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Review Article

Preseptal Cellulitis in Pediatric Patients

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Abstract

Orbital and periorbital cellulitis are common conditions encountered in pediatric practice that can often be confused with one another. Physicians frequently face the challenge of differentiating between them, as both conditions share similar symptoms, including ocular pain, eyelid swelling, and erythema. These symptoms typically arise as complications of rhinosinusitis (specifically ethmoiditis), dental infections, eyelid injuries, or external ocular infections.

The key distinction between orbital cellulitis and periorbital cellulitis lies in the orbital septum. Preseptal cellulitis, or periorbital cellulitis, occurs in front of the orbital septum, while orbital cellulitis occurs behind it. This differentiation is crucial for accurate diagnosis and treatment.

Although the symptoms may be similar, determining the precise location of the infection relative to the orbital septum is vital for distinguishing between the two conditions. Correct identification is important, as preseptal cellulitis requires a different treatment approach than orbital cellulitis due to its less invasive nature.

Computed tomography scanning is recommended for evaluating children with periorbital inflammation and rhinosinusitis, as it helps confirm the location of the infection.

Preseptal cellulitis is typically caused by bacteria such as Staphylococcus aureus, Haemophilus influenzae, and Streptococcus pneumoniae. Treatment usually involves a combination of intravenous antibiotics (such as amoxicillin with clavulanic acid, ceftriaxone, or cefixime) and, if necessary, surgical drainage.

Managing both preseptal and orbital cellulitis requires a coordinated, multidisciplinary approach. Care is usually provided by three specialists: a pediatrician, an infectious disease specialist, and an otorhinolaryngologist. Both conditions are more prevalent in children than in adults, with preseptal cellulitis being significantly more common than orbital cellulitis.

Keywords: children; nasal polyps; preseptal cellulite; pediatric rhinosinusitis, FESS.

Abbreviations

OC: Orbital Cellulite; PSC: Preseptal Cellulite; CT: Computerized Tomography; IV: Intravenous; FESS: Functional Endoscopic Sinus Surgery; CRS: Chronic Rhinosinusitis; NPs: Nasal Polyps

Introduction

Facial infections are commonly observed in children, making it essential to understand them to improve treatment outcomes. Orbital and periorbital cellulitis are two conditions frequently encountered in pediatric practice. These infections can be easily confused due to their similar symptoms, which include ocular pain, eyelid swelling, and redness. They usually develop complications of rhinosinusitis (particularly ethmoiditis), dental infections, eyelid trauma, or external ocular infections. In some instances, these complications can be difficult to treat, even with the use of antibiotics [1-3].

Preseptal cellulitis, also known as periorbital cellulitis (corresponding to type 1 of the Chandler classification), is a common infection that affects the soft tissues located in front of the orbital septum, specifically limited to the eyelids in the preseptal region.

Infections that spread posteriorly to the septum are classified as orbital cellulitis, which is a more severe, albeit less common, infection that may occur with or without complications [1,2,4].

Chandler et al. have classified orbital infections into five categories (see Table 1). This classification serves as an indicator of disease severity [4].

Preseptal cellulitis affects the tissues in front of the orbital septum and is limited to the eyelids. In contrast, orbital cellulitis involves infections that extend behind the septum; this condition is more severe but less common. Chandler's classification (Table 1) categorizes orbital infections into five levels of severity.

Table 1: Chandler classification of oculo-orbital complications of rhinosinusitis [4].

Stages	Description
Preseptal cellulitis	Eyelid swelling without proptosis, ophthalmoplegia, or loss of vision.
Orbital cellulitis	Inflammation of the orbital fat, proptosis, restricted eye movements, color desaturation.
Subperiosteal abscess	Pus collection elevating the periosteum off the bony orbit.
Orbital abscess	Abscess collection within the orbit
Cavernous sinus thrombosis	

The orbital septum is a layer of connective tissue that connects to the orbital rim and the tarsal plates in the upper and lower eyelids. It serves as a barrier between the deep orbital soft tissues and the superficial structures of the eye [1].

These conditions are more common in children than in adults, with preseptal cellulitis occurring three times more frequently than orbital cellulitis [2]. Preseptal cellulitis shows no gender preference, whereas orbital cellulitis is more prevalent in males. Ethmoidal sinusitis is the most common predisposing factor for orbital cellulitis, and it is also a significant cause of preseptal cellulitis [2,5]. The most implicated pathogens in children, include *Haemophilus influenzae* type b, *Staphylococcus aureus*, *Streptococcus pneumoniae* (which is most associated with sinus infections), and beta-hemolytic streptococci [3,4].

Preseptal cellulitis can be caused by various factors, including skin and orbital trauma, infections from nearby structures such as upper airway infections, dacryocystitis, palpebral lesions, and conjunctivitis. It can also result from ophthalmologic surgery, animal bites, or skin infections like impetigo and herpes. Hematogenous seeding is rare due to the widespread vaccination against *Haemophilus influenzae* serotype b [6-8].

The PSC typically presents with fever, sensitivity, redness, and swelling around one eye. Importantly, there is no proptosis of the eye, and both vision and eye movements remain normal. Treatment necessitates a coordinated approach involving a pediatrician, an infectious disease specialist, and an ear, nose, and throat (ENT) specialist. This may include the use of antibiotics that target a broad spectrum of bacteria, as well as the possibility of draining the sinuses. The role of systemic corticosteroids in treatment is still debated; however, recent studies have indicated that they may expedite recovery and reduce hospital stays without leading to significant side effects [1,9-11].

Understanding the anatomy of the orbit and its surrounding structures is essential for accurate diagnosis [1].

A CT scan is often used to confirm diagnoses in patients with periorbital inflammation, as clinical differentiation can be challenging. Additionally, imaging plays a vital role in evaluating any complications that may arise (Figure 1,2) [12,13].

Early diagnosis and prompt management of OC and PSC are essential to prevent potential fatalities.

Surgery aims to drain the abscess either externally or endoscopically, using general anesthesia.

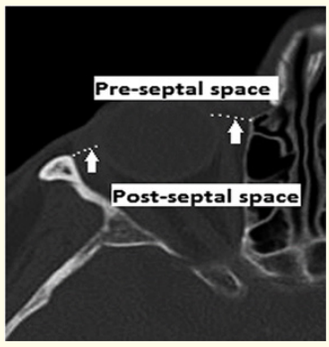

Figure 1: The white arrows indicate the location of the orbital septum, as well as the pre-septal and post-septal regions.

Figure 2: The white arrow indicates preseptal cellulitis on the axial CT scan.

Discussion

Preseptal and orbital infections are distinguished by the orbital septum [10]. Preseptal cellulitis is usually mild, with rare complications [5,13]. Diagnosing preseptal cellulitis involves identifying a specific event, such as an injury, stye, or insect bite.

The pathogens associated with preseptal cellulitis can vary depending on age and underlying causes. *Streptococcus pneumoniae* is commonly linked to sinus infections, along with *Staphylococcus aureus* and Streptococcus pyogenes. For intravenous antibiotic treatment, penicillin and cephalosporins are generally the best choices [3,4], and anti-inflammatory drugs, antihistamines, steroids, and, in some cases, includes sinus surgical drainage (FESS). Evidence of sinusitis mandates otolaryngology involvement.

Conclusions

Rhinosinusitis is often a contributing factor to preseptal and orbital cellulitis. Chronic sinusitis, particularly with nasal and sinus polyps in children, is rare and may be associated with systemic conditions such as asthma, allergic rhinitis, or cystic fibrosis. CT scans are essential for accurate diagnosis and for identifying patients who may require urgent surgery. Early diagnosis and treatment with antibiotics, along with surgical interventions such as FESS performed by an otolaryngologist, can lead to positive outcomes. In children with chronic rhinosinusitis and nasal polyps, FESS generally results in improved postoperative results

Conflict of Interest

None declare.

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