

Central Toxic Keratopathy after Small Incision Lenticule Extraction

Dear Editor,

Central toxic keratopathy (CTK) is a noninflammatory postsurgical condition involving central corneal opacity and a significant hyperopic shift [1]. This disorder is typically characterized by the triad of noninflammatory central corneal opacification, striae, and loss of stromal bed tissue, and it results in a hyperopic shift that causes a reduction in vision quality [2]. CTK is relatively rare, with a reported incidence of 0.016%, and usually resolves in 2 to 18 months [3]. Small-incision lenticule extraction (SMILE) is a flapless refractive surgery technique in which a corneal stromal lenticule is formed using a femtosecond laser system and removed through a small peripheral corneal incision. Previous studies have demonstrated that SMILE is a safe and effective procedure for correction of myopia and myopic astigmatism [4]. SMILE is considered an alternative to conventional laser *in situ* keratomileusis because of its benefits of reduced denervation, less postoperative dry eye, and no flap-related complications [5]. To the best of our knowledge, we report the first documented case of CTK after SMILE.

A 35-year-old man was referred to our outpatient clinic with a complaint of decreased and blurred vision in his right eye. He had undergone uneventful femtosecond laser-assisted SMILE surgery 10 months earlier at a local clinic and started complaining of decreased vision in his right eye 1 week after surgery. Preoperatively, he had a manifest refraction of -6.75 sph -1.00 cyl \times 35 in his right eye and -5.75 sph -0.75 cyl \times 50 in his left eye, and the corrected distance visual acuity of both eyes was 20 / 20. The keratometric reading (Pentacam; Oculus, Wetzlar, Germany) was 44.70 / 44.90 diopters in his right eye and 44.60 /

44.80 in his left eye. His central corneal thickness was 565 μ m in his right eye and 555 μ m in his left eye. The surgery was performed uneventfully first in the right eye and then in the left eye. One week postoperatively, the corrected distance visual acuity was 20 / 25 with a manifest refraction (MR) +1.75 sph -0.75 cyl \times 15 in his right eye and 20 / 20 with a MR +0.25 sph -0.25 cyl \times 150 in his left eye. Henceforth, a central anterior stromal dense opacity had formed in the right eye with surrounding superficial stromal haze. Therefore, he was referred to our hospital, and 10 months after surgery, examination revealed the typical CTK triad of corneal thinning, hyperopic shift, and a reduction in best-corrected visual acuity to 20 / 25 (Fig. 1A-1C). The manifest refraction in his right eye was +4.00 sph -0.75 cyl \times 90, and anterior segment optical coherence tomography (Casia SS-1000 OCT; Tomey, Nagoya, Japan) showed central corneal haziness and stromal thinning in the right eye (Fig. 1A). No unusual findings were observed on the fellow eye (Fig. 1D). We did not prescribe eye drops for CTK, but blepharitis was present, so daily lid cleansing was recommended. The last follow-up visit 16 months after surgery revealed uncorrected visual acuity and best-corrected visual acuity of 20 / 50 in his right eye, where the MR was +3.25 sph -0.75 cyl \times 110.

The etiology of CTK remains a matter of debate [2]. Sonmez and Maloney [1] hypothesized that the underlying etiology of CTK was a toxic reaction to a substance that undergoes photoactivation by laser. Possible precipitating factors include photoactivation of povidone-iodine and exposure to meibomian gland secretions, marking pen ink, talc from surgical latex gloves, and postsurgical debris from the microkeratome blade [3]. Contaminated forceps for extracting the lenticule of the intrastromal corneal tissue could be another cause of CTK. After extracting the intrastromal corneal tissue, the operative area is irrigated using balanced salt solution to ensure complete removal of lenticules. Contaminated balanced salt solution could be another cause of CTK. Poor lid hygiene with high concentration of tear film bacteria may contribute to degradation of the exposed collagen stromal tissue, possibly resulting in stromal opacity formation. SMILE entails a small opening, and contaminated materials could become trapped in the stroma, leading to inflammation of the cornea. There-

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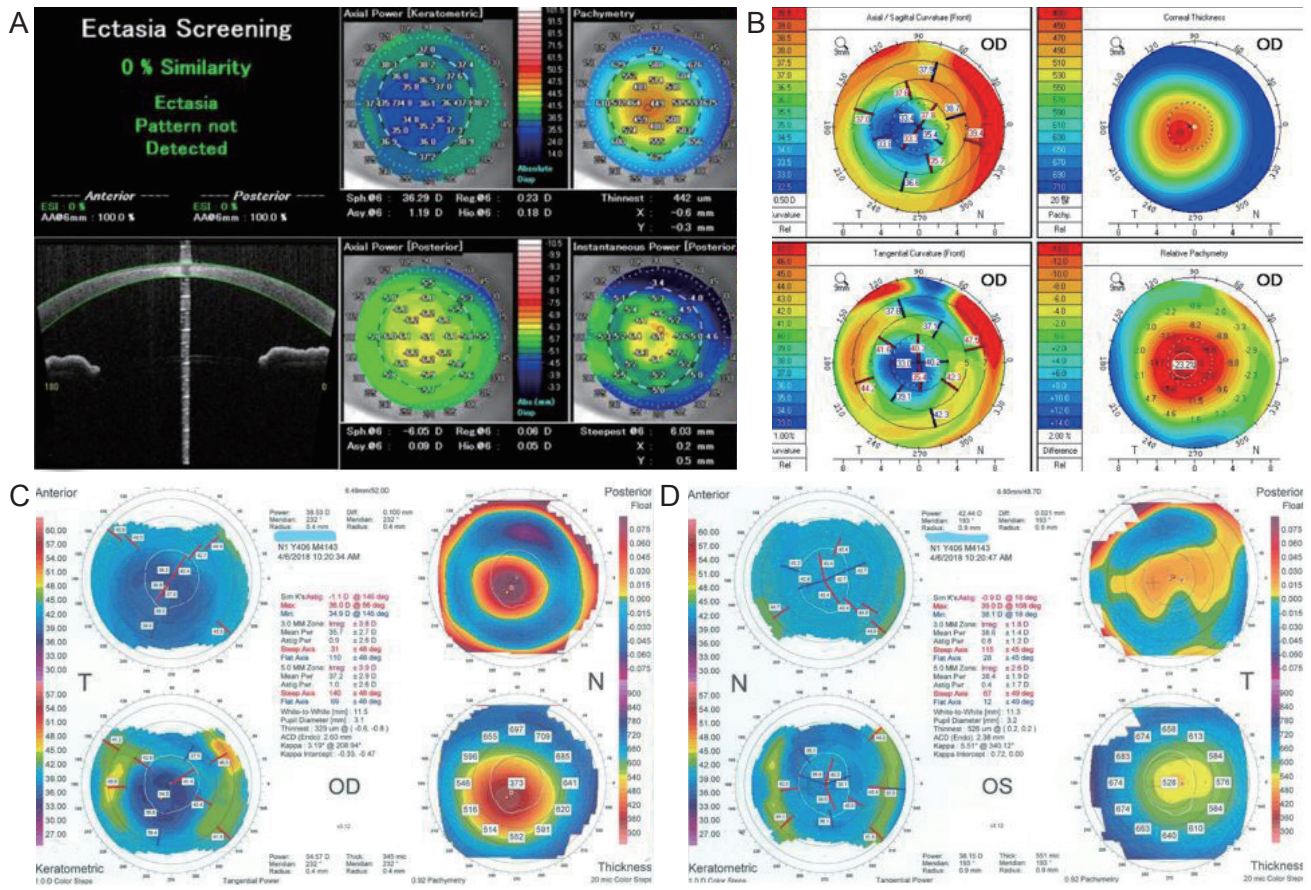


Fig. 1. Corneal imaging of central toxic keratopathy. (A) Anterior segment optical coherence tomography imaging showing central corneal haziness and stromal thinning. (B) Pentacam showing concave curvature of cornea in tangential map. (C) ORBscan of right eye (OD) showing concave center curvature in comparison with (D) ORBscan of the fellow eye. T = temporal; N = nasal; OS = left eye.

fore, although SMILE only requires a small incision, CTK is a potential complication of this procedure.

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Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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