AN EYE CENTRAL CASE REPORT

A Case of Keratoconus

Managed by: Austin Ekeoba, O.D., Dipl. ABO
#215 – 12975 84 Ave, Queen Mary Park, Surrey V3W 1B3
www.eyecentral.ca

Abstract

Keratoconus is a disease of the cornea characterized by progressive thinning and cone-like protrusion of the anterior and posterior corneal surfaces, leading to reduced and distorted vision, discomfort, and in advanced cases, blindness. Causes may be hereditary, sporadic, or associated with atopic disease; a well-established relationship exists between chronic eye rubbing and disease progression. Management depends on severity and symptoms. Visual correction is primarily achieved through specialized rigid contact lenses, while progression is controlled via corneal cross-linking, a procedure that strengthens the collagen bonds within the corneal stroma to limit further thinning and ectasia. Advanced cases with poor visual potential may require corneal transplantation. This report presents a case of keratoconus in a young female patient and outlines the management process at Eye Central.

Keywords: Keratoconus, Corneal Ectasia, Cross-Linking, Scleral Contact Lenses, Cornea

Introduction

The cornea is a transparent tissue at the anterior aspect of the eye responsible for refracting incoming light, contributing to over 65% of the eye's total refractive power. Corneal ectasias are conditions characterized by progressive corneal thinning that ultimately compromises visual quality. The most common of these ectasias is keratoconus, which accounts for over 70% of cases worldwide. Timely diagnosis and management are critical to achieving optimal visual and ocular outcomes, as the condition predominantly affects young adults during some of the most visually demanding years of their lives.

Case Report

Initial Presentation: March 20, 2024

A 26-year-old female presented to Eye Central for a comprehensive eye examination, her last visit to an optometrist having been two years prior. She reported complaints of blurry and double vision,

along with a "shadow" in her visual field that persisted even while wearing her spectacles. There were no reports of pain or headaches. Systemic history was unremarkable. She reported no use of medications and no history of pregnancy. She did report a positive history of cigarette smoking.

Clinical Findings

Unaided visual acuity was **20/100 in both eyes**. With glasses, vision improved to 20/50 in each eye, accompanied by horizontal diplopia and shadowing around characters on the acuity chart. Near acuity was 20/20 bilaterally, with diplopia also present at near. Preliminary assessment revealed mild exophoria at near (6 prism diopters) with orthophoria at distance. Extraocular motilities were full and unrestricted in both eyes. Confrontational visual field testing was normal bilaterally.

Pupils were equal, reactive to light and accommodation, with no afferent pupillary defect noted. Intraocular pressure measured 14 mmHg OD and 13 mmHg OS.

Retinoscopy revealed a scissors reflex in both eyes. Autorefraction demonstrated high astigmatism (approximately –3.25 diopters OU) with mild corneal curvature steepening. Subjective refraction yielded 20/40 vision bilaterally with unresolved diplopia that did not improve with the addition of prism lenses.

Slit-lamp examination revealed clear corneas with no scarring or bullae. Crystalline lenses were clear. Anterior chamber angles were wide open with deep, quiet chambers bilaterally. Dilated fundus examination showed a healthy, flat retina with no holes, tears, or haemorrhages in either eye. Optic nerves were well perfused with no evidence of neuropathy.

Pachymetry (corneal thickness) measured 448 microns OD and 452 microns OS, significantly below the normal range, confirming the presence of corneal thinning.

Diagnosis and Management

A diagnosis of keratoconus was made based on the combined refractive, keratometric, and pachymetric findings. The patient was educated on the nature of the condition, its known causes, and available strategies to slow progression. A discussion was initiated regarding corneal cross-linking and the importance of avoiding aggressive eye rubbing. The patient was recommended to return for a scleral contact lens fitting examination to assess potential improvement in visual outcome.

Differential Diagnoses Considered

Pellucid Marginal Degeneration: A corneal ectasia characterized by peripheral thinning and a 'kissing dove' pattern on topography, as opposed to the more central thinning typical of keratoconus. Distinguished on topographic analysis.

Strabismus: The patient's report of double vision prompted evaluation for an eye turn. This was ruled out on cover testing, which confirmed full ocular alignment.

Cataract: Cataracts can present with diplopia, shadowing, and declining vision. Slit-lamp examination revealed clear crystalline lenses bilaterally, excluding this diagnosis.

Second Visit: March 29, 2024

The patient returned for a scleral contact lens fitting to assess potential visual improvement. Fitting was performed using a Blanchard OneFit trial lens set. The horizontal visible iris diameter was measured at 11.7 mm bilaterally.

Diagnostic contact lens parameters used for initial fitting were as follows:

- Right eye: Base curve 8.0, central thickness 240 µm, power –1.50 D
- Left eye: Base curve 8.2, central thickness 250 µm, power –0.50 D

The patient's corneal curvature readings were 8.16 / 7.42 @ 85° OD and 8.30 / 7.74 @ 96° OS. At 30 minutes post-insertion, central clearance was measured at 350 µm bilaterally, indicating good lens placement. Limbal clearance measured 75 microns 360° around the cornea, with no conjunctival blanching or landing zone shadows observed.

Over-refraction through the scleral lenses achieved **20/20 vision in both eyes** using a –2.00 D lens OD and –2.50 D lens OS, with complete resolution of diplopia and the visual shadow. The patient was elated by the outcome and was scheduled for a scleral lens insertion and removal training session the following week.

Discussion

Keratoconus is the most common corneal ectasia, characterized by progressive thinning and protrusion of the cornea leading to compromised visual quality. Pain and blindness are possible outcomes in the advanced stages of the disease. Diagnosis is established through a combination of corneal topography, pachymetry, refraction, and biomicroscopy.

The leading known cause of keratoconus is atopic disease. Conditions such as eczema, allergic rhinitis, and asthma predispose patients to chronic eye rubbing. Mechanical rubbing disrupts collagen cross-links in the corneal stroma, leading to progressive bulging and thinning of the corneal apex. Additional risk factors include genetic mutations (e.g., Turner syndrome, Down syndrome) and connective tissue disorders such as osteogenesis imperfecta.

Clinical signs include irregular astigmatism, a corneal Fleischer's ring, reduced pachymetric readings, and corneal steepening on topography. Advanced disease may present with painful corneal bullae, scarring, and Munson's sign on downgaze.

First-line management of keratoconus targets progression through corneal cross-linking, a procedure involving the instillation of riboflavin drops followed by controlled UV-B light exposure to strengthen stromal collagen fibrils, thereby limiting further ectasia. Visual correction is achieved through rigid gas-permeable or scleral contact lenses, which vault the irregular corneal surface and create a new,

smooth refracting interface. Unlike soft lenses, rigid lenses do not conform to the cornea's irregular shape and are therefore far more effective at improving visual acuity in keratoconus patients. Corneal transplantation (keratoplasty) is reserved for cases with significant scarring, very poor visual potential, or intractable discomfort from corneal bullae.

Conclusion

Keratoconus is a progressive corneal disease that is best managed through early detection and prompt intervention. Corneal cross-linking remains the gold standard for halting progression, while scleral contact lenses provide the most effective means of visual rehabilitation in the absence of significant scarring. Risk factors such as atopic disease, a positive family history, and chronic eye rubbing should be routinely assessed during comprehensive eye examinations. Advanced or inadequately managed cases may require corneal transplantation for satisfactory visual outcomes.

What This Means for You

Keratoconus is a condition where the cornea, the clear front surface of your eye, progressively thins and changes shape, causing blurry and distorted vision that may not be fully correctable with regular glasses. It typically begins in early adulthood and can worsen over time if left unmanaged.

The encouraging news is that when caught early, progression can be halted with a procedure called corneal cross-linking. For those experiencing reduced vision, scleral contact lenses have transformed visual outcomes, often restoring clear, comfortable sight. At Eye Central, we specialize in the assessment and management of keratoconus and other corneal conditions. If you or a family member experiences rapidly changing prescriptions, persistent blurry or distorted vision, or a history of eye rubbing, we encourage you to book a comprehensive evaluation.