Bilateral corneal keloids after eyelid compression

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Abstract:
The purpose of this study is to present a case of bilateral corneal keloids after performing eyelid compression for half a year. This study was a retrospective case report. Visual acuity, as well as detailed high-resolution images of external eye photography, anterior segment optical coherence tomography (ASOCT), and topography were documented. Initially, the best-corrected visual acuities were 20/20 (OD) and 20/32 (OS). ASOCT revealed a characteristic irregular hyperplastic epithelium, a disrupted Bowman’s layer, and an edematous stroma for both eyes. Topography exposed an irregular astigmatism of 2.1 diopters for the left eye, while the right eye had a relatively smooth surface. After 1 year of conservative treatment, the best-corrected visual acuity improved to 20/20 (OU), and astigmatism also decreased. Corneal keloid may be induced after long-term eyelid compression. ASOCT and topography are useful for detecting and monitoring disease progression. Conservative treatments are suggested as the first line of therapy, while the size, depth, and location of the lesions are tolerable.

Keywords:
Anterior segment optical coherence tomography, corneal keloid, eyelid compression, orthokeratology, topography

Case Presentation
An 8-year-old girl presented at the clinic complaining of progressive bilateral blurred vision for months. On examination, the patient’s best-corrected visual acuities were 20/20 (OD) and 20/32 (OS); auto-refraction disclosed −3.50 D spherical plus −0.75 D cylinder at axis 155 for the right eye and +0.75 D spherical plus −6.50 D cylinder at axis 105 for the left eye. Slit-lamp biomicroscopy revealed well-defined, elevated, white-gray colored, well-circumscribed corneal lesions. They typically affect the eyes unilaterally and a bilateral presentation is extremely rare. Based on the previously published literature, a positive history of trauma or penetrating ocular surgery is usually observed. The current study presents an 8-year-old girl who developed bilateral corneal keloids after having eyelid compression for half a year.

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thickness and loss of normal lamellar pattern [Figure 2].
Topography exposed an irregular astigmatism of 2.1 D,
which was induced by the elevated lesion and corneal
warpage on the left eye [Figure 3], whereas the right eye
had a relatively smooth surface.

Reviewing the patient’s history, the girl had received
vision training at a vision-training institute for half a
year. The training programs included bilateral eyelid
compression by placing small bags of rice inside
bandage goggles while she slept. The trainer persuaded
the parents and it was a more economical type of
orthokeratology. The diagnosis of bilateral corneal
keloids was favored because of the described history
of trauma and the characteristic clinical appearance.
Considering the patient’s age as well as the area and size
of the lesions, eyelid compression was discontinued and
conservative treatment, including lubrication and 0.1%
fluorometholone eye drops twice daily were prescribed.

After 1 year of follow-up without surgical intervention,
the density of the keloids became lighter and her
best-corrected visual acuity improved to 20/20 in both
eyes. In addition, the astigmatism of her left eye had
decreased to 1.2 diopters. Series of the corneal images
and the topographies obtained during the follow-up
period are shown in Figure 4.

Discussion

Many “vision improving technologies,” including
eyeball exercising, extraocular muscle massaging,
and other variations[4] are claimed to reduce or
eliminate the use of glasses. Since no reliable evidence
has been published, they are no longer popular in
Western countries.[5] However, at present, some of
the technologies are still being marketed in Taiwan. As
orthokeratology was invented, alternative methods
of mechanical compression aiming to produce the
same effect have been established. In Ancient China,
people put small weights or sandbags on their eyelids
to reduce myopia, which is quite similar to the present
case.[6] Whether these methods are effective or not remain
controversial, the presented patient did develop keloids
and increased astigmatism after performing eyelid
compression for half a year.

Corneal keloids are a type of uncommon ophthalmic
disease. Based on the previously published literature,
a history of ocular trauma is often reported in patients
who develop the condition.[1,3,7] Corneal keloids typically
present as slowly-enlarging, painless, outgrowing,
whitish, glistening lesions located on the cornea,[1,3,7]
with characteristic corneal epithelium hyperplasia and
Bowman’s layer disruption.[1,3,7] They may interfere with
eyelid closure and result in exposure keratopathy if large

Figure 1: External eye photography revealed bilateral corneal well-defined, elevated,
whitish opaque lesions (OU), the left eye (b) was more severe than the right eye (a).
Under high-power magnification, the lesion had a glistening appearance without
vascularization (c)

Figure 2: The anterior segment optical coherence tomography of the left eye revealed
that the corneal lesion expressed a hyperplastic epithelium with Bowman’s layer
disruption, and mild edematous stroma, which had increased thickness and loss of
normal lamellar appearance. The Descemet’s membrane and endothelium were intact
during this examination

Figure 3: On the patient’s initial visit to the clinic, the corneal topography revealed
an irregular astigmatism for the left eye (b). The right eye had a relatively smooth
surface (a)
enough. According to the history of eyelid compression and the characteristic clinical appearance, the authors hypothesize that the long-term eyelid compression may cause the repeated corneal trauma, which gradually results in keloid change.

Besides slit-lamp biomicroscopy, anterior segment imaging is also helpful in investigating these lesions. ASOCT was easy to perform in the present case who was just 8 years old, and high-resolution images of the cornea can be easily acquired without any invasion or contact, which may have caused distress. Using ASOCT, the corneal lesions appeared to be visualized between a severe outgrowth of the epithelium and a disrupted Bowman’s layer; mild edematous stroma surrounding the lesions was also identified. These mentioned features were compatible with a diagnosis of corneal keloids. Topography is another useful tool for monitoring disease processes. During the patient’s clinical follow-up, topography disclosed that the highly irregular astigmatism decreased over time, which meant the use of aggressive treatment was not warranted.

When a history of ocular trauma can be traced, the differential diagnosis for corneal keloid includes hypertrophic scar. The key point used to distinguish between these two disorders is that hypertrophic scar appears immediately after injury and does not grow beyond the initial border, whereas corneal keloid behaves in the opposite way. Reviewing the patient’s history and symptoms, a blurred vision developed slowly and progressively over a few months, which

Figure 4: Series of the obtained images were shown in this figure. (a) The initial presentation of the left eye at the patient’s first clinical visit. The lesion extended a little beyond the previous border 3 months later (b). After 1 year of conservative treatment, the lesion’s size stayed still but its density became lighter and the tangential curvature became more smooth (c)
indicates the gradual enlargement of the lesions. There were other disorders present with whitish lesions, including corneal inclusion cysts, Salzmann’s nodular degeneration, and congenital hereditary endothelial dystrophy. However, those mentioned disorders were unlikely the answer of our patient’s condition because of the obtained clinical images and the course of the disease. Depending on the location and the size and depth of the corneal keloids, treatment options other than conservative management include superficial lamellar keratectomy, phototherapeutic keratectomy, deep anterior lamellar keratoplasty, and penetrating keratoplasty. In the present case, none of these surgeries were required as the patient’s irregular astigmatism decreased and her vision improved after 3 months of conservative treatment.

**Conclusion**

Corneal keloid may be induced after long-term eyelid compression. ASOCT is a helpful tool for providing detailed images of the cornea, which enable the detection of the size and depth of disruption caused by the lesions. Topography is useful for monitoring disease progression. Conservative treatments, such as lubrication and corticosteroid, are suggested as the first line of therapy, while the size, depth, and location of the lesions are tolerable.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient has given her consent for her images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

**Conflicts of interest**

The authors declare that there are no conflicts of interests of this paper.

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