

# Early treatment of allergic conjunctivitis in preventing keratoconus

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## CASE

A man, aged 24 years, with a history of allergic rhinitis presented with a two-day history of sudden onset right eye redness, pain and blurred vision. Upon further enquiry, he revealed that since his teenage years, he had experienced intermittent eye redness and tearing, and began noticing blurred vision approximately four years ago. He also had a habit of frequent eye rubbing. For this current presentation, he sought help from general practitioners and was treated with a combination of topical antibiotics and corticosteroids, but experienced minimal relief of symptoms. Additionally, he consulted several optometrists for his blurred vision, but they had difficulty determining his refractive power because of the perceived high degree of refractive error. On initial examination at the ophthalmology clinic, his right eye had a visual acuity of counting fingers at 30 cm, whereas his left eye's visual acuity was 6/18. Examination of the right eye revealed generalised papillae across the palpebral conjunctiva with diffuse conjunctival injection. Notable findings included significant corneal conical protrusion (Figure 1), a focal area of microcystic oedema suggestive of acute hydrops (Figure 2) and a positive Munson's sign. The red reflex was present and a limited fundus examination following pupil dilatation revealed no remarkable findings.

The patient was treated with topical corticosteroids, hyperosmotic agents and cycloplegic therapy for the acute corneal hydrops. In addition, topical antihistamines were initiated for allergy control to prevent further disease progression. His condition showed improvement, with corneal scarring observed.

## QUESTION 1

What is the most likely diagnosis?

## QUESTION 2

What is the underlying pathophysiology?

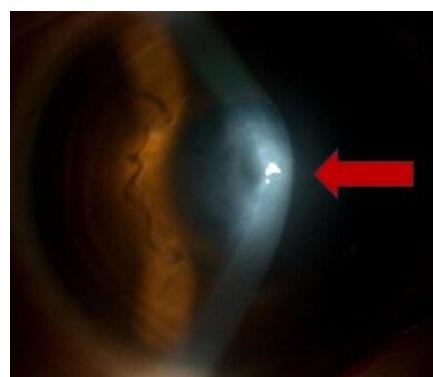
## QUESTION 3

What are some general management considerations?

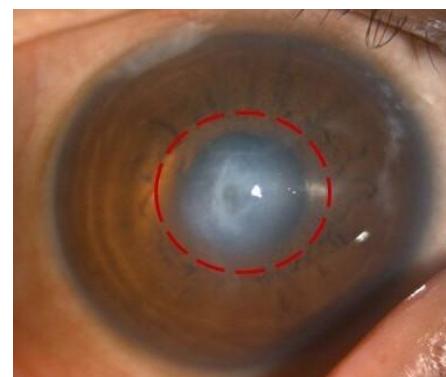
## ANSWER 1

Keratoconus (KC) is characterised by progressive stromal thinning, driven by increased production of proteolytic and lysosomal enzymes, alongside reduced levels of protease inhibitors, leading to an abnormal collagen structure.<sup>1,2</sup> Acute corneal hydrops is a complication of KC that occurs when a rupture in the Descemet membrane allows intraocular aqueous humour to infiltrate the cornea, causing stromal oedema.<sup>3,4</sup>

KC is most commonly diagnosed in adolescents around puberty and might continue to progress over the next two decades.<sup>5</sup> Because of the dynamic nature of the young cornea, paediatric KC progresses more rapidly than in adults, as collagen remodelling in the cornea occurs at a higher rate in children.<sup>5,6</sup> As a result, paediatric KC carries



**Figure 1.** Slit lamp photograph showing conical corneal protrusion (red arrow).



**Figure 2.** Acute corneal hydrops with surrounding corneal oedema (red ring).

a higher risk of corneal opacities and might require keratoplasty earlier than in adult cases.<sup>6</sup> Additionally, vernal keratoconjunctivitis and eye rubbing are more common in children, highlighting the importance of early detection and timely intervention.

#### ANSWER 2

In vernal keratoconjunctivitis, repeated exposure to allergens activates allergen-specific immunoglobulin E (IgE) on the conjunctival surface, triggering the release of inflammatory mediators such as histamine, proteases, tumour-necrosis factor-alpha (TNF- $\alpha$ ) and interleukins (IL).<sup>1,7-9</sup> Elevated concentrations of these inflammatory mediators are implicated in the pathogenesis of KC. Eye rubbing has been shown to increase tear matrix concentrations of IL-6, TNF- $\alpha$ , and matrix metalloproteinase (MMP)-13, even in healthy individuals. In patients with vernal keratoconjunctivitis, forceful eye rubbing is believed to further elevate protease activity, accelerating the development and progression of KC.<sup>1,2,8</sup>

#### ANSWER 3

Recognising subtle signs, such as progressive astigmatism or visual disturbances that do not improve with corrective lenses, should prompt immediate referral to a tertiary centre for further evaluation and management.

Patients with vernal keratoconjunctivitis should be referred for corneal tomography and biomechanical assessments to monitor their risk of developing corneal ectasia. Furthermore, as young patients are more prone to eye rubbing and experience faster KC progression, routine corneal topography and biomechanical monitoring are particularly recommended for young boys with allergies, a history of eye rubbing and newly developed corneal astigmatism.<sup>10</sup>

Treating the underlying vernal keratoconjunctivitis is equally important, as proper management can help prevent the exacerbation of KC. Early intervention, including treatments such as corneal cross-linking, can significantly slow disease progression, reduce the risk of acute hydrops and avoid the need for more invasive procedures like corneal transplants.

The authors suggest the implementation of routine refractive assessments for young boys presenting with persistent eye rubbing

or allergic conjunctivitis. This approach enables the early detection of progressive astigmatism or frequent changes in refractive error, which might serve as early indicators of potential KC. Integrating regular refractive screening into primary care practice can enhance the timely identification of high-risk cases and ensure appropriate specialist referrals when warranted. By ensuring timely referrals, primary care physicians can help protect patients' vision and improve vision-related quality of life.

#### Key points

- Progressive astigmatism can be the early presentation of KC.
- Frequent eye rubbing might accelerate KC progression.
- Timely referrals and managing underlying vernal keratoconjunctivitis can prevent KC progression.

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