost one line of BCVA.

My results represent a huge improvement compared with the other surface techniques I tried. With PRK, the average healing time for my patients is approximately

5 days, with some taking 7 days or longer to fully re-epithelialize.

IMPROVED POSTOPERATIVE COMFORT

Regaining functional vision and returning to work relatively quickly are major factors in patients' acceptance of any surface ablation procedure. Even more important is the amount of pain they experience postoperatively.

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It is hard to say whether removing the epithelial flap affects patients' level of comfort. What has made a significant difference is premedicating them with Neurontin (gabapentin; Pfizer Inc., New York, NY) 100mg t.i.d. or Lyrica (pregabalin; Pfizer, Inc.) 75mg b.i.d. I instruct my patients to take one of these medications on the morning before their surgery.

Immediately after the procedure, I hold a frozen Weck-Cel sponge (Medtronic Xomed Surgical Products Inc., Jacksonville, FL) against the stromal bed for 30 seconds to chill the nerve endings, which helps to reduce postoperative pain. I have tried a number of bandage contact lenses and have found that a tight-fitting lens works best. I favor Night & Day lenses (CIBA Vision, Duluth, GA) with a base curve of 8.4.

In addition to Neurontin or Lyrica, I prescribe Xibrom (bromfenac ophthalmic solution 0.09%; Ista Pharmaceuticals, Irvine, CA) q.i.d.; Ambien (zolpidem tartrate; Sanofi Aventis, Bridgewater, NJ) q.h.s. for 4 days; Mepergan Fortis (promethazine HCl 25mg/meperidine HCl 50 mg; Wyeth-Ayerst Pharmaceuticals, Collegeville, PA); and diluted proparacaine (10 drops of proparacaine in 1-mL bottle of artificial tears). I like Xibrom because its mild anesthetic effect lasts for approximately 45 minutes after each instillation. Oral Mepergan Fortis does not cause nausea and has a symbiotic effect with either of the other pain medications. I tell patients to use the narcotic painkiller or the comfort drops if they experience any “breakthrough pain” after taking the other medications.

In addition to the pain cocktail, I prescribe a steroid and fluoroquinolone, both q.i.d. Once the eye heals, usually on postoperative day 3.5, I remove the bandage lens and stop all the pain medications, including the NSAID. I decrease the frequency of steroid treatment to

b.i.d. and instruct patients to continue administering the antibiotic for 2 more days. I like to get most of the chemicals off the epithelium as quickly as possible.

The aforementioned regimen was used for my first 100 eyes treated with the new advanced surface treatment technique. On the first postoperative visit (day 2.5 or 3.5) I asked patients whether they used any pain medication other than the Neurontin/Lyrica. Seven of the 55 patients (12%) took one narcotic pain pill during the first 24 hours following surgery. On postoperative day 2, three of the 55 patients (5%) took one pill. No patients took additional pain pills over the weekend.

I also asked whether the patients had used the comfort drops at all. Two patients (4%) had used the drops at least once during the first 24 hours after surgery. After that, none of the patients used the drops at all. In addition, my patients reported being quite functional during the weekend, with many going out to dinner or the movies and otherwise engaging in normal activities.

CONCLUSION

The advanced surface treatment procedure with Epi-K has allowed me to attract patients to my practice who have been afraid of laser vision correction. They want a safer procedure. My practice has grown 18% since this time last year, and more of my patients undergoing the advanced surface treatment are referring friends for surgery than my LASIK patients have for a long time. ■

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