

**International Society of Refractive Surgery (ISRS) Externship Program:
my experience and an interesting case report**

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Introduction

It gives me great pleasure to share my experience of participating in the Externship Program of the International Society of Refractive Surgery (ISRS) which offered me the exceptional opportunity to accomplish a three-month clinical “Cataract and Refractive Surgery” Fellowship at the Asian Eye Hospital in Pune, India.

After completing my residency, my main intention was to participate in training programs in different Eye Clinics since I have always believed that it would be a significant and constructive experience. Apart from expanding clinical knowledge and practice, programs like these offer a unique opportunity to attend novel procedures performed in specific centers worldwide as well as to work with people of a different culture. Thus, I first worked as a research and clinical Fellow at the Cornea and Refractive Surgery Department of the Jules-Gonin Eye Hospital at the University of Lausanne in Switzerland under the supervision of Prof. George Kymionis. During my Fellowship in Jules-Gonin Eye Hospital, I found out about the Externship Program of the ISRS and I applied immediately since my great will to enrich my experience in Cataract and Refractive Surgery and improve patient care was my motivation. I found the Program a preeminent chance to continue my training at a well-known Institute in another continent. So, I applied to be an ISRS Extern for three months to the Asian Eye Hospital in Pune, India. At this point, I would like to express my gratitude to the Board of Directors of the ISRS for awarding me this Scholarship and to the Director of Asian Eye Hospital Dr. Vardhaman Kankariya for accepting me as a Fellow at his Institute.

During my Fellowship at Asian Eye Hospital, I came across a lot of interesting cases, but since it was my first-time attending the small incision lenticule extraction

(SMILE) technique, I would like to share with you a challenging case of suction loss during SMILE, which is worth mentioning that is under review in a well-recognized Ophthalmology Journal.

Case Presentation

Abstract

A 26-year-old female presented to the Institute for refractive error correction and SMILE was planned. Towards the end of cap interface cut in her right eye, unstable suction resulting in intrusion of conjunctival tissue under the contact interface was noted. Although femtosecond laser application was completed, it was ineffective in creating the small incision. CIRCLE software was used to create a 50° wide small incision only (310° wide hinge) avoiding cap conversion to a flap. Lenticule extraction was performed through the new small incision and the procedure was completed uneventfully. Uncorrected distance visual acuity was 20/20 on the first postoperative day. Thus, CIRCLE software can be used after suction loss in SMILE for creation only of the small incision without cap-to-flap conversion allowing completion of the flap-less SMILE procedure.

Case report

A twenty-six-year-old female presented to the Institute for correction of her refractive error. Uncorrected (UDVA) and corrected distance visual acuity (CDVA) were counting fingers and 20/20 in both eyes, respectively (-3.50 -0.50 × 180° at the right and -4.00 at the left eye). Slit-lamp and fundus examinations were unremarkable. Corneal topography (Sirius Tomograph and Corneal Topographer, CSO, Scandicci, Italy) was within normal limits; keratometry readings were 43.57/44.90 diopters (D) and 43.48/44.61 D at the right and the left eye, respectively. Corneal thickness (CT)

was 556 μm and 535 μm at the right and the left eye, respectively. SMILE was planned for correction of her refractive error in both eyes.

The procedure was performed under sterile conditions and topical anesthesia using the 500-kHz Visumax femtosecond laser platform (Carl Zeiss Meditec, Jena, Germany). The patient's right eye was well centered, docked and suction was started. Targeted lenticule and cap diameter in right eye were 6.50 mm and 7.50 mm, respectively. The intended cap thickness was 120 μm . The 3 mm (46°) wide small incision was planned at 90° (Fig. 1A). The lenticule interface and side cuts were successfully completed. Towards the end of cap interface cut, unstable suction resulting in intrusion of conjunctival tissue within the contact interface was noted. Laser application was continued and completed since there was no loss of contact between the corneal surface and the suction glass. Cap interface was successfully formed, but the small incision was not created. During manual dissection, the surgeon confirmed that femtosecond laser application was ineffective in creating the small incision. Since laser delivery was complete, it was not possible to use the restart treatment module of the software. We decided to use the CIRCLE software (Carl Zeiss Meditec, Jena, Germany) to create only the small incision without converting the cap to a flap. The lamellar cut was created at same depth of 120 μm as original cap thickness using CIRCLE software ("D" pattern). In order to create a 50° wide (3.2 mm) small incision, a 310° hinge (20.83 mm) was designed. The hinge was positioned at 290° in such a way that the new small incision would not coincide with the previous SMILE incision at 90° ; thus, the new incision was created superotemporally at 110° (Fig. 1B). Manual lenticule dissection and extraction were then performed uneventfully. SMILE treatment of the left eye was uneventful.

On the first postoperative day, UDVA was 20/20. Corneal topography showed a regular postoperative curvature map (40.31/41.33 D) with a well centered treatment. Slit-lamp examination as well as anterior segment optical coherence tomography (Cirrus HD-OCT Model 500, Carl Zeiss Meditec, Dublin, CA) showed regular and clear corneal stromal interface (Fig. 2). UDVA was found to be stable during the three-month follow-up.

Discussion

SMILE is a flap-less lenticule extraction technique used currently for correction of myopia and myopic astigmatism.^{1,2} In SMILE, intrastromal lenticule is created using a femtosecond laser and manually extracted through a small incision avoiding the flap-related complications.^{1,2} Nevertheless, several other complications of SMILE can occur; one of the main intraoperative complications is suction loss.³ Several approaches for the management of suction loss during SMILE have been described depending on the stage at which suction loss is encountered.⁴⁻⁶ Reinstein et al. has described a comprehensive decision tree for management of suction loss during different stages of SMILE, depending on the type of eye movements, suction stability grading and progress of the femtosecond laser cutting.⁵ Liu et al. reported the clinical results of suction loss during SMILE managed by different re-treatment modalities to be comparable to the outcome in fellow eyes which underwent uneventful SMILE.⁶

In this case, suction loss occurred at the end of cap interface cut resulting in conjunctival tissue intrusion within the contact interface. Although cap interface cut was successfully completed, the small incision was not created because of overlying conjunctival tissue. Since the laser was completely delivered, restart treatment module of the software could not be used. Various re-treatment options such as conversion to

surface ablation or thin-flap LASIK were considered. However, as creation of the cap and lenticule interfaces had been completed, the only concern was to gain access to the formed lenticule.

CIRCLE software, originally indicated as a tool for enhancement after SMILE, allows conversion of SMILE cap into a flap providing access to the interface.⁷⁻⁹ Ganesh et al. and Reinstein et al. have demonstrated the use of CIRCLE software for the management of complicated lenticule dissection during SMILE.^{10,11} Converting the cap to a flap using the CIRCLE software could have been an option in this case in order to gain access to the lenticule. However, this alters the flapless SMILE procedure to a flap-assisted femtosecond lenticule extraction procedure. Hence, we used CIRCLE software only for the creation of the small incision without converting the cap to a flap. CIRCLE was planned in a novel manner to create a 50° wide small incision with a 310° hinge. Our main goal was to complete the flapless SMILE procedure avoiding cap-to-flap conversion and thus the possible complications and disadvantages of a flap. SMILE is devoid of flap related complications and has less postoperative dry eye with minimal loss of corneal sensitivity when compared to femtosecond LASIK.¹²

In conclusion, this report describes the successful use of CIRCLE software for small incision creation only as a management strategy for suction loss in SMILE. This unique approach of utilizing the CIRCLE software without cap-to-flap conversion in similar scenarios seems to be safe resulting in a favorable outcome.

What I have learned during my ISRS Externship - my experience

Being awarded the chance to participate in the ISRS Externship Program and continue my training at the Asian Eye Hospital was a significant challenge and incredible experience for me. On the whole, it gave me the great opportunity to further advance my knowledge and practice in the field of Cataract and Refractive Surgery.

Specifically, I had the chance to attend the activities at all the departments of the Institute, but I mostly spent my time with Dr. Vardhaman Kankariya who is an expert in his field and always happy to share his knowledge and experience. In the outpatient clinic, apart from examining and following cataract and refractive patients, I came across a variety of corneal and other anterior segment diseases. The time I spent in the operating room was especially educational and constructive as well. I had the privilege to gain further experience and pearls in cataract surgery and familiarize with the whole spectrum of the refractive surgery seeing that all of the current approaches are performed in the Institute including advance surface ablation, femtosecond laser-assisted LASIK, SMILE, phakic intraocular lens implantation and lens exchange. Moreover, I was happy to find out that all the current corneal cross-linking (CXL) protocols, including the Cretan protocol which has been my PhD, are performed in the Institute for the management of keratoconus. Although the time period was limited, I took part in some clinical research projects and cases, including the one I mentioned above, which I hope to be published in well-recognized Ophthalmology Journals. Last but definitely not least, since it was my first time in India, I had the chance to work and interact with colleagues of a completely different mindset and I feel more than thankful for their help, cooperation and hospitality. It is worth noting that I did the best from my part to share my knowledge, experience and way of thinking in clinical practice and

research activity with my colleagues and offer the utmost to patient care and group productivity. I hope they also gained something from my presence there.

On a final note, I am certain that the benefits I acquired from my participation in this Program were unique and will be more than helpful for my future career. Thus, I highly recommend to all ophthalmologists, especially the younger ones, to apply for the ISRS Externship Program and live an amazing experience.

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Legends

Figure 1: Primary SMILE planning (A) and retreatment planning using CIRCLE software (B) for the creation of the small incision only.

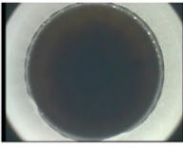
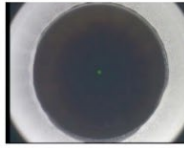
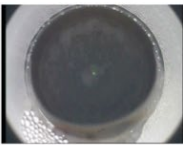
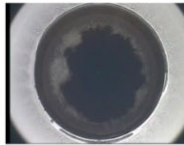
Corneal surgery – ReLEx SMILE		A	OD OS	Corneal surgery – CIRCLE		B	OD OS
Diagnostic data Cornea vertex distance [mm]: 12.00 Manifest Sphere [D]: -3.50 Cylinder [D]: -0.50 Axis [°]: 0 Corneal radius [mm]: 7.63 Mean K-reading [D]: 44.24 Pachymetry [µm]: 556				Diagnostic data Cornea vertex distance [mm]: 12.00 Manifest Sphere [D]: 0.00 Cylinder [D]: 0.00 Axis [°]: 0 Corneal radius [mm]: 7.63 Mean K-reading [D]: 44.24 Pachymetry [µm]: 556			
Treatment data Treatment pack size: S Suction time [hh:mm:ss]: 00:00:36		Nomogram info Refraction, Version 3.0 Lenticule data Optical zone [mm]: 6.50 Transition zone [mm]: 0.10 Thickness [µm]: Min: 25 Max: 91 Side cut angle [°]: 90 Refractive correction Sphere [D]: -3.50 Cylinder [D]: -0.50 Axis [°]: 0		Treatment data Treatment pack size: S Suction time [hh:mm:ss]: 00:00:17		Nomogram info FlapExtension, Version 1.1 CIRCLE mode: Junction up and down Lamellar and side cut: Diameter [mm]: 7.70 Depth [µm]: 120 Side cut angle [°]: 90 Hinge position [°]: 290 Hinge angle [°]: 310 Hinge width [mm]: 20.83 Junction: Diameter [mm]: 6.50 Lower depth [µm]: 135 Upper depth [µm]: 105	
Expected result ReLEx SMILE incisions created. Remaining refraction Sphere [D]: 0.00 Cylinder [D]: 0.00 Axis [°]: 0 RST [µm]: 345				Expected result CIRCLE incisions performed. RST [µm]: 421			

Figure 2: Anterior segment optical coherence tomography (Cirrus HD-OCT Model 500, Carl Zeiss Meditec, Dublin, CA) on the first postoperative day showing regular and clear corneal stromal interface.

