The ML7: A New-Generation Microkeratome

This technology may eliminate constraints with LASIK treatments.

BY GILLES COURSAUX, MD

For years, the use of femtosecond laser technologies has dominated discussions of refractive surgery and flap creation. Now, attention has turned to the use of these devices in cataract surgery to create the capsulorrhexis and soften the nucleus for emulsification. I was never one who jumped on the femtosecond bandwagon, however, because I have had excellent refractive surgery results with new-generation microkeratomes such as the ML7 (Med-Logics, Laguna Hills, Inc., California). This tool provides three necessary factors for predictable and superior LASIK outcomes: accuracy, safety, and, most important, no limitations in the LASIK treatment.

NO LIMITATIONS

I have used the ML7 since August 2009 to treat approximately 1,000 eyes. This device has five vacuum rings, with 8.0-, 8.5-, 9.0-, 9.5-, and 10.0-mm optical zones, to allow treatment of all corneal curvatures and diameters without compromise. The 19-mm width of the device can be inserted in all types of orbits and eyelids, and I can create a flap with a diameter of up to 10 mm and avoid the need for a sponge or other agent to protect the hinge, even for hyperopic treatments. This is a complementary match for six-dimensional eye-tracking lasers, advanced systems that measure the curvature of the eye. A sponge on the hinge could disturb these measurements and result in suboptimal results.

Hinge position is adjustable with the ML7, allowing me to fine-tune its length and position over 360° and resulting in greater freedom in treatment. I also have the flexibility to choose flap thickness in 10-µm steps by selecting the proper blade thickness; each blade can be mounted on the same microkeratome head. I generally select the 100-µm head and then utilize the plano, -10, -20, or -30-µm calibrated LASIK blades to achieve flap thicknesses from 70 to 100 µm. I have been able to treat thin corneas (less than 500 µm) and maintain a minimum 300-µm residual stromal bed thickness.

ACCURACY

A combination of corneal marks with the three vacuum ring markers results in perfect centration on a consistent basis (Figure 1). The flap is created in a planar fashion for better vision without the induction of astigmatism or aberrations. The stromal bed is smooth due to

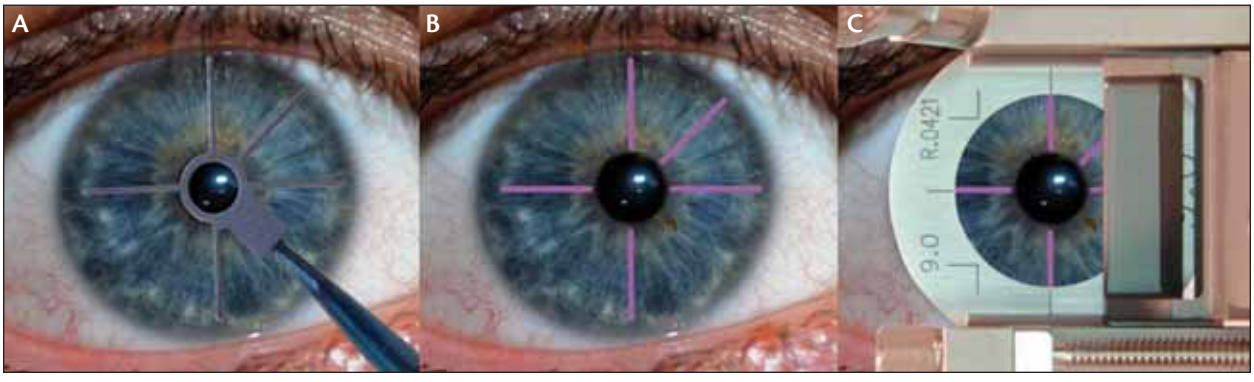

Figure 1. (A) The center of the cornea is marked using the Med-Logics ML7 Eye Marker. (B) The marks are made and confirmed centrally located over the cornea. (C) The assembled ring is positioned on the cornea by matching corneal markings with lines located on the deck of the vacuum ring. The two right angles on the assembled ring indicate where the hinge will be located.

the speed of the blade (10,400 oscillations/sec), which is constant even under varying loads.

Flap thickness, as measured with in-line optical coherence tomography (OCT), has been accurate across all 1,000 cases with a 9-µm standard deviation. There is no deviation in the function of corneal diameter, and I have experienced little deviation in the function of corneal thickness. The rule of thumb that thicker flaps are created in thick corneas and thinner flaps are created in thinner corneas can now be managed effectively to yield consistent, accurate results across all corneal thicknesses.

CONTROL DURING THE LASIK PROCEDURE

Suction. The device is designed to avoid complications during the flap cut. The internal vacuum reservoir creates suction quickly and alerts the surgeon when vacuum is stable. Additionally, I can modify the suction level by adjusting a knob on the front panel of the screen. The numbers on the top row indicate the suction preset, and the numbers on the bottom row indicate the actual achieved suction level. When patients are anxious or contract their eyelids, I can increase the suction level to avoid suction loss. For more relaxed patients, I can decrease the suction level to allow faster visual recovery.

Vacuum stability. Two beeps are heard when vacuum stability is achieved. This feedback was quite helpful on an early case when I could not achieve stable suction due to use of a large vacuum ring. Downsizing the ring resulted in a successful procedure.

The cut. The pathway of the blade across the cornea is protected, and the mechanical parts of the vacuum ring and handpiece are elevated above the eye. Incomplete cuts have not occurred. The design of the ML7 also prevents flap buttonholes.

Hinge placement. Two marks on the ring indicate the exact placement of the hinge. When utilized correctly, there is no risk of a free flap. The ML7's design also prevents flap buttonholes.

TAKE-HOME MESSAGE

- Using the ML7 avoids the need to apply a sponge to protect the flap hinge.
- In the 1,000 cases performed by this surgeon, there was no incidence of postoperative infection.

POSTOPERATIVE RESULTS

In my practice, patients typically achieve 20/16 to 20/20 visual acuity the day after surgery, with little to no conjunctival hemorrhage. The novel carrier for the single-use sterile blades prevents contact with the blade during its insertion into the head. My center has had no incidence of postoperative infection. There has been no haze with 70- to 80-µm flaps and no incidence of transient light sensitivity. Of the 1,000 LASIK procedures we have performed, one case of diffuse lamellar keratitis required additional medical treatment.

The edges of the flap cuts consistently allow perfect flap stability, and we have not seen any cases of flap displacement. The edges of the LASIK cut are fine, and it has been a significant advantage in the overwhelming majority of cases. If enhancement is needed, I prefer to mark the edge of the interface limit prior to the procedure at the slit lamp.

CONCLUSION

The ML7 represents a new generation of microkeratomes that delivers the highest standard of quality. It is a key component in my facility to deliver accuracy, consistency, and safety to my patients. It avoids any limitations in my LASIK treatment that I experienced using other technologies. ■

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