



Contents lists available at ScienceDirect

American Journal of Ophthalmology Case Reports

journal homepage: <http://www.ajocasereports.com/>

Case report

Management of incision failure during small incision lenticule extraction because of conjunctivochalasis



Bu Ki Kim, Su Joung Mun, Dae Gyu Lee, Hyun Tae Choi, Young Taek Chung*

Onnuri Smile Eye Clinic, Hyobong Building 9F 1, Gangnam-daero 65 gil, Seocho-gu, Seoul, South Korea

ARTICLE INFO

Article history:

Received 1 September 2016
 Received in revised form
 31 March 2017
 Accepted 20 June 2017
 Available online 24 June 2017

Keywords:

Small incision lenticule extraction
 SMILE
 Conjunctivochalasis
 Complication

ABSTRACT

Purpose: We report a case of incision failure during small incision lenticule extraction (SMILE) and its management.

Observations: The incision could not be made using the femtosecond laser because of a redundant conjunctiva, so it was instead done manually using a diamond knife. The lenticule was successfully separated and extracted. Three months after the procedure, the uncorrected distance visual acuity was 20/20 and no complication was observed.

Conclusions and importance: This case demonstrates that the conjunctiva should be carefully examined before SMILE. If a complication occurs because of conjunctivochalasis, it can be resolved with proper management without compromising the patient's visual acuity.

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1. Introduction

Small incision lenticule extraction (SMILE) is a new, flapless, minimally invasive procedure that can correct myopia and myopic astigmatism using a VisuMax[®] (Carl Zeiss Meditec, Jena, Germany) femtosecond laser.¹ Numerous studies have reported that SMILE is effective, safe, and yields predictable results, so this procedure has gained wide acceptance.^{1–3} However, there are several possible complications specific to the femtosecond laser including suction loss, interface haze, anterior chamber bubbles, black spots during the creation of the lenticule, and blockage of the laser by an opaque bubble layer.^{4–6} Although these potential complications occur infrequently, they present a challenge to the surgeon.

Conjunctivochalasis is characterized by the existence of excess fold of conjunctiva located between the globe and the lid margin.⁷ It usually does not affect corneal refractive procedures because they only involve the cornea. However, the peripheral cornea is sometimes covered by redundant conjunctiva that affects SMILE because it relies on a suction system. We report a case involving blockage of SMILE by redundant conjunctiva that required manual incision.

2. Case report

A 37-year-old female visited our clinic for treatment of visual problems. She had a history of dry eye and had used soft contact lenses for 10 years. Her preoperative manifest refractions were sphere, -2.25 ; cylinder, -0.75 ; and axis, 80° in the right eye, and sphere, -2.5 ; cylinder, -0.5 ; and axis, 90° in the left eye. The automated keratometry readings were 44.25 diopters (D) at 155° and 44.75 D at 65° in the right eye, and 44.5 D at 5° and 44.75 D at 95° in the left eye. The preoperative uncorrected distance visual acuity (UDVA) was 20/200 and the corrected distance visual acuity (CDVA) was 20/20 in both eyes. The patient underwent a preoperative examination including specular microscopy (NONCOM ROBO-CA; Konan Medical, Tokyo, Japan), anterior segment optical coherence tomography (OCT) (Visante OCT[®]; Carl Zeiss Meditec, Dublin, CA, USA), posterior segment OCT (Cirrus[™] OCT; Carl Zeiss Meditec), and dual Scheimpflug analysis (GALILEI; Ziemer Ophthalmic Systems, Port, Switzerland). Ultrasound pachymetry showed a central corneal thickness of 564 μm in the right eye and 566 μm in the left eye. No corneal abnormalities were detected during the preoperative evaluation, and the patient had no history of ocular injury.

Both eyes were treated on the same day by the same surgeon (CYT) using a VisuMax[®] 500 kHz femtosecond laser (Carl Zeiss Meditec). The laser settings included a cut energy of 180 nJ and a

* Corresponding author.

E-mail address: ytchungc@hanmail.net (Y.T. Chung).

spacing of 4.5 μm . The lenticule diameter was 6.6 mm, the cap diameter was 7.5 mm, and the intended cap thickness was 110 μm in both eyes. The intended lenticule thicknesses were 66 μm and 67 μm , and the expected residual corneal beds were 388 μm and 389 μm in the right and left eyes, respectively. The incision was 2.0 mm long in both eyes. The target refractive corrections were $-2.25-0.75 \times 80^\circ$ and $-2.5-0.5 \times 90^\circ$ for the right and left eyes, respectively. SMILE was performed as previously described.¹ Although the SMILE procedure in the left eye was performed without any difficulty, the conjunctiva blocked the laser in the right eye. After confirming that the laser failed to cut the cornea, the incision was performed manually using a diamond knife. The surgeon created an incision to 1/4 the depth of the cornea. The lenticule was separated and successfully extracted through the incision (Fig. 1). After the procedure, the patient was treated with 0.5% moxifloxacin (Vigamox; Alcon, Hünenberg, Switzerland) for 7 days, and 0.1% fluorometholone (Oculmetholone; Samil Pharmaceutical Co., Ltd., Seoul, Republic of Korea) and preservative-free hyaluronic acid lubricating drops (0.1% Hyalein Mini; Santen Pharmaceutical Co., Ltd., Osaka, Japan) for four weeks.

One week after the procedure, the UDVA was 20/25 and 20/20 in the right and left eyes, respectively. After three months, the UDVA and CDVA were 20/20 and 20/18, with $0-0.25 \times 90^\circ$ in the right eye, and 20/18, 20/18, with $+0.25-0.25 \times 90^\circ$ in the left eye, respectively. The patient complained of eye pain after injection of the right eye on the first day after the procedure, but there were no complaints after several days. Fig. 2 shows dual Scheimpflug images of the right eye taken preoperatively and three months after

surgery. No complications such as keratitis, ectasia, or opacification were observed during the follow-up period. The patient was satisfied with her uncorrected vision, and did not complain of dryness or pain.

3. Discussion

Conjunctivochalasis is a condition of ocular which involves a loose conjunctiva increases while downgaze.⁷ Reported causing factors are as follows: aging, ocular movement, ocular surface inflammation, and delayed tear clearance.⁷⁻¹⁰ Suspected causing factors are mechanical and inflammatory factors, however it is not clear that what causes conjunctivochalasis.^{7,9} Most patients with conjunctivochalasis are asymptomatic, especially if the condition is mild. In symptomatic patients, the symptoms include dryness, a foreign body sensation, injection, and eye pain.⁷⁻¹⁰ Conjunctivochalasis status is not important when examining patients who require refractive correction because almost all patients who undergo refractive procedures are young, and the procedures are performed on the cornea. However, there are some patients with conjunctivochalasis who want refractive correction. Wearing contact lenses is an important risk factor for conjunctivochalasis, and conjunctivochalasis-induced dry eye or foreign body sensations can be a cause of contact lens intolerance, which is a possible reason for patients to request refractive correction.¹¹ In our case, the patient's mild conjunctivochalasis was not detected preoperatively. It was noticed on slit-lamp examination during the follow-up, and the surgeon did not pay close attention to the conjunctiva covering the

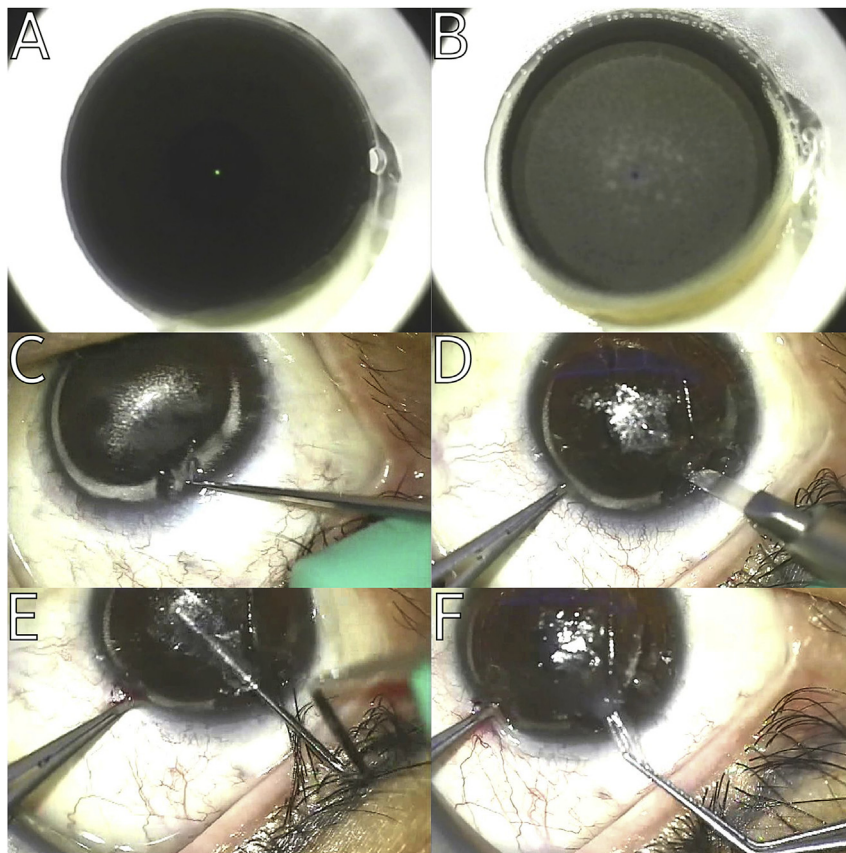


Fig. 1. (A) Redundant conjunctiva covered the peripheral cornea from 4 o'clock to 7 o'clock when suction was used. (B) The conjunctiva prevented laser treatment, and no incision was made. (C) The surgeon tried to find the incision, then confirmed its absence. (D) The incision was made manually using a diamond knife. (E, F) The lenticule was separated and successfully extracted.

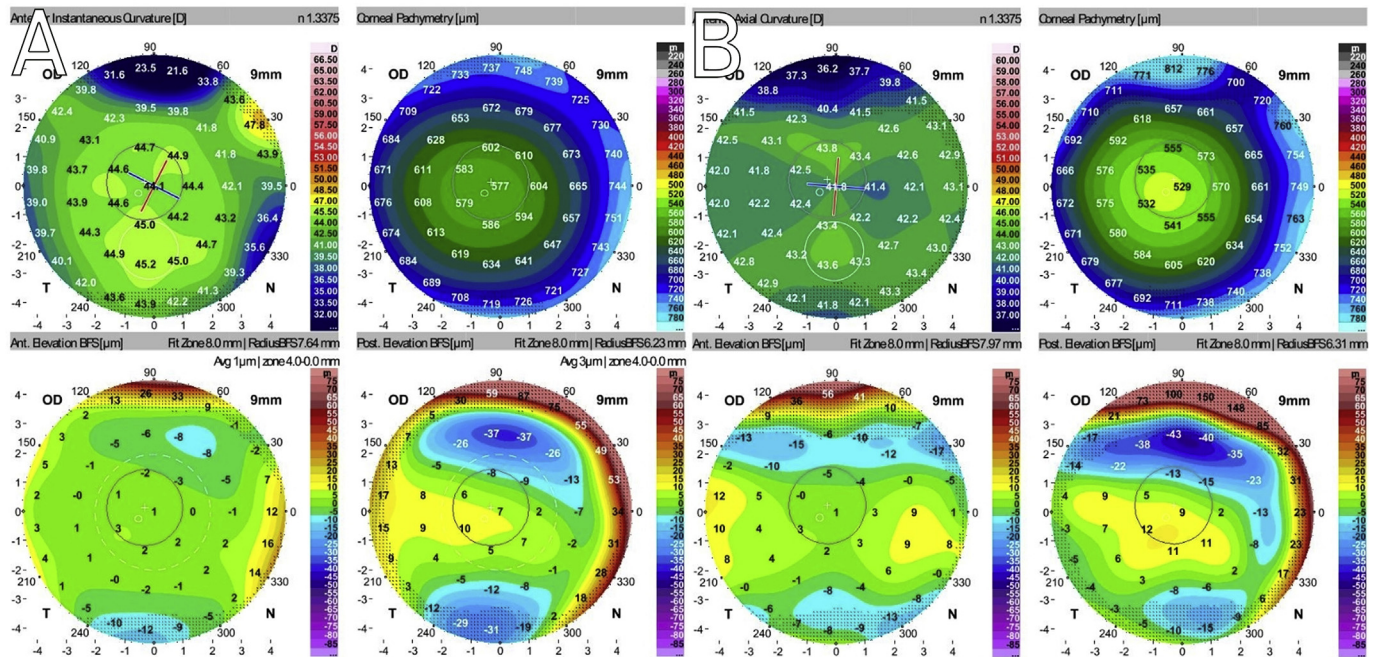


Fig. 2. Dual Scheimpflug images of the right eye. (A) Preoperative. (B) Postoperative.

peripheral cornea where the incision was planned, so the surgery proceeded. If the surgeon had noticed the conjunctivochalasis preoperatively, the surgeon would have paid a closer attention during the surgery, as if releasing the cornea after the suction and then pressing the suction button again. Although the rest of the procedure was successful after performing the manual incision, it took much longer than usual, so the patient experienced delayed visual recovery, eye pain, and injection. In addition, manual incision is considered to be more susceptible to infection because of increased epithelial damage. However, no postoperative complication, including keratitis, was observed.

Ramirez-Miranda et al.⁴ reported that 26.9% of eyes treated with SMILE had complications, including epithelial defects, suction loss, an opaque bubble layer, a cap rupture, or lenticule rupture. In one patient, the small incision was not performed because an opaque bubble layer blocked the laser, and the incision was performed manually. They reported that most of the complications had a favorable resolution, with no permanent effects on the patient's final visual acuity. In our case, the patient's UDVA was 20/20 at three months after the procedure, and she did not complain of dryness or pain.

4. Conclusion

Surgeons should carefully inspect the conjunctiva before SMILE, even if the patient is young, and if the conjunctiva is suspected to cover the cornea during the procedure, the surgeon can release the suction and start again. If the incision cannot be made using SMILE, it can be made manually using a knife. With proper management, a failed incision during SMILE can therefore be successfully managed without compromising the patient's visual acuity.

Patient consent

Consent to publish this report was obtained in writing.

Acknowledgements and disclosures

Funding

No funding or grant support.

Conflict of interest

The following authors have no financial disclosures- BK Kim, SJ Mun, DG Lee, HT Choi, YT Chung.

Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

Acknowledgements

None.

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