Case Report

Unilateral Keratoconus after Chronic Eye Rubbing by the Nondominant Hand

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Keywords
Unilateral keratoconus · Eye rubbing · Pathogenesis

Abstract

Introduction: To report the development of unilateral keratoconus in a healthy male after persistent unilateral eye rubbing by the nondominant hand which was not needed for professional activities. Methods: Observational case report. Results: A 60-year-old male was first seen in our clinic due to decreased vision in his left eye. Slit-lamp biomicroscopy of the left eye revealed Vogt’s striae, stromal thinning, and a stromal scar. Corneal topography showed a stage 4 keratoconus. Clinical examination and corneal topography of the right eye were normal. Medical history revealed a habit of chronic eye rubbing only in the left eye because of the right hand being occupied for professional needs. During follow-up of 5 years, Scheimpflug images of the right eye stayed normal while the left eye showed a stable cone. Discussion: This case report supports the hypothesis of mechanical fatigue of the cornea due to repetitive shear stress on the surface caused by eye-rubbing.

Background

Keratoconus is a progressive, noninflammatory corneal disease that leads to inferior steepening and thinning of the cornea. It is a common disorder, affecting 0.054% of healthy
people, that usually presents bilaterally although often asymmetrically [1, 2]. The incidence of unilateral keratoconus is very low (1.83%) [2]. A high percentage of keratoconic patients have atopic disease or allergy, and as a consequence frequently rub their eyes [3]. Rab- inowitz [4] and Naderan et al. [5] performed case-control studies which found that kerato- conus patients do rub their eyes more often than normal controls (80 and 83% vs. 58 and 52%, respectively). Repetitive mechanical trauma can cause corneal weakening and the proposed mechanisms include increased apoptosis and increased oxidative damage due to cyclic shear stress on corneal microstructures [6, 7].

We report a case of unilateral keratoconus due to repetitively rubbing one eye by the nondominant hand, which supports the hypothesis of mechanical fatigue of the cornea in the pathogenesis of this disease.

**Case Presentation**

A 60-year-old male presented at our clinic with decreased vision of the left eye, found by accident on a routine examination. He had a general history hypercholesterolemia and tinnitus. His ophthalmic and familial history was blanc. At the first visit, his best corrected visual acuity was 0.0 on logMAR (S-1.25 C-1.25@80) on the right eye and 2.0 (counting fingers) (S-15) on the left eye. The intraocular pressure was 14 mm Hg in both eyes. Slit-lamp examination of the right eye was normal, and the left eye showed Vogt's striae, stromal thinning, and a stromal scar (Fig. 1). Fundoscopy was normal in both eyes. Corneal tomography (Oculus Pentacam) of the right eye showed inferotemporal steepening with the thinnest point being in the center of the cornea (Fig. 2). The thinnest pachymetry was 609 μm and K\(_{\text{max}}\) was 45.9 dpt. The posterior float map showed an isolated hot spot of +20 μm inferiorly, not consistent with the area of maximal steepening or thinning. The index of surface variance was 27 (normal <37) and the index of height asymmetry was 12.1 (normal <19) [8]. These readings do not correlate with the keratoconus. Corneal tomography of the left eye, however, showed inferior steepening accompanied by significant thinning of the cornea (Fig. 3). The thinnest pachymetry was 300 μm and K\(_{\text{max}}\) was 83.8 dpt. The index of surface variance was 223 and the index of height asymmetry was 73.6. These readings correlate with a stage 4 keratoconus following the scale of Amsler-Krumeich [9].

For occupational reasons, the man had always been working with a computer and had been controlling the mouse with his right, dominant hand. He habitually rubbed his left eye with his unoccupied left hand.

**Discussion**

Keratoconus is a noninflammatory ectatic disorder of the cornea. The cause of keratoconus is still unknown, but rubbing the eye is a well-known risk factor. We present an otherwise healthy patient who developed a unilateral keratoconus stage 4, after repetitively rubbing only that eye with his nondominant hand. This supports the hypothesis of mechanical fatigue of the cornea after repetitive shear stress on the surface. McMonnies and Bon- ham [10] proved that bilateral keratoconus presents more severely in the side of the domi- nant hand of individuals who excessively eye rub. We present the first case report of unila- teral keratoconus after chronic eye rubbing by the nondominant hand which was not needed
for professional activities. This patient had no systemic diseases and developed the habit of unilateral eye rubbing as a tic.

**Statement of Ethics**

The authors state that the patient has given his informed consent.

**Disclosure Statement**

The authors have no competing interest to declare and no financial support was received for this submission. The study was performed with informed consent.

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**Fig. 1.** Slit-lamp examination of the right eye is normal; the left eye shows Vogt’s striae, stromal thinning, and a stromal scar.

**Fig. 2.** Corneal tomography shows a normal right cornea.

**Fig. 3.** Corneal tomography shows inferior steepening accompanied by significant thinning of the cornea.