Commentary: Pediatric infectious keratitis

Pediatric infectious keratitis accounts for approximately 13% of all cases of infectious keratitis and is more commonly observed in developing countries, especially in tropical regions.[1] It differs from microbial keratitis in adults with respect to the predisposing factors, causative microorganisms, clinical course as well as visual prognosis.

Diagnosis and investigations are more challenging in the pediatric age group as they may not be cooperative for a detailed slit-lamp examination. Examination under anesthesia or deep sedation is often required to obtain corneal scrapings and document the extent of ulcer, as well as monitor response to treatment. The culture positivity rates range from 34% to as high as 88.8% in cases where the scrapings are obtained under anesthesia.[2,3] Prior institution of antimicrobial treatment and superficial scraping without adequate sedation decrease the likelihood of obtaining positive culture results.

Corneal trauma is the most common risk factor associated with the development of pediatric infectious keratitis, especially in developing countries.[1] Systemic diseases in children also predispose to the development of infectious keratitis, which may often be bilateral. Jhanjhi *et al*. observed a significant association between the severity of protein-energy malnutrition and bilateral infectious keratitis in children, which also correlated with the socio-economic status and the immunization status.[4] Ocular co-morbidities may also lead to the development of infectious keratitis in children, with vernal keratoconjunctivitis and blepharoconjunctivitis most commonly associated with ocular pathologies.[1,4,5] The concomitant steroid use in allergic ocular disorders predispose to the development of secondary infectious keratitis in these children. With the increasing use of contact lens in children and the advent of orthokeratology for the treatment of myopia, contact lens usage is emerging as a highly prevalent causative factor in older children living in developed countries such as Taiwan and USA; however, it is uncommonly associated with infectious keratitis in developing countries.[1]

Bacterial infections are the most common, with *Staphylococcus* being the most prevalent species associated with post-traumatic infections. Pseudomonas is commonly observed in cases associated with contact lens wear. Fungal infections are associated with vegetative trauma and more often observed in tropical countries such as India. Herpetic infections are prevalent in pediatric age group; however, they are often undetected or misdiagnosed. A retrospective study in South India observed fungi to be the most common causative organisms in pediatric cases associated with trauma, and Fusarium was the most commonly isolated species.[6]

This trend was similar to the etiopathogenesis in cases of adult infectious keratitis in South India and may be attributed to the local environmental conditions. In contrast, another study in Northern India observed bacterial infections to be the most prevalent followed by fungal infections in pediatric cases.[5] The present study by Singh *et al*. also observed bacterial infections most commonly, followed by fungal and acanthamoeba infections.[7] There is a definite difference in the spectrum of causative organisms between North and South India.

Monotherapy is often preferred in non-serious pediatric infectious keratitis, as it has the advantage of improved compliance in pediatric patients. Moreover, a majority of children have small central or paracentral ulcers which are amenable to treatment with a single anti-microbial agent. Fluoroquinolones are associated with good antimicrobial susceptibility of more than 80% and are the preferred agents for first-line treatment. Rossetto *et al*. observed good antibiotic susceptibility ranging from 87.1% to 95.7% to commonly prescribed antibiotics including fluoroquinolones, aminoglycosides, and third-generation cephalosporins.[8] Natamycin 5% is the preferred agent for fungal infections. Combination therapy with fortified antibiotics may be necessary in extensive ulcers, non-healing or progressive cases and deep infiltrates. We routinely prescribe fortified antibiotics with broad antimicrobial coverage in cases of pediatric keratitis at initial presentation. Ours is a tertiary care referral center and the cases often have a delayed initial presentation, wherein institution of fortified antibiotics helps in a rapid achievement of the minimum inhibitory concentration and hasten the resolution of infection.

Most of the pediatric infectious keratitis cases are amenable to medical treatment alone and surgical intervention is required in less than 20% of cases.[1] Surgical intervention is more frequently required in traumatic cases and fungal infections. Therapeutic keratoplasty is more challenging, owing to poor graft survival in children and the high incidence of ocular co-morbidities including post-keratoplasty glaucoma and graft rejection.

One of the major challenges associated with pediatric microbial keratitis is the visual rehabilitation after the resolution of infection. The residual corneal scar may result in suboptimal vision due to irregular astigmatism and visual-deprivation amblyopia. Aggressive amblyopia therapy remains the key obtaining optimal visual outcomes after appropriate corrective measures are taken to restore a best corrected visual acuity.

To conclude, pediatric infectious keratitis is less common than adult-onset infectious keratitis; however, it is more challenging to manage. Trauma remains one of the most common predisposing factors, highlighting the need for creating awareness among parents regarding the dangers posed by seemingly innocuous everyday objects. An in-patient management should be preferred due to the difficulties in establishing the diagnosis, instillation of topical therapy, and monitoring response to treatment. A multi-pronged approach is required, aimed at resolution of the infection, restoration of the anatomical integrity of the globe, and ensuring optimal visual rehabilitation.

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Quick Response Code:

Website: www.ijo.in

DOI: 10.4103/ijo.IJO_47_20

Cite this article as: Kaur M, Titiyal JS. Commentary: Pediatric infectious keratitis. Indian J Ophthalmol 2020;68:440-1.