

CASE OF THE MONTH

Lenticule Extraction with SMILE in low myopic patients – a case study

By Bostjan Drev, MRCP, FRCS, FRCOphth

EXCHANGE OF EXPERIENCE

Findings from various studies along with anecdotal observations point to growing patient interest in refractive surgery, and this trend is expected to continue.^{1,2} Most patients seeking refractive surgery are younger (20 to 40 years old), the vast majority are myopes, and low myopia (< -3.0 D) accounts for the largest proportion of the myopic population.^{1,3}

We acquired a VisuMax femtosecond laser (Carl Zeiss Meditec AG; Jena, Germany) in April 2015 and began to offer Lenticule Extraction with SMILE (Carl Zeiss Meditec AG, Jena, Germany) to treat myopia and myopic astigmatism soon after. Today SMILE accounts for approximately 92% of our myopic procedures. The following case illustrates the great outcomes that are achieved using Lenticule Extraction with SMILE to treat low myopia and highlights some of the features that make it our refractive procedure of choice for nearly all patients with myopia.

CASE HISTORY

A 30-year-old male who works as a car maintenance supervisor presented for a refractive surgery consultation. The patient had been using contact lenses to correct low myopia, but dust at his workplace caused problems with his contacts and he had stopped wearing them about 6 months earlier. The patient said he enjoys cycling, football, and martial arts. He was motivated to have refractive surgery because he wanted freedom from glasses at work, and he was particularly interested in SMILE because of his enthusiasm for contact sports. The patient underwent a comprehensive ophthalmic evaluation. His visual acuity and refractive data are shown in the table and maps from Scheimpflug imaging (Pentacam, OCULUS Optikgeräte GmbH; Wetzlar, Germany) are shown in the figure.

Parameter	Preoperative	Postoperative		
		Day 1	Month 1	Month 18
UCVA			Binocular 1.5	
OD	0.4	1.0	1.2	1.2
OS	0.4	0.9	1.2	1.0
BCVA				
OD	1.0	1.2		1.2
OS	1.0	1.0		1.2
Refraction*				
Subjective				
OD	-0.50 -2.25/10°	+0.50 -0.25/112°	+0.25 -0.0	+0.25 -0.0
OS	-1.00 -0.75/175° (180° repeat)	+0.75 -0.50/87°	+0.25 -0.0	+0.25 -0.25/70°
Cycloplegic				
OD	-0.25 -2.00/8°			
OS	-0.7 -0.75/177°			

* Preop refractions are done twice; postop refractions are from autorefractor

Table. Preoperative and postoperative data

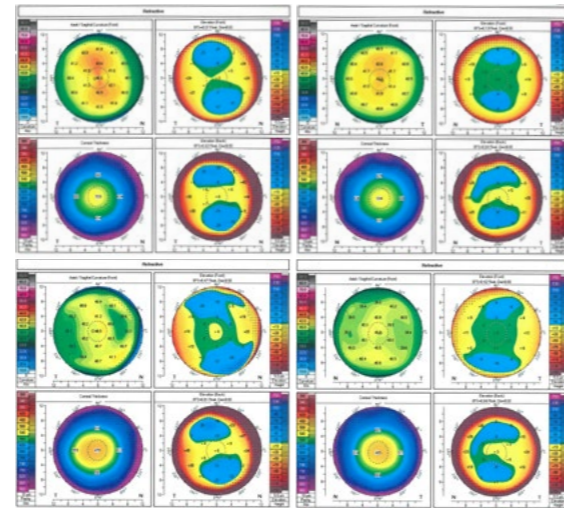


Figure. Preoperative (top row) and postoperative (bottom row) maps from Scheimpflug imaging

All options for refractive surgery and their individual risks and benefits were discussed with the patient, and he confirmed his interest in SMILE. The procedure was planned using the following parameters: cap thickness 140 µm, cap diameter 7.90 mm, incision position 90°, incision angle 40°, optical zone 7.0 mm, and minimum side cut 20 µm. The input for refractive correction was -0.50 -2.50/10° OD, -1.00 -1.00 cyl/177° OS. The cylinder correction was increased from the subjective refraction by -0.25 D OU and the axis OS was set at 177°, midway between the first and second examinations. The measured sphere values from the subjective refractions were used because the values from the cycloplegic refraction were lower than from the subjective refraction.

The procedure was completed successfully, and the patient commented about its speed and comfort. Data collected from follow-up after 1 day, 1 month, and 18 months show his very good results and stability of the refractive and functional outcomes (Table). The patient expressed his satisfaction at all visits, nothing that he was especially pleased about the rapid recovery and freedom from glasses and contact lenses.

DISCUSSION

Our clinic has built a reputation as a center of excellence for SMILE based on word-of-mouth referrals from happy patients, and the patient in this case who

presented with a specific interest in SMILE is typical of our refractive surgery population. Approximately three-fourths of patients inquire about SMILE at the initial consultation. Nevertheless, all suitable options are discussed so that patients understand the pros and cons of each procedure. Great outcomes can be achieved with SMILE and also with excimer laser refractive surgeries. However, Lenticule Extraction with SMILE is a minimally invasive procedure associated with fast visual recovery. Compared to LASIK, SMILE offers benefits of a larger functional optical zone, potentially less dry eye, and freedom from flap-related complications.^{4,5} Dry eye has become a growing problem among adults of all ages, and the potential for flap dislocation is a particular concern for active adults, such as the patient in this case, who enjoys contact and other sports that put him at risk for traumatic eye injury.

Published reports document that SMILE for low myopia is safe and predictably effective.⁶⁻⁸ Over the past 6 years, we have performed more than 2000 cases of SMILE to correct SE between -0.75 D and -12.0 D, of which approximately 40% of cases were low myopia (-0.75 to -3.00 D) with or without astigmatism. Analyzing our SMILE outcomes, we found very good results across all groups of eyes stratified by level of myopic error.

SURGICAL DETAILS

When treating low myopia, I use a cap thickness of 120 to 140 µm and extract the lenticule through a 2.6 to 2.8 mm incision at 12 o'clock (90°), although I make two incisions in some cases. Optical zone size varies from 6.50 to 7.50 mm and is made as large as pachymetry allows to maximize achieved lenticule thickness. I initially changed the default setting for side cut minimum edge thickness from 15 to 25 µm when I first started treating low myopia; after gaining experience in these cases, I set the edge thickness to 20 µm for cases with SE < -2.0 D.

Based on outcomes analyses, our initial SMILE nomogram was adjusted to achieve greater refractive accuracy, and we now correct 10% above the subjective refraction when treating eyes with > -2.0 SE or when treating lower levels of myopia in younger patients. The target refraction is +0.50 D for patients aged 18 to 25 years, 0.0 D for patients aged 26 to 38 years, and slight monovision for patients older than 38 years (-0.5 D to -0.75 D in the non-dominant eye, depending on the patient's professional activities and lifestyle).

Using the original VisuMax laser good centration and cyclotorsion adjustment is achieved with attention to proper patient positioning and "verbal anesthesia" to help the patient fully relax. I also place a reference mark on the peripheral cornea when treating >1.5 D of Cylinder, and adjust for cyclotorsion if needed. The new VISUMAX 800, which was launched in October

2021, incorporates a centration aid to support surgeons with this critical step and cyclotorsion alignment is done by digitally rotating the shooting pattern instead of manual alignment.

Following is my approach to lenticule dissection and extraction. Using a small hook, I open the incision and then create an entrance to the upper layer from the lateral (temporal) side to two-thirds of the distance to the center of the incision. Then, I look for the edge of the lenticule in the middle of the incision, go under the lenticule, and open the lower plane from the center to the opposite (nasal) side. After finding both interfaces, I gently separate the upper lenticular interface followed by the lower interface. When I am certain that the edges are free, I grasp the lenticule in the center with a micro-forceps and slowly extract it. Finally, I always check that the edges are smooth.

These steps are technically the same regardless of level of myopia, but the correct application is most important for low myopia. Surgeons should find it reassuring to know that the site on the lenticule that is most susceptible to tears, its edges, are at least as thick if not thicker in low myopia cases compared to medium or high myopia.

CONCLUSION

Within the population of patients interested in refractive surgery, low myopes represent a large potential pool that can be offered the benefits of SMILE. After performing 2,000+ Lenticule Extraction procedures with SMILE, I can say with confidence that surgeons who adopt SMILE will be gratified by the results and rewarded with patients like the gentleman in this case who are thrilled with their outcome and act as a referral source for building practice volume.

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Bostjan Drev, MRCP, FRCS, FRCOphth
specializes in cataract and refractive surgery and is in private practice at Vidim Eye Surgical Center, Celje, Slovenia.



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