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# Progressive Keratoconus in a Neglected Case of Epiphora: A Case Study Highlighting the Role of Chronic Eye-Rubbing

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### Abstract

**Title:** Progressive keratoconus in a neglected case of epiphora: A Case Study Highlighting the Role of Chronic Eye-Rubbing

**Purpose:** to report a case of unilateral keratoconus in an otherwise healthy male, resulting from frequent wiping of one eye due to epiphora secondary to nasolacrimal duct obstruction.

Design: Observational case report.

**Methods:** Thorough evaluation and elaborate history of the patient revealed persistent rubbing of the affected eye for persistent epiphora.

**Results:** The patient was advised to stop eye-rubbing once identified as keratoconus. Timely recognition and management of the NLD obstruction were crucial in preventing further progression of corneal complications.

**Conclusions:** Eye-rubbing is a recognized characteristic of several systemic conditions associated with keratoconus, such as Downs syndrome, atopic keratoconjunctivitis, Leber's congenital amaurosis, and intellectual disability. Numerous reports have highlighted the significance of eye-rubbing in non-inflammatory keratoconus cases in both children and adults. However, in this particular case, keratoconus developed and progressed as a secondary condition due to chronic and persistent eye-rubbing resulting from epiphora due to post-traumatic Nasolacrimal Duct (NLD) obstruction. This underscores the importance of early recognition and management of NLD obstruction to prevent potential corneal complications like keratoconus.

## Background

Nasolacrimal Duct (NLD) obstruction as a result of midfacial injuries is a known complication [1]. The subsequent epiphora, may manifest shortly after the initial trauma or even years later [2]. This condition can greatly impact a patient's quality of life,

as it often requires frequent wiping of the eyes. This repetitive action can lead to microtrauma of the cornea and, in chronic cases, can also be implicated in the pathogenesis of keratoconus [3].



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#### **Case presentation**

A 30-year-old man initially visited a General Practitioner (GP) with complaints of persistent watering from his left eye, which had been ongoing for over four years following blunt trauma to the inner corner of the eye. After initial conservative management and follow ups, he was then referred to ophthalmology clinic as an outpatient for the same complaints. A thorough examination revealed a positive Regurgitation on Pressure over the Lacrimal Sac (ROPLAS) test, and during lacrimal sac syringing, no saline reached the nose, indicating a nasolacrimal duct obstruction. His vision was 6/6 in the right eye and 6/36 in the left eye, with a best-corrected visual acuity of 6/9 with -4 diopters cylindrical at 160 degrees. Intraocular pressures were 18 mmHg in the right eye and 20 mmHg in the left, as measured by Goldmann Applanation Tonometer (GAT). Anterior segment evaluation of the left eye showed central corneal thinning with the presence of a Fleischer ring, while the right eye showed no significant findings. Both tarsal conjunctivae were free of papillary or follicular lesions. Corneal topography of the left eye revealed central thinning with corneal steepening, whereas the right eye topography was normal. Retinoscopy of the left eye displayed a scissoring reflex. Dilated fundus examination of both eyes was normal, with a cup-to-disc ratio of 0.3:1.

The nasolacrimal duct obstruction was further confirmed by Tc-99m sulphur colloid dacryoscintigraphy, which showed normal tracer passage in the right eye. In the left eye, dynamic images revealed tracer pooling in the conjunctival sac with no flow into the lacrimal sac. Delayed static images showed tracer passage from the conjunctival sac to the lacrimal sac, with no further flow, confirming an obstruction in the proximal part of the nasolacrimal duct. The patient was advised to undergo endoscopic Dacryocystorhinostomy (DCR), however was lost to follow up.

On a subsequent visit after five months corneal thinning was found associated with and vogt's striae in the affected eye only. Distant visual acuity in left eye in this visit was 6/60 improving to 6/18 with -6.5D at 160 degree. Corneal topography performed at this visit indicated significant steepening of the left cornea, with signs of progression of keratoconus. The patient was then treated with unilateral endoscopic DCR and corneal collagen cross-linking (CXL) to halt the progression of the keratoconus. Additionally, the patient was advised to stop the habitual wiping of the left eye and prescribed sclera contact lenses for the same.



**Figure 1**: Vogt's striae visible on slit lamp examination in central cornea with central thinning of cornea.

In conclusion, in patients with epiphora, visual and slit-lamp assessments should be conducted to rule out any ectasia or scarring. Patient counseling and timely intervention are crucial to preventing corneal and other ocular complications.



**Figure 2:** Follow up Corneal Topography showing quad map study. Corneal thickness map shows thinnest pachymetry of 418 micron, Kmax- 58-88D. Front elevation- 16.0 micron @326 degree. Posterior elevation- 15.3 micron at 325 degrees.

#### Discussion

Nasolacrimal trauma can lead to epiphora, either temporarily or permanently [1]. Temporary symptoms often result from posttraumatic edema, while persistent dysfunction may be caused by scarring of the lacrimal sac, nasolacrimal duct, or fractures involving the nasolacrimal canal [2]. In our case, the blunt trauma led to a chronic NLD obstruction, causing the patient to frequently wipe their eyes. This chronic wiping can closely resemble eye rubbing, which contributed to the development of keratoconus in our patient.

Charles W. et al. have discussed the impact of Chronic Habits of Abnormal Rubbing (CHAR) in the pathogenesis of keratoconus [4]. Various mechanisms have been implicated, such as increased temperature leading to the upregulation of collagenase activity and a thixotropic reduction in ground substance viscosity [4]. While CHAR is known to contribute to keratoconus, Kallinikos P. et al. have shown that even non-vigorous eye rubbing can cause keratinocyte loss and increase inflammatory mediators [5]. Our case supports this, suggesting that even the nonvigorous wiping associated with epiphora can lead to corneal ectasia if not properly managed.

Alexander S. Ioannidis et al. have described a similar case of unilateral keratoconus in a child with a habit of chronic and persistent eye rubbing [6]. In our case, the temporal association is clear, as the patient is known to be previously emmetropic (through previous documentation) and had no other identifiable cause for keratoconus in the affected eye apart from the persistent wiping.

It is well-documented that patients with keratoconus often use a pointed instrument like a knuckle or fingertip to rub their eyes, primarily involving a circular motion with pressure applied to the cornea [7]. The intensity and duration of rubbing, sometimes lasting up to 300 seconds are also noted in keratoconus patients [4]. Although the frequent wiping in our patient was not as severe as the rubbing typically seen in keratoconus patients, it was sufficient to cause corneal thinning and ectasia due to its chronic nature. This suggests that even suboptimal, chronic rubbing can mimic the pathogenesis of keratoconus and lead to significant corneal thinning.

#### Author declarations

**Patient consent:** Consent to publish this case report has been obtained from the patient(s) in writing.

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## **Conflicts of interest**

Authors have no financial disclosures or conflict of interest.

## Authorship

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

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