

Treatment of Extraocular Infections

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ABSTRACT

Children, including newborns and infants, frequently struggle with extraocular infection. Rapid extraocular disease detection and treatment at the point of contact diminish ocular morbidity and visual impairment.

Blindness, occasionally bilateral due to severe ophthalmia neonatorum, may occur if the proper therapy is not administered on time and the patient is not referred to eye care professionals. This review's primary goal is to provide working paediatricians and neonatologists with basic, succinct information regarding common extraocular illnesses that affect newborns and kids living in developing countries. Through this review, paediatricians—as the child's initial point of contact—might feel more secure and at ease handling ocular infections in children, especially those living in distant rural and tribal areas. A literature search was conducted by extracting pertinent publications from peer-reviewed journals, PUBMED, and Cochrane meta-analyses.

Keywords: Conjunctivitis, Orbital cellulitis, Trachoma, Keratitis, Ophthalmia neonatorum

1. INTRODUCTION

One of the most regular ocular issues treated in Conjunctivitis, which the general public refers to as red eyes, is treated in the paediatric emergency room [1]. The most frequent eye condition affecting newborns is purulent conjunctivitis [2]. Ophthalmia neonatorum was the leading cause of neonatal blindness (60–75%) until Crede's prevention [3]. Neonatal conjunctivitis can be sight-threatening if appropriate treatment is not given right once, with an incidence ranging from 1% to 24% depending on location [4]. Infective keratitis and ophthalmia neonatorum cause corneal opacity, which accounts for a sizable fraction of blinding eye illnesses in Asia and Africa [4]. In India, corneal opacity causes 60% of

blindness in children under the age of 12 years, placing a significant social and economic burden on families and society [5].

Antenatal treatment, newborn screening, and prevention for ophthalmiae neonatorum and trachoma could reduce ocular morbidity and blindness in the paediatric population, especially in underdeveloped countries [2]. The requirement for immediate ophthalmic care is greater for more severe ocular conditions such as corneal ulcer, iritis, and acute congestive glaucoma [6]. Paediatricians and neonatologists in tropical countries would be able to recognise and treat extraocular infectious eye disorders in newborns and young children after this study is complete.

Classification

The various ocular and adnexal structures that make up extraocular infections can be broadly categorised as follows:

1. Lids and Adnexa
2. Lacrimal sac
3. Conjunctiva
4. Corneal infection (Infective keratitis)
5. Uncommon corneal and conjunctival lesions linked to systemic illnesses

Lid Infections

The occurrence of blepharitis is lower in children than in adults. It has a protracted course. Children frequently have squamous blepharitis. Although it does not endanger vision, it increases the risk of red eyes and minor corneal infiltrate. Gram-positive cocci are frequently found on their own at the lid border. Acute ulcerative blepharitis may benefit from the topical administration of 0.5% erythromycin eye ointment twice daily for 2-4 weeks. Manual removal is required for crab louse-caused parasitic infestations. Improved personal hygiene helps stop recurrence. Antibiotics taken orally are unnecessary.

Blepharitis or blepharoconjunctivitis may mimic the lesion. The nits will be seen upon close inspection of the lids [7]. Mechanical nit removal is part of the treatment, along with three days of 2% pilocarpine eye drops. Lubricants are an option.

It is a frequent, excruciating eyelid margin irritation that is primarily brought on by bacterial infection. In many situations, the lesion drains on its own and disappears without medical intervention.

The inflammation, however, has the potential to spread, cause excruciating pain, or perhaps evolve into a persistent condition called chalazion. Stye, also known as hordeolum externum, is treated by taking out the offending eyelash and using ophthalmic antibiotic eye drops four times per day for a week. Warm compresses are a part of treatment. If the lesion results in excruciating discomfort and swelling of the lids, oral antibiotics are advised.

An infection called molluscum contagiosum is brought on by a pox virus. Lesions on the hands, face, and ocular adnexa may result in persistent follicular conjunctivitis and corneal vascularization. The molluscum's contents are expressed at the outpatient clinic, then topical steroid eye drops are applied twice daily for a week as part of the treatment. The lesion will get worse if you use iodine as cauterization or stick a needle in it. A paediatrician should be notified if a child has many molluscum on their face so they can rule out AIDS in both the child and the parents.

An infection of the eyelids and periorbital soft tissues termed as preseptal cellulitis is defined by the sudden onset of lid edoema, primarily in the upper lid, without involving the globe. It typically manifests as a unilateral condition. Without a history of ocular trauma, it is rarely observed in ophthalmic practise. Bacteria, viruses, fungus, and parasites are possible causes. In contrast to orbital cellulitis, preseptal cellulitis only affects the soft tissue in front of the orbital septum. It may progress and spread to the orbit, resulting in sight-threatening orbital cellulitis. This needs to be distinguished from cellulitis related to childhood orbital and ocular malignancies. Parenteral antibiotics that are efficient against gramme positive bacteria are administered as part of the treatment to manage bacterial infection. To avoid corneal infection, topical medications such 1% tetracycline or 1% erythromycin could be advised twice daily for a week.

Congenital Dacryocystitis

In newborns and young children, unilateral conjunctivitis is also brought on by congenital occlusion of the lacrimal pathway. In the afflicted eye, there may be watering or a buildup of mucopurulent secretion over the lower fornix. The diagnosis could be confirmed by digital pressure over the lacrimal sac. In the majority of instances, spontaneous alleviation can be attained within 6 months of infancy with a few easy digital massages down and in. An ophthalmologist should probe the naso-lacrimal duct if blockage continues. If the probing is carried out before the first birthday, the prognosis is good.

Conjunctivitis

Since it accounts for roughly a quarter of all instances of newborn conjunctivitis and recurs in 35% of cases, chlamydia has long been acknowledged as the primary cause of blindness [10]. In 50% of instances, bacteria could be isolated, including *Staphylococcus epidermidis* (28.65%) [11]. Based on the duration and origin, conjunctivitis in children can be broadly categorised as acute or chronic. The cause may be bacterial, viral, allergic, chemical, or poisonous, and it depends on the child's age.

Since Credes first proposed it in 1884, prophylaxis has proven to be the most effective strategy [3, 12]. Immediately upon delivery, one percent silver nitrate or 2.5 percent povidone iodine may be utilised [13]. It must be created because it is not readily available commercially. Silver nitrate is the least effective treatment for chlamydial conjunctivitis, and excessive application might cause chemical conjunctivitis. Tetracycline one percent or erythromycin 0.5% ointment produce superior results, are less harmful to a baby's eyes, and are widely accessible [14, 15].

Bacterial Acute conjunctivitis is most frequently caused by bacteria after the newborn period. *Moraxella*, *Staphylococcal*, *H. influenzae*, *S. pneumoniae*, and other species are often isolated. The presence of associated otitis strongly suggests that *Haemophilus influenzae* is the cause of the infection [8]. Children who are in school are typically bilaterally affected by acute bacterial conjunctivitis. The infection could be carried by other siblings. Swollen eyelids with matted eyelashes and mucopurulent discharge are traditional symptoms. Ointment form is superior at delaying the onset of medication activity in the conjunctival sac and preventing the glueing of the eyelids. Due to effective immunisation, diphtheria-related membranous conjunctivitis is extremely uncommon.

Herpes Simplex Conjunctivitis

Between 1 and 5 years is when primary infection peaks. Even without therapy, herpes simplex self-limits [10]. However, recovery takes time. Use 3% acyclovir or 0.15% ganciclovir ointment four times per day for two weeks if the cornea is affected or if there is severe unilateral blepharitis. Antivirals may cause ocular toxicity after 2 weeks [12].

Vernal conjunctivitis, a kind of allergic conjunctivitis, is more prevalent in tropical nations. It begins at age 5 and lasts till maturity. Every time, it is bilateral. The primary symptoms are itchiness, watering, photophobia, and mucous discharge. Atopic illness and keratoconus may coexist in a small number of youngsters. In older children, the upper tarsal conjunctiva exhibits numerous papillae that are active and scarring. The pigmented and muddy bulbar conjunctiva may be visible. Despite being referred to as seasonal because of its high prevalence in the spring, it is perpetual in tropical regions. Vernal catarrh does not pose a threat to vision, but it has an impact on school-age children's performance and quality of life. In mild cases, cold compresses are used as a kind of treatment. The illness disappears in adults and there is no specific treatment available. In extreme situations, fluometholone 0.1% drops twice day as a mild topical steroid may be advised for a week or two [14]. Steroid-induced cataract and glaucoma may develop if topical steroids are used continuously. Parents need to be informed about these risks to their children's vision.

Pediatric Infective Keratitis

Pediatric infective keratitis is difficult to treat in children even though it affects them less frequently than adults do because they are less likely to disclose their symptoms and have poor drug compliance. As a result, the corneal scar will cause amblyopia and a poor visual outcome. The biggest risk factors in India are minor ocular injuries and systemic infectious illnesses [13]. Recent research on microbial keratitis in children has revealed that fungal keratitis incidence (54.2%) is rising faster than bacterial keratitis (40.8%). Similar to adult cases, paediatric keratitis is typically caused by isolated bacteria. Children's infective keratitis is frequently caused by gram-positive bacteria and the fungus *Fusarium* [5]. Use topical aminoglycosides, second- or third-generation fluoroquinolones, or both to treat a minor corneal ulcer that is only affecting the peripheral cornea. Keep topical steroids away. Refer to an ophthalmologist for further assessment and care if the ulcer gets worse within 48 hours.

Herpes simplex virus keratitis is seen in children between the ages of 6 months and 5 years. The maternal antibodies protect newborns. More often than HSV type II, HSV type 1 affects the cornea and lids [14]. HSV type II is bilateral and is transmitted by the mother during vaginal delivery [15]. As the treatment differs, it should be distinguished from other infant ocular diseases. The cornea frequently becomes involved. The HSV ocular infection is brought on by fever and an upper respiratory illness.

Ligneous Conjunctivitis (LC)

Ligneous conjunctivitis is an uncommon condition that can cause blindness and even death (by blocking the airway). It is characterised by recurring, frequently bilateral, fibrin-rich pseudomembraneous lesions with a woody nature that occur mostly on the tarsal conjunctiva. Due to a plasminogen deficit, it manifests in infancy [16]. Due to a mutation in the plasminogen gene, LC may be inherited in an autosomal recessive form and be linked to type 1 plasminogen deficiency, which impairs wound healing. Low serum plasminogen levels may be detected in laboratory tests. Despite Bouisson's 1847 diagnosis, Borel is credited with coining the term "ligneous," which means "woody." [7] The woody membrane returns after

surgical removal. A follow-up is required, and prompt consultation with an ophthalmologist and a paediatric surgeon is essential. Due to respiratory tract obstruction, the majority of children die during their first decade, and even tracheostomies cannot save them.

Stevens-Johnson Syndrome (SJS)

Children and adults can develop Stevens-Johnson syndrome, a rare, severe, and sometimes fatal allergic reaction involving the skin and mucous membrane. In India, it is common for children who have had the chicken pox or who take medications known to increase their risk of developing SJS to have it (sulfa, antiepileptics). Children who have chicken pox generally do not seek out modern medical care and arrive with ocular issues that could endanger their sight. Ophthalmologists must monitor children with this condition for the rest of their lives in order to treat severe dry eye and SJS's aftereffects. Ocular lubricants, such as sodium carboxymethylcellulose 0.5% or hypermellose 0.7%, can be often injected to provide some comfort. Avoid topical steroids, benzalkonium chloride, non-steroidal anti-inflammatory eye drops, and other eye medications that include preservatives. Treatment lasts a lifetime. The prognosis for surgery to repair the ocular surface is dismal.

Congenital Corneal Anesthesia

It is an uncommon corneal condition that can mimic paediatric infective keratitis and create diagnostic confusion. Because there is typically no discomfort or corneal sensation, the youngster is normally comfortable and can confront strong light without experiencing photophobia. The diagnosis can be verified by using a wisp of cotton to feel the cornea. The youngster may have had their hands and lips amputated. Atypical dentition is possible. There is no known cause. Congenital mesenchymal abnormalities or primary hypoplasia of the hind brain may be suspected [8]. A permanent central tarsorrhaphy is the best option if the child has severe neurotrophic keratopathy that poses a hazard to corneal perforation. All throughout one's life, lubricants for the eyes should be used.

Tyrosinosis

Tyrosine aminotransferase deficiency causes this uncommon autosomal recessive genetic condition, which an ophthalmologist hardly ever encounters. The illness could show up at the neonatal or infantile stages. It resembles epithelial herpes very much. Patients with type 1 tyrosinosis smell like cabbage. In some cases, the palms and soles may develop hyperkeratotic lesions. Herpes simplex virus keratitis differs from other types of keratitis in that it develops later in infancy, is unilateral, may be accompanied by vesicles over the lips and eyelids, is self-limiting, and responds to topical antiviral therapy. Severe blepharospasm, bilateral, recurrent red eyes, and watery eyes are all symptoms of tyrosinosis. An enzyme analysis may confirm a positive family history. A specific diet with little or no protein is one form of treatment.

Xerophthalmia

After receiving oral vitamin A syrup from the Indian Ministry of Health, xerophthalmia and keratomalacia are extremely uncommon. Rarely, a small number of babies exhibit acute malnutrition, respiratory illness, wrinkled, dry conjunctiva, and melting cornea. These babies require urgent ophthalmic care. Parenteral vitamin A supplementation given when needed in a therapeutic dose will significantly improve the ocular surface and prevent diarrhoea and

respiratory infections. For a few days, both eyes should get two applications of topical 1% tetracycline ointment. It is advised to repeat parenteral Aquasol, a water-soluble vitamin A, after 48 hours if necessary. 100,000 units IM. Due to poor absorption and digestive issues, oral supplements during the acute phase are ineffective [9].

Xeroderma Pigmentosum (XP)

With an estimated prevalence of 1 per million people, Xerodermapigmentosum is a rare autosomal recessive condition [11]. Due to a malfunctioning repair process for UV-induced DNA damage in skin cells, exposure to sunshine exacerbates the illness. Ocular surface neoplasia and other cutaneous and ocular abnormalities are present in XP patients. Photophobia, eye watering, blepharospasm, and vision impairment are ocular symptoms. Body parts that are exposed to sunshine suffer UV light damage. Patients with XP are more likely to develop sarcoma and skin cancer as well as pass away in their adult years. Children frequently have dry, keratinized conjunctiva that is inflamed and accompanied by redness and pigmentation. The symptoms could be momentarily relieved by routine surface lubrication with artificial tears such 0.5% methylcellulose. The illness advances over time.

Ichthyosis

The degree of ocular involvement depends on the type of ichthyosis. In X-linked ichthyosis, lid lesions and exposure keratopathy are frequent. Lubricants that hydrate the skin or eyelid provide momentary relief [11].

2. CONCLUSIONS

Extraocular infections in children in developing nations could be treated effectively by physicians at the earliest sign of the illness, preventing blindness and vision loss. Additionally, it reduces the financial strain on the family and days missed from school. A little change to the title is made to include a few rare systemic disorders that are very briefly treated in this study in order to emphasise the significance of their relationship to ocular morbidity.

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