

Case Report

# Anterior Segmental Optical Coherence Tomography Analyses of Severe Corneal Irregular Astigmatism following Blepharoptosis Surgery

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## Keywords

Anterior segmental optical coherence tomography · Cornea · Astigmatism · Suture exposure · Blepharoptosis surgery

## Abstract

We report a case of severe irregular corneal astigmatism resulting from delayed diagnosis of suture exposure following blepharoptosis surgery. An 81-year-old man who had bilateral blepharoptosis surgery and two revisions on his right eye before he complained foreign body sensation (FBS) and blurred vision of his right eye. The visual acuity was 0.4 and the MRD1 was 1 mm for his right eye. A very severe corneal astigmatism of 7.7D, eccentricity of 0.53, corneal thinning, and higher order aberration (HOA) of 3.346  $\mu\text{m}$  was found. Scratch-like lesions on the upper cornea suggested the presence of suture exposure; however, no sutures were found by the previous physicians and at our first examination. With greater effort, a large conjunctival fold on the back of upper tarsus was turned over to reveal 2 interrupted sutures protruding the palpebral conjunctiva. The sutures were removed, and the FBS quickly disappeared. However, the patient's blurred vision persisted. His right eye's visual acuity was 0.6, and the astigmatism (6.8D), eccentricity (0.72), and HOA (2.993  $\mu\text{m}$ ) were comparable to that before suture removal. Early diagnosis of suture exposure is critical to avoid severe complications and vision impairment. Attention should be paid to large conjunctival folds especially in re-operated cases.

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## Introduction

Suture exposure after oculoplastic surgery is rare but can be a very problematic complication which necessitates urgent attention [1–3]. The symptoms and signs include foreign body sensation (FBS), eye pain, epiphora, and corneal abrasion in severe cases.

External levator advancement is the most common procedure used to treat a wide range of ptosis abnormalities. In this procedure, the surgeon advances the attenuated or dehisced levator musculo-aponeurotic junction inferiorly onto the superior border of the tarsus [4, 5]. Although the advantage of this procedure is the maintenance of an intact conjunctival sac and minimal ocular surface invasion, trans-palpebral conjunctival suture exposure may occur due to the incorrect placement of the sutures. Once suture exposure is diagnosed, it must be immediately adjusted or removed to relieve the ocular discomfort and to prevent injury of the ocular surface [6].

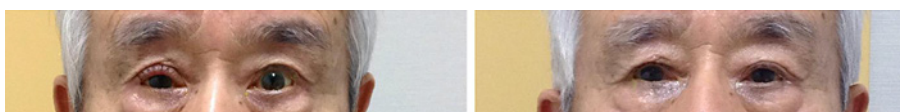
The purpose of this report is to present our findings in a patient that underwent repeated levator resection surgeries, and had severe complications caused by suture exposure. For the first time, we applied anterior segmental optical coherence tomography (AS-OCT) to analyze the irregularity of the cornea and OPD-III scan to evaluate the corneal higher-order aberration (HOA).

## Case Presentation

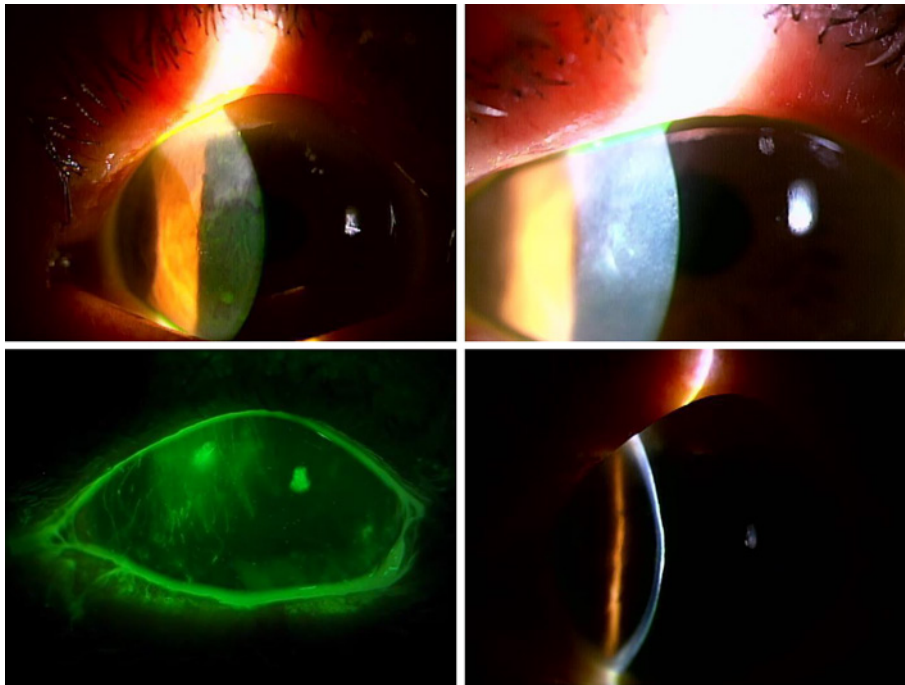
An 81-year-old man was diagnosed with involutional blepharoptosis and had bilateral levator resection surgery 4 years earlier in an oculoplastic surgery clinic. Two years earlier, the right eye was re-operated in the same clinic due to a recurrence of the ptosis. Since then, he has been suffering from FBS, intermittent eye pain, and epiphora of his right eye. He was treated with hyaluronic acid and eye ointment without improvement, and he was referred to a corneal specialist for an “intractable dry eye syndrome.” Corneal scratch-like lesions were noted, and the possibility of suture exposure was suggested. However, exposed sutures could not be found in the palpebral conjunctiva, and he was referred to our hospital.

On his first examination, the decimal best-corrected visual acuity (BCVA) was 0.4 and the intraocular pressure was 11 mm Hg for the right eye. The MRD1 was 1.0 mm for the right eye and 3.0 mm for the left eye (Fig. 1). Longitudinal scratch lesions were noted mainly in the upper portion of the cornea. The corneal stroma was cloudy due to the epithelial lesions and intrastromal opacities (Fig. 2). The anterior chamber was clear, and the appearance of the fundus was within the normal limits.

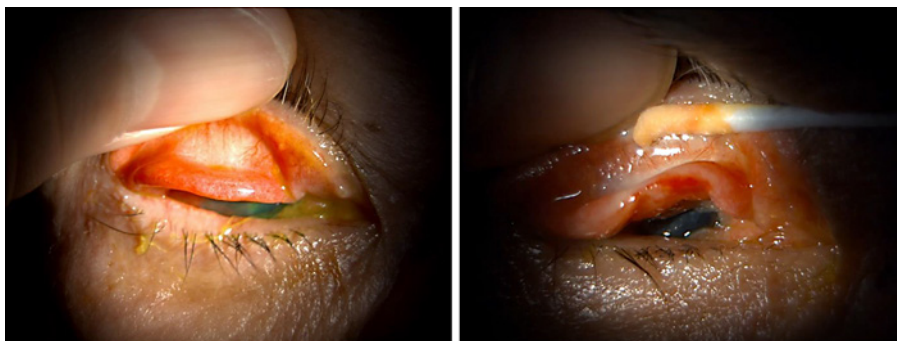
The upper eyelid was inverted to search for any exposed sutures, and a large conjunctival fold was found without any sutures (Fig. 3). After application of 4% lidocaine, the conjunctival fold was more forcefully pushed to search the upmost portion of the fornix. This then revealed three suture bites behind the conjunctival fold and two were protruding above the conjunctiva (Fig. 4). The sutures were removed transconjunctivally and ocular lubricants and anti-inflammatory eye drops were applied.



**Fig. 1.** Recurrent blepharoptosis of the right eye of an 81-year-old man who had repeated external levator advancement surgery (left). An inter-eye symmetry was achieved following a repeated blepharoptosis surgery in our hospital (right).



**Fig. 2.** Slit-lamp photograph of the patient's right eye at the first visit. Upper corneal stromal opacity (upper), longitudinal scratch pattern corneal lesions (lower left), and the thinning of cornea (lower right) can be seen.

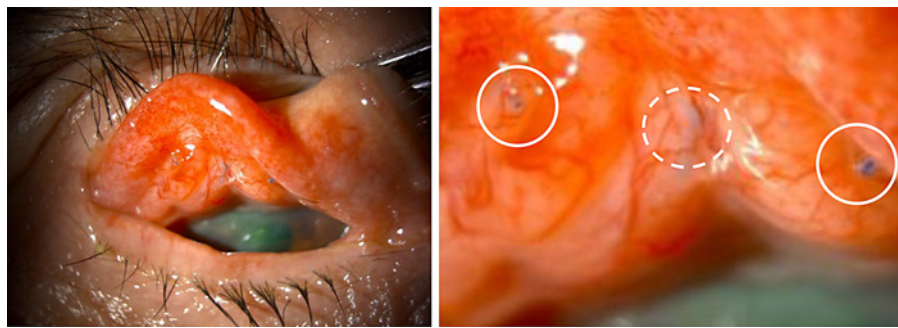


**Fig. 3.** Inverted upper eyelid showing a large palpebral fold. No apparent suture exposure were found (left) even when an effort was made to further invert the lid using a swab (right).

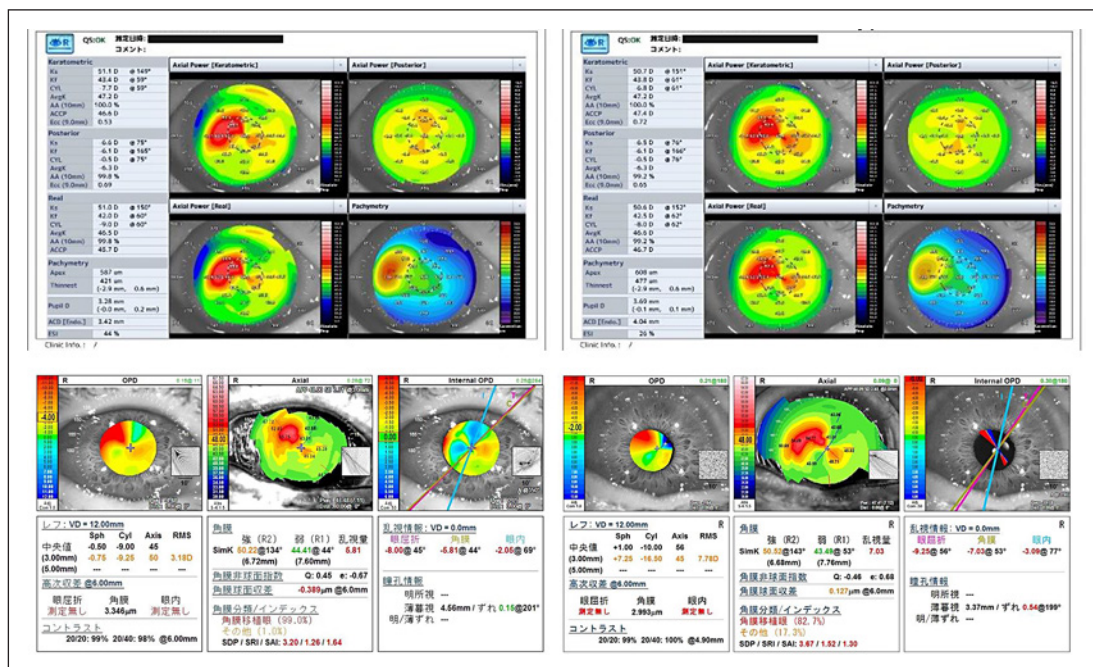
On the patient's second visit 1 week later, the FBS was completely relieved, and the corneal scratch lesions were gone. However, his blurred vision remained. A thorough corneal examination by anterior segment AS-OCT showed that the keratometric astigmatism was 7.7 diopters (D) and the eccentricity of the cornea was 0.53 for his right eye, and the comparable values for the left eye were 0.3 D and 0.48, respectively. For objective visual function evaluation, OPD-III scan was applied to study the corneal HOA. The HOA was 3.346  $\mu\text{m}$  for the right eye in contrast to 0.411  $\mu\text{m}$  for his left eye (Fig. 5).

Two months later, we performed another version of blepharoptosis repair to correct the ptosis of his right eye. The levator was resected and advanced. The postoperative results were satisfying with a well-balance bilateral MRD1 (Fig. 1).

After a 12-months follow-up after suture removal, the patient's decimal BCVA was improved to 0.6 but he still complained blurred vision of this right eye. The keratometric astigmatism



**Fig. 4.** Following topical anesthesia, the large palpebral fold was further rotated using a pair of forceps to search for suture exposure at the upmost conjunctiva fornix (left). Three suture bites were found with two protruding the palpebral conjunctiva (right, solid circle).

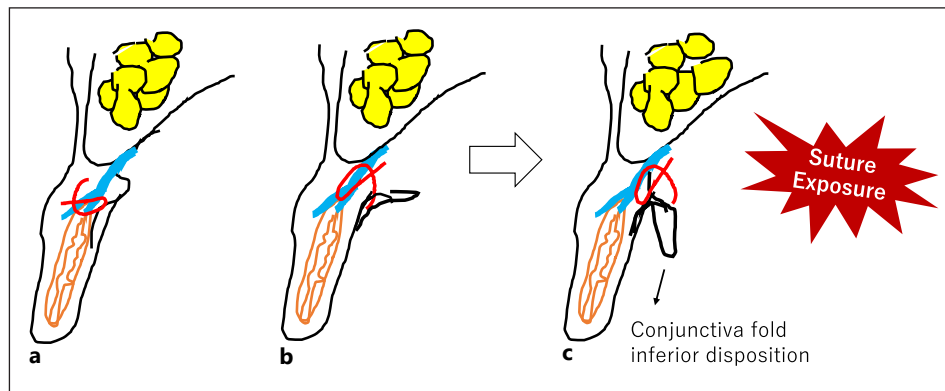


**Fig. 5.** Anterior segment optical coherence tomography showing severe astigmatism before suture removal (upper left) and even at 1 year after suture removal (upper right). OPD-III scan showing high values of higher order aberration at first visit (lower left) and 1 year after treatment as well (lower right).

was 6.8 D, the eccentricity of the cornea was 0.72, and the HOA of right cornea was 2.993 μm, a very high degree of abnormality (Fig. 5).

## Discussion

Suture exposure following oculoplastic surgery is relatively rare but can be a severe complication because it can cause FBS, epiphora due to the irritation of the ocular surface, corneal lesions, and changes in the corneal morphology. In severe cases, there is ocular pain and reduced vision. Therefore, early diagnosis and immediate treatment are mandatory [1–3].



**Fig. 6.** Schematic image of suture exposure following external levator advancement surgery. **a** No suture exposure if the suture is correctly placed and the palpebral conjunctiva is intact. If the suture is incorrectly placed or palpebral conjunctival break/tear occurs, the risk of suture exposure arises (**b**) and the formation of the large palpebral conjunctival fold may prevent the early detection of the exposed sutures (**c**).

Late onset suture exposure following oculoplastic surgery often occurs several years after the surgery, and most patients with eye symptoms seek consultation at an eye clinic. Cosmetic surgeons are less likely to encounter this condition which may explain why these complications have seldom been reported [1].

Our findings showed a development of severe corneal irregular astigmatism in an eye with suture exposure following repeatedly blepharoptosis surgery. This case suffered from FBS and intermittent eye pain for almost 2 years, during which the corneal pathology progressed and led to the irregular astigmatism. The corneal thinning could be due to long-term ocular surface inflammation caused by the friction of the exposed sutures, and also the corneal keratocytes may have undergone apoptosis due to the continuous irritation of the cornea. This could be irreversible. Our case had severe corneal irregularities even at 1 year after removal of the exposed sutures. The BCVA and corneal HOA were significantly affected by the severe alterations of the corneal morphology.

Levator advancement procedure is a widely performed external approach to repair blepharoptosis. The levator aponeurosis is dissected and the complex of levator and Mueller muscle is advanced and sutured to the upper tarsus. The advantage of this procedure is that the conjunctival sac is kept intact and the invasion of the ocular surface is minimal [4, 5]. However, several factors need to be considered to explain the suture exposure in our case. First, in cases of repeated operation, the synechiae of the levator muscle and orbital septum and possible breaks or tears of the conjunctiva might have led to an incorrect placement of the suture. It is also possible that the suture exposure was caused by blinking or eyelid rubbing postoperatively. Second, reoperations are often associated with greater advancements of the levator muscle and deeper placement of the sutures. The large palpebral conjunctival fold observed in our case may have prevented an early detection of the exposed sutures. Usually, if the conjunctival fold is folded upward toward the conjunctival fornix, the suture exposure will not be a problem because no direct contact between the suture and the cornea is made. However, if the fold is unfolded downward during blinking or eye rubbing, the exposed suture can scratch the cornea resulting in FBS and corneal lesions (Fig. 6). We suggest that this was the main factor leading to the ocular complications. The difficulty of upper eyelid eversion due to cicatricial changes after repeated ptosis surgery may also account for the delayed diagnosis of suture exposure.

Early diagnosis of suture exposure is important but this is sometimes difficult, as in our case in which the large conjunctival fold could be obstacle. However, the scratch pattern of

the corneal lesions was the key sign that suggested the existence of suture exposure and a thorough search was made ⇒ necessary.

## Conclusion

We present our findings in a case of severe corneal complication due to delayed diagnosis of suture exposure after repeated blepharoptosis surgery. Both oculoplastic surgeons and ophthalmologists need to be aware of this kind of severe case to provide early diagnosis and treatment and to prevent the possible complications.

## Acknowledgment

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## Statement of Ethics

This case report was conducted ethically in accordance with the World Medical Association Declaration of Helsinki. This study protocol was reviewed and the need for approval was waived by the Ethics Committee of Ehime University Hospital. Written and informed consent was obtained for publication from the patient. Written informed consent was obtained from the patient for publication of the details of his medical case and any accompanying images.

## Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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## Author Contributions

X.Z. performed the blepharoptosis surgery, data analyses, and manuscript writing. M.Y., T.K., T.G., and A.S. examined the patient and interpreted the patient data. All authors read and approved the final manuscript.

## Data Availability Statement

Besides data shown in this article, all the patients' original data including visual acuity, intraocular pressure, slit lamp examination, AS-OCT images are also available on request to the author's email.

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