

SBK With a Mechanical Microkeratome: Enhancing Safety of Laser Vision Correction

The thinner flaps leave a thicker stromal bed, potentially lowering the risk of ectasia.

BY DANIEL CASADO, MD

I began performing sub-Bowman's keratomileusis (SBK) approximately 1 year ago. After the first case, I have not returned to creating standard flaps. I prefer SBK for all my LASIK cases, regardless of refractive error or corneal thickness.

The advantages of SBK are enormous: tissue preservation, a thicker residual bed, improved biomechanical stability, and a potentially lower risk of ectasia. Additionally, visual recovery seems to be slightly faster, with better quality of vision and a lower enhancement rate compared with standard LASIK flaps, although we do not yet have data to confirm these impressions. We are also seeing fewer cases of postoperative dry eye and corneal sensation loss in patients for whom we perform SBK.

We perform approximately 2,500 refractive proce-

dures annually, of which 60% are thin-flap LASIK; however, our percentage of surface ablation procedures (30% epi-LASIK or LASEK) is increasing because I perform LASIK more conservatively than I previously have. In 10% of patients, I alternatively use IOLs.

I opt for surface ablation if the patient has an asymmetrical topography, posterior corneal surface irregularity, red or yellow indices on the Pentacam exam (Oculus Optikgeräte GmbH, Wetzlar, Germany), significant dry eye, central pachymetry reading thinner than 500 μm , and in individuals who play contact sports or who are nervous about having their cornea cut.

GOING THIN

It takes just a few procedures to become comfortable with handling the more delicate flaps used in SBK. For me, moving to SBK also required a transition from a pivoting or rotational microkeratome to the linear Moria One Use-Plus SBK (Moria GmbH, Antony, France). The linear microkeratome is faster, and the use of longitudinal movement reduces the risks of

Courtesy of James S. Lewis, MD (Elkins Park, PA)

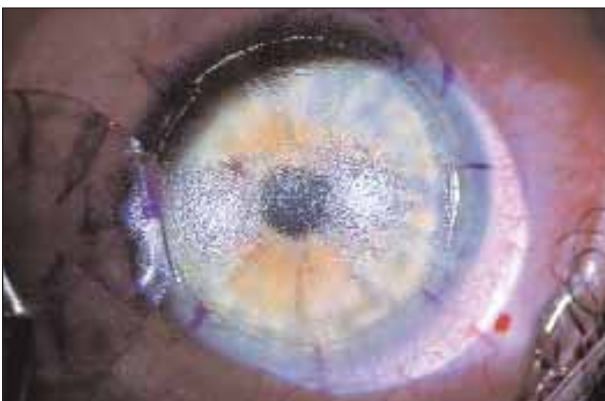


Figure 1. Excellent smoothness of the residual stromal bed after creating a SBK flap.



Figure 2. Flap thickness and planar profile with the One Use-Plus SBK and metal ring.

Courtesy of Daniel Casado Rodríguez, MD (Madrid, Spain)

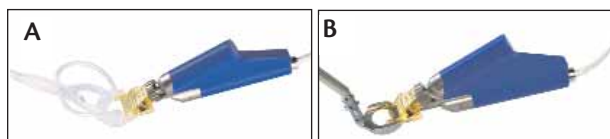


Figure 3. The Moria One Use-Plus SBK with (A) single-use plastic and (B) reusable metal rings.

buttonholes, obstructions, and collision of the head with the lid speculum. Before transitioning to the nasal hinge approach of SBK, I used a superior hinge; however, I quickly adapted to the new hinge location.

SBK is gentle on the epithelium. I usually get only a small epithelial notch in the nasal periphery, near the hinge, but it is not clinically significant. I initially expected to see more striae and folds with thinner flaps, but the SBK flap adapts to the modified curvature of the cornea more readily than a standard thickness flap. (I think this may be due to the smoothness of the stromal bed.) With previous microkeratomes, it was not unusual to see stromal microirregularities, such as peaks or lines, but I have not noticed these when using the One Use-Plus SBK (Figure 1).

Compared with thicker standard flaps, which tend to retract when hydrated, SBK flaps fit precisely onto the stromal bed and adhere strongly. I anticipated difficulty in lifting these flaps for enhancements; however, those made with the mechanical microkeratome have been no more challenging to relift than standard flaps.

Flaps made with the microkeratome appear to be planar. We measured the planarity of the flap with ocular coherence tomography (Figure 2), but given the subjective nature of identifying the interface, current imaging technology is inadequate for verifying planarity. A slight movement of the interface mark can significantly alter the measured thickness by 10 to 15 μm .

PLASTIC VS METAL SUCTION RING

I use a disposable head with either a plastic (fully disposable) or metal (partially disposable) suction ring (Figure 3). I prefer plastic because it provides the highest degree of safety. In countries where sterilization requirements demand disposability, or if the patient has a viral infection, the plastic system is

optimal. The plastic ring also allows better visualization of the cornea and confirms suction throughout the procedure.

In an ongoing prospective clinical study of both rings (200 eyes), attempted correction in the metal ring group (100 patients) ranged from 6.00 to -7.50 D. In the plastic ring group (100 patients), the attempted correction ranged from 5.50 to -9.00 D. I performed wavefront-optimized ablation (Allegretto; WaveLight AG, Erlangen, Germany) with adjustable asphericity.¹

All flaps made in the study were of high quality. There were no complications; specifically, no free caps, buttonholes, epithelial abrasions, infections, or cases of diffuse lamellar keratitis. The median flap thicknesses were 99.7 μm and 98.1 μm in the metal and plastic groups, respectively. The thickest flap was 135 μm ; the thinnest, 73 μm . I have since created flaps between 68 and 70 μm , and even these ultra-thin flaps were easy to manage. The median flap diameters were 9.5 and 9 mm in the metal and plastic groups, respectively. I expect to see no significant differences in the outcomes upon completion of the study.

TECHNIQUE PEARLS

When I first began performing SBK, I adhered strictly to the manufacturer's nomogram for ring and stop selection, according to corneal curvature. As my comfort increased, I made minor changes in certain cases, such as using a larger ring for hyperopia. The only risk of the larger ring is the occurrence of some bleeding in the periphery, which is manageable.

I preassemble the microkeratome head before plac-

TABLE 1. FLAP CHARACTERISTICS WITH THE MORIA ONE USE-PLUS SBK MICROKERATOME BY RING TYPE

		Metal Ring (N=100 eyes)	Plastic Ring (N=100 eyes)
Flap Thickness (μm)	Median \pm SD	99.7 \pm 13.2	98.1 \pm 10.7
	Minimum	73	77
	Maximum	135	122
Flap Diameter (mm)	Median \pm SD	9.5 \pm 0.2	9.0 \pm 0.3
	Minimum	8.75	8.25
	Maximum	10	10

* Flap thickness was measured with an ultrasound pachymeter.

TAKE-HOME MESSAGE

- The advantages of SBK include tissue preservation, a thicker residual bed, improved biomechanical stability, a potentially lower risk of ectasia, faster visual recovery, a lower enhancement rate, and fewer cases of postoperative dry eye.
- It takes only a few procedures to become comfortable handling SBK flaps.

ing the suction ring on the eye, and I always use a new head for each patient. I center the ring on the pupil. For larger ablation diameters, I slightly decenter the ring nasally; the hinge will be a little smaller in these cases.

The microkeratome has two advancement speeds; I default to the higher speed. If the flap is thinner than 90 μm in the first eye, we switch to the lower speed for the second.

After gaining experience with SBK, I increased drying time from 2 to 2.5 minutes and added a few more seconds of polishing or painting the flap borders to promote adherence.

For laser vision correction, safety is my most important consideration. If I have any concerns about performing LASIK, I opt for surface ablation instead. When I perform LASIK, I want to make it as safe as possible. At this moment, I believe the safest procedure I can offer my patients is SBK. ■

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1. Casado Rodríguez D. LASIK Sub-Bowman with the new Moria One Use-Plus SBK. Paper presented at the: 23rd annual meeting of the Sociedad Española de Cirugía Ocular Implanto-Refractiva; May 30, 2008; Madrid, Spain.

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