

Alternatives

Flap creation: Laser? Mechanical?

Second-generation microkeratome an attractive option for SBK procedures

By Cheryl Guttman

Reviewed by James S. Lewis, MD

San Francisco—A proprietary microkeratome (One-Use Plus, Moria) is a safe and effective alternative to a femtosecond laser for flap creation when performing sub-Bowman's keratomileusis (SBK), and the mechanical device offers a number of advantages as well, said James S. Lewis, MD, at refractive surgery subspecialty day at the



Dr. Lewis

annual meeting of the American Academy of Ophthalmology.

Dr. Lewis compared the limitations and benefits of the second-generation mechanical microkeratome with those of the femtosecond laser.

He concluded that many of the advantages claimed for the femtosecond laser in terms of its reliability, safety, and flap architecture are at least matched by the microkeratome, while other theoretical benefits of flap creation using the femtosecond laser remain to be proven. There is no debating that the mechanical microkeratome has an advantage for lower cost and improving patient flow.

"The femtosecond laser is excellent technology that reduces the overall risk of flap complications, particularly compared with use of first-generation mechanical microkeratomers," said Dr. Lewis, affiliated surgeon, Wills Eye Surgical Network, and director of cornea and refractive surgery, Salus University, Elkins Park, PA. "In addition, the femtosecond laser is a versatile tool that allows many options for flap customization and has the potential for multiple new applications in the future. However, all-laser LASIK does not deserve to be considered the only option for premium thin-flap surgery."

Economics

Cost is a major drawback of the femtosecond laser considering the initial capital outlay, click fees, and maintenance/upgrade expenses. Femtosecond laser users also incur lost opportunity costs since the flap cutting procedure itself is slow with all but the newest-generation unit, can be further delayed by the opaque bubble

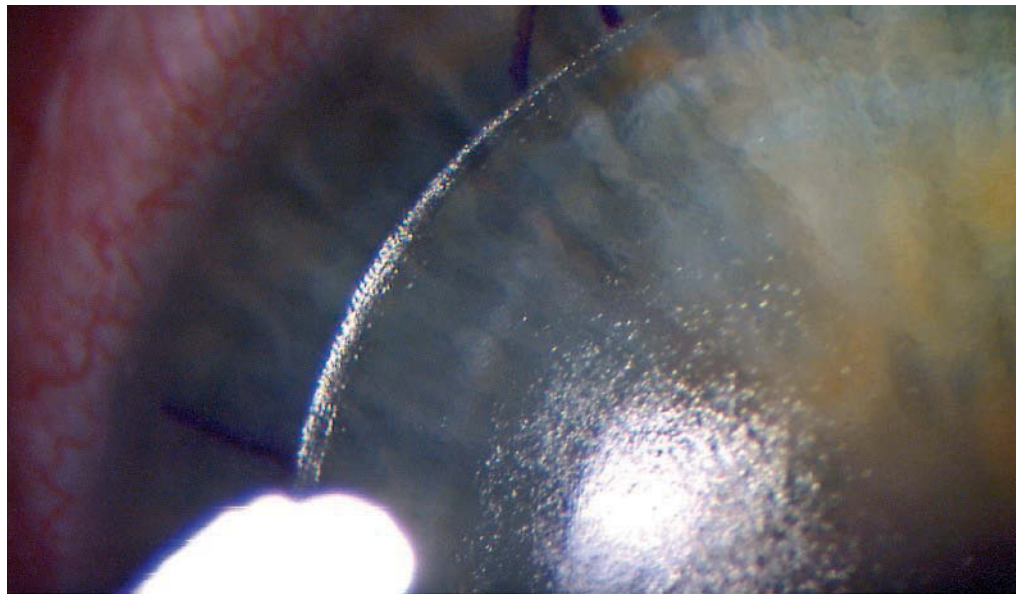


Figure 1 Beveled flap edge using Moria One-Use Plus sub-Bowman's keratomileusis.

layer, and involves extra patient transport time from room to room.

"Using [this microkeratome], my surgery day runs smoothly and on time," Dr. Lewis said.

Safety comparison

Dr. Lewis said that outstanding safety is a positive feature of the femtosecond laser, and surgeons can restart the procedure in the case of an aborted flap.

However, the risk of flap complications when the microkeratome is used in the hands of skilled surgeons is also extremely low, in part due to the outstanding suction and stability of the device.

In addition, IOP is elevated for less than 5 seconds during suction, flap elevation is easy both in the primary procedure and for enhancements, disposable blades and suction heads reduce the risk of infection and diffuse

lamellar keratitis, and patients require minimal steroid use postoperatively.

"More intensive anti-inflammatory treatment is needed after a femtosecond laser procedure because of greater inflammation," Dr. Lewis said.

Flap features

The device also competes well with the femtosecond laser for creating predictably thin flaps. Using anterior segment optical coherence tomography (OCT) (Visante, Carl Zeiss Meditec) to measure flap dimensions in Moria OUP SBK in a series of 300 eyes, Dr. Lewis found the central thickness averaged about 97 μm with a standard deviation of 8 μm .

"Thin flaps cut with the [device] do not exhibit haze as can occur when flaps <115 μm are cut with the femtosecond laser, and I feel the physiologic health of the tissue is better with a blade cut, which is gentler, delivers less heat, and causes less microscopic disruption of the collagen fibers," he added.

Although the femtosecond laser cuts a truly planar flap, the geometry of the flap cut with the device is more semi-planar than meniscus. Measurements made with anterior segment OCT show a difference of about 15 to 20 μm comparing the periphery of the microkeratome cut flap with its apex.

"The semi-planar shape actually has advan-

Take-Home Message

A microkeratome (One-Use Plus, Moria) is an excellent option for refractive surgeons interested in performing sub-Bowman's keratomileusis. Its features and performance make it a worthy competitor to the femtosecond laser, according to one surgeon.

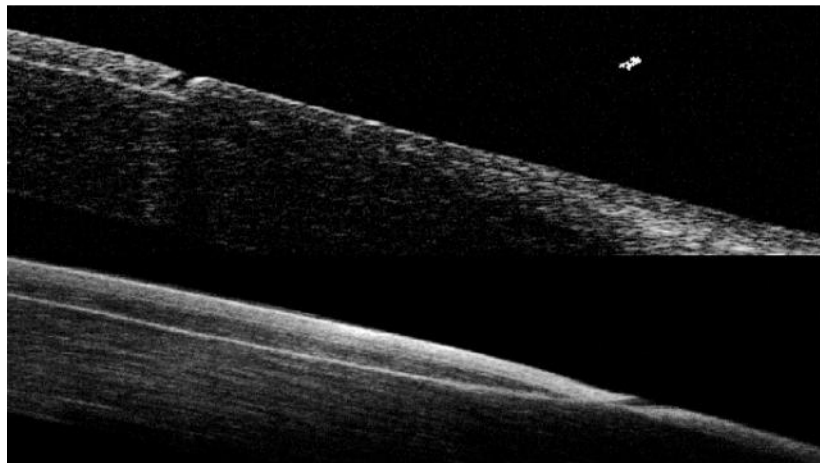


Figure 2 (Above) Femtosecond furrow immediately after surgery. (Below) No stromal interruption with Moria One-Use Plus sub-Bowman's keratomileusis. (Illustrations courtesy of James S. Lewis, MD)

tages because it favors flap stability, resists striae development, and facilitates flap handling without adversely affecting corneal strength or biomechanical integrity," Dr. Lewis said.

'The semi-planar shape . . . favors flap stability, resists striae development, and facilitates flap handling.'

James S. Lewis, MD

Using another anterior segment OCT platform (RTVue-100, Optovue), Dr. Lewis also has been evaluating the morphology of the flap and postoperative healing. Imaging performed immediately after surgery showed perfect alignment between the flap stroma and the stromal peripheral bed. In contrast, he has observed a gap or "furrow" in eyes with a flap created by femtosecond laser. Although the explanation for the findings in the latter eyes is unknown, Dr. Lewis suggests it could be due to true tissue loss from an ablative ef-

fect or tissue contraction induced by the delivered energy.

"We know the femtosecond laser is not supposed to ablate tissue. Perhaps that is true for the lamellar cut where it is creating a cleavage plane, but not when it is making the side-cut," Dr. Lewis said.

The presence of this tissue loss also provides evidence against the claim that the new reverse bevel configuration possible with the 150-kHz femtosecond laser (iFS, Abbott Medical Optics) affords an ideal tongue-and-groove alignment between the flap and the bed.

"Until this is more carefully investigated, we have to consider the premise that flap creation with the femtosecond laser results in a better flap to bed match is theoretical, unproven, and possibly false," Dr. Lewis said.

Further study is also needed to validate the claim that the unique edge architecture associated with use of the femtosecond laser for flap creation reduces the risk of epithelial ingrowth.

Dr. Lewis said that epithelial ingrowth during primary procedures is rare for both flaps created by mechanical microkeratomers and those by femtosecond laser. However, rates of post-enhancement epithelial ingrowth (usual in the first month) increase steadily after the second year. Flaps lifted after 5 to 10 years can show epithelial ingrowth almost half the time.

"A reduced ingrowth rate for the reverse bevel cut with the femtosecond laser is nothing more than opti-

mistic conjecture since there is not sufficient follow-up in eyes undergoing the new reverse bevel procedure to determine the incidence," Dr. Lewis concluded. **OT**

fyi

James S. Lewis, MD
Phone: 215/886-9090
E-mail: jslewis@mac.com
Dr. Lewis is a lecturer for Moria.

EXPERIENCE WILLS EYE EDUCATION ONLINE

Experience Wills Eye Education Online

A new educational initiative from Wills Eye Institute

Wills Eye Knowledge Portal

State-of-the-art, comprehensive, online learning for ophthalmologists and eye care professionals around the world.



LEARN from top doctors at Wills Eye Institute.
EXPERIENCE web-based medical education.
EARN CME credits from world renowned experts.

VISIT www.willseyeonline.org

See us at the ASCRS Meeting, Booth #320

FOR MORE INFORMATION CONTACT DR. LISA HARK
PHONE 215.928.3045 EMAIL LHark@willseye.org