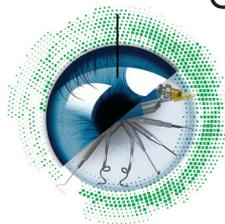


The Modern Automated Microkeratome

The Moria One Use-Plus SBK Microkeratome holds its own against typical femtosecond laser results



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When I began practicing as a LASIK surgeon, I was initially skeptical of the fact that the center I had joined relied on microkeratomes to create the LASIK flap. I had been trained using femtosecond lasers and considered laser flaps to be the standard for LASIK. I was also skeptical of a published study I found on the latest microkeratome by Moria (Antony, France) in which the authors reported zero complications.¹ "That can't possibly be true." I thought. But I agreed to try the Moria One Use-Plus SBK microkeratome for one week—confident that I would soon be ordering a new femtosecond laser.

Instead, from the very first case, I was amazed at the ease of use and speed of an automated microkeratome compared to the femtosecond laser. After analyzing my own complication rate over more than 6,000 cases, I am convinced that the One Use-Plus SBK microkeratome offers a high level of safety, excellent refractive outcomes, and efficiencies for both surgeons and patients.

Single-use microkeratome

The One Use-Plus device is a fully automated microkeratome with a disposable head that provides a pristine cutting edge for each patient. The single-use head is clear, allowing the surgeon to have full visualization during the flap creation. It can be set to create a 90/100- μm sub-Bowman's keratomileusis (SBK) flap (my preference) or a traditional 130- μm flap. In addition to the single-use plastic suction rings, reusable metallic suction rings from -1 Large-Cut to +3 are available to customize the flap to the correction [refer to Moria nomograms #65041 & #65067 respectively]. The microkeratome makes a translational movement from the temporal to the nasal side, creating a nasal hinge. There is no rotational movement and therefore no risk of an unexpected central flap buttonhole.

Between May, 2019 and May, 2021, I treated a total of 6,222 eyes with the One Use-Plus SBK microkeratome and the VisX Star S4 IR[®] (Johnson & Johnson Vision, USA) excimer laser and recorded



my outcomes and complication rates. The data set includes all eyes treated, including those with flat corneas (<40 D), corneal scars, or a history of long-term contact lens wear. The only exclusions were eyes that would normally be excluded from LASIK, such as those with keratoconus or elevated risk for ectasia.

Procedure time

One of the first things I noticed with the microkeratome was the speed compared to my prior femtosecond laser experience using the IntraLase[®] laser (Johnson & Johnson Vision, USA). From suction to flap lift is approximately 25 seconds. My total procedure time per eye is 2.8 ± 0.6 minutes, compared to nearly 5 minutes with the femtosecond laser. I don't have to move between two devices and, since no flap dissection is required to break the remaining tissue adhesions, the flap lift itself takes only about 5 seconds.

Being able to go 1-2 minutes faster is not a big deal in a single case but, over a long day of LASIK procedures, the minutes add up to more than an hour of my day—time that can be spent with more patients or relaxing at home with my family.

Flap quality and reliability

I have found the One Use-Plus SBK flaps to be very reproducible. The microkeratome leaves a very smooth stromal bed and the flap seats nicely back in the bed. It is well known that a nasal flap hinge preserves more of the corneal nerves, limiting postoperative dry eye and the loss of corneal sensation.²

In a smaller series of 60 eyes of 30 consecutive patients that I treated with this microkeratome, we carefully measured the central flap thickness in each case. In all eyes, the target was a 90- μm flap. The mean flap thickness measured by preoperative



ultrasound pachymetry (PalmScan P2000, Micro Medical Devices, USA) was $93.8 \mu\text{m}$ with a standard deviation of just $5.1 \mu\text{m}$ (range: 85-109 μm , Fig 1). There was no significant

difference between the first and second eyes (i.e., the first and second use of the blade), with **right eyes averaging 94.8 μm and left eyes 92.9 μm** ($p=0.1521$, Fig 2).

Fig. 1. Accuracy: Preoperative Central Pachymetries vs Central Flap Thickness

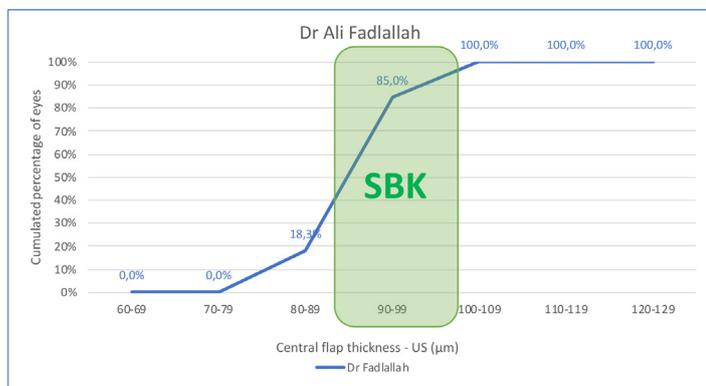
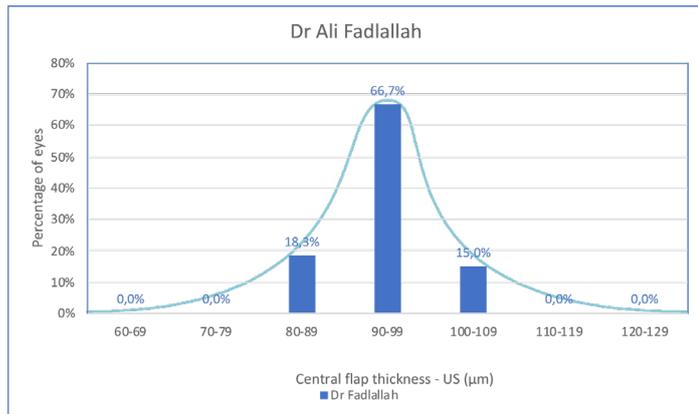
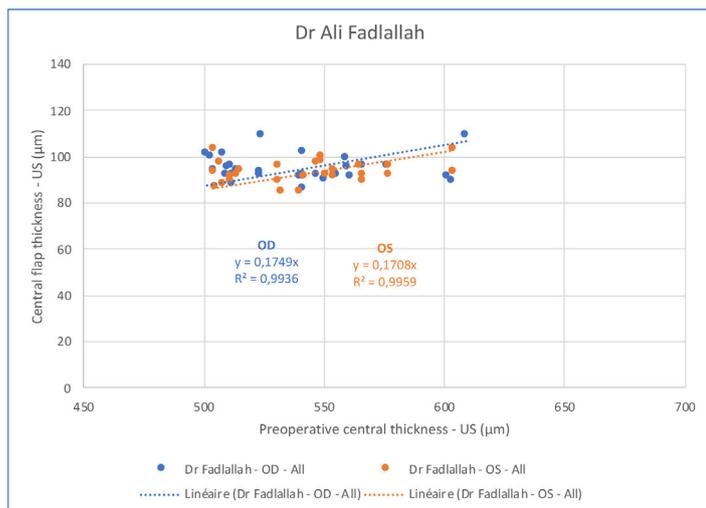


Fig. 2. Reproducibility: OD // OS vs Central Flap Thickness



In a published study in which subjects were randomized to a femtosecond laser, the One Use-Plus SBK microkeratome, and an older microkeratome, investigators measured the flap thickness at 20 locations on each cornea. Flaps made with the One Use-Plus SBK microkeratome and the femtosecond laser were both more uniform and accurate than those made with the older microkeratome.³

Low complication rate

Most impressive to me has been the very low rate of complications (Table 1) with the One Use-Plus SBK microkeratome. For example, I had only 1 case of suction loss in 6,222 eyes, which is far lower than we would expect with contemporary femtosecond lasers. There were no buttonholes, incomplete flaps or irregular stromal beds, and of course no cases of vertical gas breakthrough or opaque bubble layer that might occur with the laser.

Table 1: Complication Rate in 6,222 Eyes

Complication	Number	Rate
Suction loss	1	0.016%
Buttonhole	0	0%
Incomplete flap	0	0%
Free cap	2	0.032%
Epithelial defect	11	0.177%
Irregular stromal bed	0	0%
DLK	2	0.032%
Postop flap displacement	2	0.032%
Epithelial ingrowth	1	0.016%

I had 2 free flaps, both of which occurred in my first 3,200 eyes, which I consider incidental rather than a real complication for any experienced refractive surgeon; there were none in the subsequent 3,000 cases. In my previous experience with femtosecond laser flaps, about 2-3% of patients had diffuse lamellar keratitis (DLK) after surgery. In this case series, there were only 2 cases of DLK in all. I believe this is due to **less inflammation with a bladed flap cut compared to the process of breaking the tissue adhesions when lifting a laser flap**. I also see fewer epithelial defects with the One Use-Plus than I did with the femtosecond laser. Of the 11 cases in this series with an epi defect, all but one were very small (<1 mm). The single eye with a larger epi defect also had a history of epithelial basement membrane dystrophy.

Finally, although some surgeons are concerned that nasal flaps dislocate more easily, I have had only 2 flap displacements in this large series, both due to postoperative eye trauma. My feeling is that **thin, uniform SBK flaps stick much better than conventional LASIK flaps to the residual stromal bed**, which could explain the absence of flap dislodgment during the early postoperative time period.

Faster visual recovery

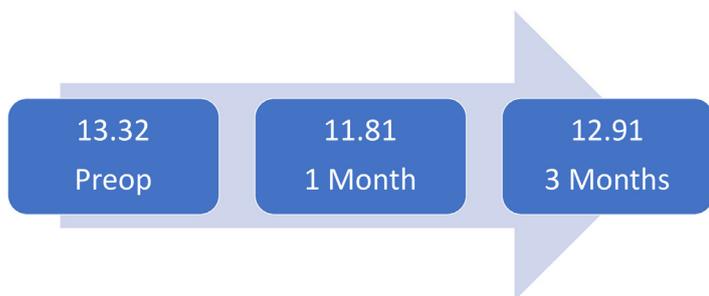
I don't see any differences in the final refractive outcomes between eyes treated with the femtosecond laser and the One Use-Plus SBK microkeratome. However, there is a more immediate "wow factor" with the microkeratome (Table 2), which I believe is due to the lack of inflammation. I measure binocular Snellen visual acuity immediately after surgery and find that most patients can see 20/25 to 20/40 already at that point. As with any other LASIK procedure, higher myopes may take a little longer to fully recover. By the first day postop, most eyes have improved to the 20/15 to 20/25 range, and at 1 month, the proportion of patients with excellent vision is even higher.

Table 2: Postoperative Visual Acuity in 6,222 Eyes

Hour 1	Day 1	Month 1
92.1% 20/40 or better	99.1% 20/25 or better	99.7% 20/25 or better

We have also found no major change in Schirmer scores from preop to the 1- or 3-month postoperative visit (Table 3).

Table 3: Schirmer Scores



Increasing access to LASIK

I believe that LASIK will continue to be the gold standard in refractive surgery. According to a recently published prospective contralateral eye study, wavefront-guided LASIK resulted in faster visual recovery, better low-contrast visual acuity, and greater gains in uncorrected visual acuity than SMILE (SMall Incision Lenticule Extraction).⁴ In a recent editorial in the *Journal of Refractive Surgery*, biomechanical concerns about ectasia after SMILE were raised.⁵ Dr. Randleman concluded that SMILE should have a limited, if any, role in eyes that are deemed to be at higher risk for postoperative ectasia and are therefore excluded from LASIK due to biomechanical concerns. If LASIK is contraindicated, then a surface procedure such as PRK or TransPRK may be considered.

Fortunately, we are enjoying renewed interest in the benefits of refractive surgery. As in other parts of the world, mask-wearing and unspent disposable income during the COVID-19 pandemic contributed to strong growth in LASIK volumes at our center, with a 35% increase in procedure volume in 2020-2021. Although

growth has slowed somewhat in 2022, we are still seeing volumes much higher than pre-pandemic. I continue to believe this procedure greatly benefits patients and should not just be limited to the "VIP" patient who can afford the most expensive technology. Using a microkeratome, for us, makes the equipment costs 10 times lower and the consumables cost per case five times lower, broadening access to LASIK.

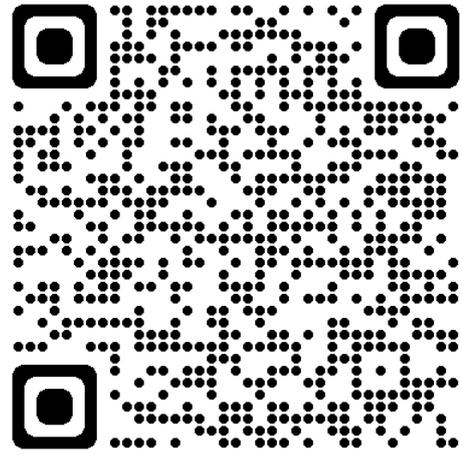
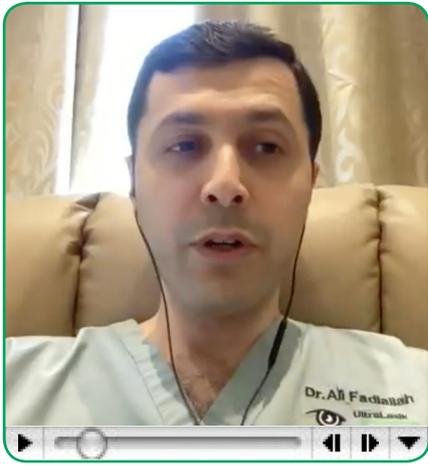
A lower cost, faster procedure—on its own—would not be enough to convince me. However, given that this microkeratome can provide the same visual results with even more rapid visual recovery and a similar or even lower rate of complications as a femtosecond laser, it is clear to me that the Moria One Use-Plus SBK microkeratome provides unrivalled performance, even in the age of FemtoLASIK.

Dr. Fadlallah is in practice at the UltraLASIK Eye Center in Dubai, UAE. He has no financial or consulting relationships related to this article.

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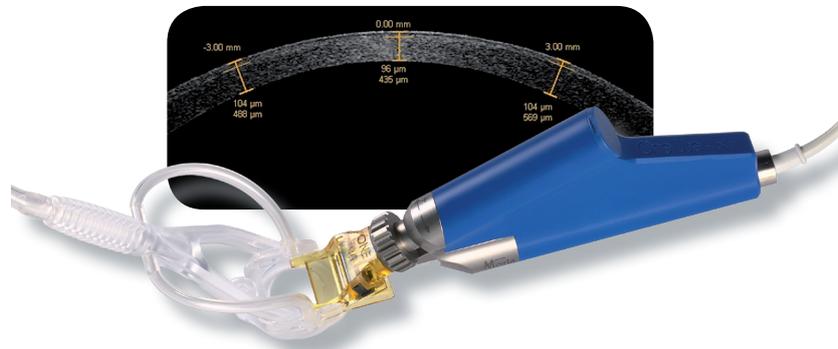
References

1. **Falcon C**, Norero Martinez M. Safety of the automated microkeratome for sub-Bowman's keratomileusis on the flat cornea. *French J Ophthalmol*. **2016**;39(2):202-9.
2. **Donnenfeld ED**, Solomon K, Perry HD, et al. The effect of hinge position on corneal sensation and dry eye after LASIK. *Ophthalmology* **2003**;110(5):1023-9.
3. **Zhai CB**, Tian L, Zhou YH, et al. Comparison of the flaps made by a femtosecond laser and automated keratomes for sub-bowman keratomileusis. *Chin Med J (Engl)*. **2013**;126(13):2440-4.
4. **Chiang B**, Valerio GS, Manche EE. Prospective, randomized contralateral eye comparison of wavefront-guided LASIK and SMILE refractive surgeries. *Am J Ophthalmol*. **2022**;237:211-20.
5. **Randleman JB**. Ectasia after SMILE, revisited. *J Refract Surg*. **2021**;37(12):798-99.



<https://invivox.com/fr/training/detail/MRIA12059>

For more information, please watch Dr. Ali Fadlallah's lecture about SBK on Invivox (free registration).



Flap creation in less than 4 seconds



Predictible thin sub-Bowman flaps



Excellent stromal surface smoothness



Excellent safety profile



Very fast visual recovery



Excellent quality of vision



Supported by in-vivo confocal microscopy



Customization of the whole flap geometry

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