

## ABOUT THE AUTHOR



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# Pediatric Blepharokeratoconjunctivitis: An Update

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## Introduction

Pediatric blepharokeratoconjunctivitis (BKC) is a form of ocular surface inflammation which is a unique clinical entity in children. It is also known as phlyctenular conjunctivitis and rosacea keratitis. A recent definition obtained with a modified Delphi method by a group of experts defined BKC as “a frequently underdiagnosed, sight-threatening, chronic, and recurrent inflammatory eyelid margin disease associated with ocular surface involvement affecting children and adolescents. Its clinical spectrum includes chronic blepharitis, meibomitis, conjunctivitis, and corneal involvement, ranging from superficial punctate keratitis to corneal infiltrates with vascularization and scarring.”<sup>1</sup> The pathophysiology of BKC is poorly understood but is believed to be related to staphylococcal hypersensitivity, with *Staphylococcus aureus* being the most common

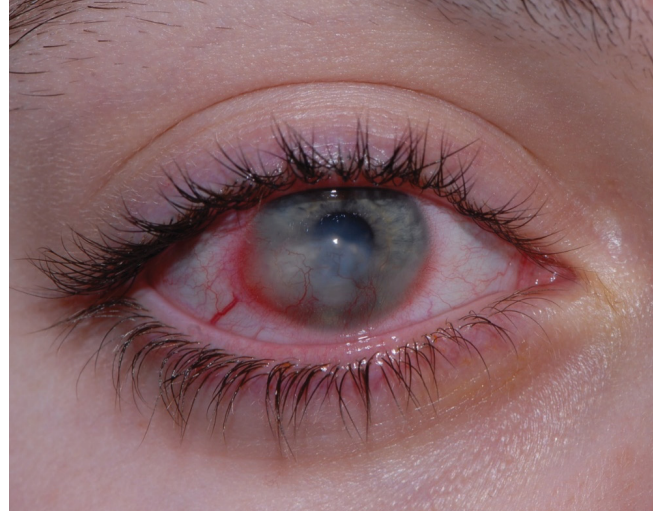
flora cultured from the lids in BKC. The robustness of the inflammatory response is thought to be age-related.

The age of onset of BKC is often as early as age 3–5 but can present in adolescence. Gender predilection varies between studies but is roughly equal in incidence for males and females. There is little good natural history data reported on the time course of the disease, but it can become chronic with multiple exacerbations over a period of years. In one study from the United Kingdom, there is the observation of increased incidence of severe disease in younger boys with South Asian or Middle Eastern background.<sup>2</sup> In our experience, however, severe disease can present in all ages and ethnic groups.

There is often a significant delay (up to 2 years) until definitive diagnosis because of lack of familiarity by clinicians with the diagnosis and frequent misidentification with other disorders.<sup>2</sup>



**Figure 1.** Conjunctival phlyctenule; *photo courtesy of Asim Ali, MD, FRCSC.*



**Figure 2.** Corneal infiltrates and scarring from BKC; *photo courtesy of Asim Ali, MD, FRCSC.*

The differential diagnosis of BKC includes other chronic and relapsing causes of red eye in childhood including herpes simplex keratitis and vernal keratoconjunctivitis. The corneal infiltrates frequently mimic bacterial keratitis and many children are treated unsuccessfully with topical antibiotics. Historically, the phlyctenules seen in BKC have also been associated with tuberculosis and liver parasites, but even in countries where these disorders are endemic these causes are rare. Without a strongly suggestive history it would not be recommended to test for these pathogens on a routine basis.

## Clinical Features

Symptoms of BKC include pain, redness and significant photophobia. Due to this photophobia, young children with active BKC may be very difficult to examine and a complete eye examination is often impossible. In select cases, especially with visible keratitis or recurrent symptoms, a sedated examination may be necessary in order to make the diagnosis.

Characteristic signs of BKC include meibomian gland stenosis, congestion, and inspissation. The extent of changes in the meibomian glands is often less impressive than that seen in adults. Changes to the lid margin including rounding of the lid margin, lash loss, and telangiectasia are less common in children than in adults. Anterior blepharitis can also be seen with crusting around the base of the lashes and inflammation of the lid margin. Chalazia

may be seen at the same time as other signs but often these findings are asynchronous. Indeed, a history of chalazia in early childhood is often helpful in making the diagnosis of BKC in the absence of eyelid findings. While widely implicated in the etiology of adult blepharitis, the patterns seen in presumed *Demodex* infestations such as cylindrical dandruff are not typically seen in children. Malar telangiectasia and pustules on the skin can also develop in BKC in an analogous fashion to ocular rosacea in adults, but this is comparatively rare.

Conjunctival changes include the development of phlyctenules, which can often originate on the bulbar conjunctiva (**Figure 1**) and migrate toward the limbus and cornea, taking a serpentine route and causing scarring. On examination these lesions are elevated, injected and typically stain with fluorescein. The cornea can develop sterile infiltrates which may or may not stain with fluorescein. These are often not just at the periphery but can occur in the central cornea, which is distinct from the marginal infiltrates seen in adults (**Figure 2**). These infiltrates can mimic bacterial keratitis. Inferior punctate keratitis is frequently seen. The development of neovascularisation is also common and is typically superficial but can also be deep. Rarely these new vessels are associated with lipid keratopathy or crystals. Thinning of the cornea can develop and rarely this can progress to descemetocoele and perforation. Perforation has been reported to be more likely in older adolescents of European descent.<sup>3</sup>

## Treatment

Once a definitive diagnosis has been made a treatment plan should be developed to address both the acute ocular surface inflammation and the underlying blepharitis. Topical anti-inflammatory therapy is the mainstay of acute treatment. Corticosteroids are often used in the acute phase to relieve symptoms and are especially helpful when there is corneal involvement such as phlyctenules or infiltrates. Potent corticosteroids such as prednisolone or dexamethasone can be used in a tapering schedule over 4–6 weeks and this can rapidly improve the clinical situation. Symptoms such as photophobia respond very quickly. A treatment follow-up visit should be arranged within 1 month and in younger children the second examination is much easier to tolerate. Often, fundus examination and refraction can be deferred to this visit. Special care needs to be taken with the use of potent corticosteroids in children as their effect on IOP is greater in children than in adults with both a greater increase in pressure and early onset of this effect. There is no role for long-term potent corticosteroid use in the treatment of this disorder and families need to be educated about the associated risks.

Select oral antibiotics are very effective in achieving long-term remission of BKC due to their anti-inflammatory effect on meibomian glands through multiple mechanisms. The tetracyclines (including doxycycline and minocycline) are contraindicated in children with primary dentition due to staining of the permanent teeth, and thus can only be used in older children. Macrolides such as erythromycin, clarithromycin, and azithromycin do not have these age limitations and all can be used to control BKC in the long term. Oral azithromycin can be administered less frequently which helps with compliance in children.<sup>4</sup> In our practice, it is prescribed weekly, and is highly effective and well-tolerated by most children. The most common side effect is gastric upset but this rarely results in discontinuation of therapy. Topical azithromycin has also been described in the literature for the treatment of BKC, but it is not available in Canada.

In select children who are intolerant of oral therapies or who have mild disease, lower potency corticosteroids such as loteprednol and fluorometholone can be helpful. These agents have a lower risk of ocular hypertension, but

regular monitoring is still important. Topical cyclosporine in various reported concentrations has also been used in similar scenarios and avoids the side effects of corticosteroid use. Stinging with instillation can make it difficult to use in the long term in many children.

Other concomitant management includes the use of topical antibiotics such as erythromycin and fucidic acid drops which are very helpful in children with anterior blepharitis. Both are active against *S. aureus* and help to decrease the overall bacterial load. Lid scrubs and warm compresses should be taught and recommended to families as an adjuvant therapy but are rarely effective as a primary therapy. The role for these measures is for maintenance after the acute inflammation has subsided with other treatment. The use of omega-3 supplements has been advocated in the literature but there is no good evidence for their use in children. Published dosing guidelines are not available and their toxicity profile is unknown.

## Refractive Sequelae

Recurrent episodes of untreated corneal inflammation typically occur over a period of months to years which can lead to astigmatism and stromal scarring. These sequelae can result in amblyopia in younger children. In different series, the rate of amblyopia due to anisometropia or deprivation from scarring has been reported to be as high as 30%, but most children will develop excellent vision with appropriate treatment.<sup>5,6</sup> It is important to perform a cycloplegic refraction once the acute inflammation has been controlled, usually 1–2 months after presentation.

The resultant astigmatism may be either regular or irregular. Increasing amounts of astigmatism are associated with multiple recurrences of disease.<sup>6</sup> If the cornea is otherwise mostly clear, glasses should be tried first and the patient followed for any improvement in vision. If the vision plateaus, part-time patching therapy should be prescribed. Some patients may need either rigid gas-permeable contact lenses or scleral lenses for irregular astigmatism, although tolerance of these modalities in this patient group is poor. In a minority of individuals, deep anterior lamellar keratoplasty can be considered in cases with severe central scarring. Recovery of vision is often limited by underlying amblyopia, but graft survival is excellent in our institutional experience.

## Summary

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Pediatric BKC is an important cause of recurrent red eye in children and is frequently misdiagnosed. Pulse corticosteroid therapy combined with oral macrolide use can control symptoms and reduce scarring and vision loss. It is important to monitor for recurrence and address refractive error with glasses and amblyopia with patching. Using these approaches, the visual outcomes can be excellent.

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