

PRESEPTAL CELLULITIS



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It is not uncommon to find the busy practitioner and student overwhelmed by research publications. *Vision*, in each edition will present summaries of certain clinical research topics highlighting some of the most salient points. This will aid clinicians and students to keep in touch with the latest developments in eye care and related fields.

INTRODUCTION

PRESEPTAL CELLULITIS is a common infection of the eyelid and periorbital soft tissues that is characterised by acute eyelid oedema and erythema. This bacterial infection usually results from an external ocular infection, local spread of an adjacent sinusitis or dacryocystitis, or following trauma to the eyelids. Preseptal cellulitis tends to be a less severe disease than the feared orbital cellulitis (postseptal cellulitis), which can present in a similar fashion. Preseptal cellulitis differs from orbital cellulitis in that it is confined to the soft tissues that are anterior to the orbital septum. Orbital cellulitis has a higher morbidity, requires aggressive treatment, and may require surgical intervention, whereas preseptal cellulitis usually is managed with pharmaceutical agents.

AETIOLOGY

The most common organisms are *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Streptococcus* species, and anaerobes, reflecting the organisms that commonly cause upper respiratory tract infections and external eyelid infections.

Events preceding preseptal cellulitis may include the following recent eyelid lesions: hordeola, chalazia, insect bites, trauma-related lesions, lesions caused by a recent surgical procedure near the eyelids, lesions caused by oral procedures, dacryocystitis. An upper respiratory tract infection, especially sinusitis, may be present concurrently with preseptal cellulitis or may have recently occurred. Many systemic diseases have been reported with concurrent preseptal cellulitis, including the following: varicella, asthma, nasal polyposis, neutropenia.

EPIDEMIOLOGY

Preseptal cellulitis is primarily a paediatric disease, with approximately 80% of patients being younger than 10 years and most patients being younger than 5 years. Patients with preseptal cellulitis tend to be younger than patients with orbital cellulitis. There is no predilection for gender, age or region. Immunosuppression may increase the risk.

CLINICAL PRESENTATION

Patients may have mild to moderate temperature elevation. Signs and symptoms include variable pain upon palpation, redness, swelling and red-purple skin coloration that is firm and warm to the touch. Other ocular signs include conjunctival injection, oedema and depending upon the extent and severity of the periorbital processes, and corneal insult. Eyelid infections involving the orbit and adnexa have been organised via the modified Chandler classification into two forms: the preseptal form (Stage I-Preseptal cellulitis, II-orbital cellulitis, anterior to the orbital septum) and the retroseptal form (Stages III-Subperiosteal abscess, IV-Orbital abscess, V-Cavernous sinus thrombosis) posterior to the orbital septum.

PATHOPHYSIOLOGY

Periorbital inflammation is classified by location and severity. One of the major anatomical landmarks in determining the location of the disease is the orbital septum. The orbital septum is a thin membrane that originates from the periosteum and inserts into the anterior surfaces of the tarsal plates of the eyelids. The orbital septum separates the superficial eyelid from the deeper orbital structures, and it forms a barrier that prevents infection from extending into the orbit. Preseptal cellulitis begins when inoculating microbes seed infection in the affected region. This can occur secondary to acute dacryocystitis, chronic sinusitis/upper-respiratory infection, puncture wound from a foreign body from blunt or projectile trauma, an insect bite or sting, or as a result of chronic hordeola or chalazia. Iatrogenic causes include dacryocystorhinostomy, nasolacrimal probing, nasolacrimal stenting, surgical reduction of orbital or eyelid abscess, chalazion and cilia epilation. Preseptal cellulitis may spread to the posterior septum and progress to form subperiosteal and orbital abscesses. Infection in the orbit can spread posteriorly and cause cavernous sinus thrombosis or meningitis. At this advanced stage, preseptal cellulitis has progressed to orbital cellulitis where the condition is sight-threatening as well as life-threatening.



Figure 1. 8-year-old patient who presented with unilateral eyelid swelling and erythema secondary to bacterial infection.

MANAGEMENT

Because orbital cellulitis and preseptal cellulitis can each present with eyelid inflammation, it is important to perform a complete ocular examination. Be alert for signs of systemic illness, especially in children.

The eyelids and ocular adnexa should be inspected for signs of local trauma. Cervical, submandibular, or preauricular lymphadenopathy may be present. A tender preauricular lymph node may be suggestive of adenoviral conjunctivitis. Conjunctivitis may be present, and the quality of conjunctival drainage should be noted.

Test vision, EOM motility and pupillary reactions in all patients who present with eyelid inflammation, as evidence of limited motility or impaired vision suggests that the inflammation has spread to the orbit. An afferent pupillary defect suggests optic nerve compression, and immediate referral to an ophthalmologist for surgical drainage. Resistance to retro-pulsion and proptosis suggest orbital involvement. The ocular fundus should be examined carefully for signs of optic nerve swelling and venous engorgement.

Inspect for possible dacryocystitis or dacryoadenitis, which can result in the spread of inflammation to adjacent tissues.

Sinus tenderness, rhinorrhea, adenopathy, and other hallmarks of upper respiratory tract infection may be present.

Findings on examination that warrant imaging studies include pain on eye movement, afferent pupillary defect, limited extraocular motions, resistance on retro-pulsion, and arterialization of conjunctival blood vessels.

An appropriate CT scan would include thin axial sections through the orbits and sinuses and either true coronal sections or coronal reconstructions. A CT scan of the head is also indicated for any neurologic symptoms or neurologic findings on examination.

CT scan findings in preseptal cellulitis include the following: swelling of the eyelid and adjacent preseptal soft tissues, obliteration of the fat planes or details of the preseptal soft tissues, absence of orbital inflammation. A CT scan can delineate the extent of orbital involvement. The modified Chandler staging system describes a spectrum of disease, as follows:

- **Stage I** - Preseptal cellulitis
- **Stage II** - Inflammatory orbital edema
- **Stage III** - Subperiosteal abscess
- **Stage IV** - Orbital abscess
- **Stage V** - Cavernous sinus thrombosis

Preseptal cellulitis can be conservatively managed with hot compresses at the site of infection to stimulate the body's immune response to the local region as well as broad-spectrum oral antibiotics and oral analgesics.

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When lesions are small, focal, superficial and painful, they can be decompressed and allowed to passively drain by creating an opening with a small-gauge needle, epilating an obstructing eye lash, or opening a visibly blocked gland. The skin over the lesion can be anaesthetised with topical anaesthetic to aide in the comfort of the procedure; however, injectable anaesthetic is never used as adding additional volume to an already congested region inhibiting diffusion is contraindicated. Initial antibiotic therapy is empiric, and, in most cases, a pathogen will not be identified. Given the predisposing factors, antibiotic choice should be directed toward the organisms that cause upper respiratory infections, particularly sinusitis. Specific organisms include *Streptococcus pneumoniae*, nontypeable *H influenzae*, and *Moraxella catarrhalis*. In cases due to focal trauma, treatment should include coverage for *S aureus*. The oral antibiotic classes that are commonly used include the penicillins (cloxacillin, dicloxacillin, fluclloxacin) 250-500mg BID-QID, the cephalosporins (cephalexin, cefadroxil, cephadrine) 250-500mg BID-QID, the macrolides (azithromycin as directed on Z-PAK, clarithromycin 500mg BID) and fluoroquinolones (ciprofloxacin, levofloxacin) 500mg BID-QID. Topical and oral antibiotics should never be tapered and the duration should be 7-10 days depending upon the severity of the infection or the area involved. According to Sowka *et al*, in more severe cases or cases with a larger area of infection, intravenous antibiotics can be initiated. In cases of concurrent dacryocystitis, epiphora may result, leading to a lateral canthus fissure or other ulcerative defects secondary to the drying effects of the sodium laden tears. In these cases, a topical antibiotic ointment can augment a skin moisturiser to protect against infection and aid in lesion resolution.

CLINICAL PEARLS

- Patients are strongly advised not to massage an infected area given the risk of infection spread.
- Upper respiratory tract infections, especially paranasal sinusitis, commonly precede preseptal cellulitis.
- Patients who are immunocompromised or diabetic have a higher likelihood of developing fungal infections, which can rapidly become fatal. Aggressive management, including imaging studies of the brain and early IV therapy, along with a high index of suspicion, is indicated for these patients.
- Otorhinolaryngology consultation is suggested for medical and surgical treatment of sinusitis and if fungal infection is suspected. Infectious disease consultation is needed in all cases not responding to conservative management.
- Orbital cellulitis generates a greater leukocytosis and febrile response than preseptal cellulitis does. Pain or limited eye movement, chemosis, afferent pupil, or resistance to retropulsion indicates orbital extension of the infection. Patients should be instructed that loss of vision or pain with eye movements is an indication that the infection has spread to the orbit and may necessitate surgical intervention. Increased oedema and redness or pain in general are also warning signs.
- Visualisation with computed tomography (CT) or magnetic resonance imaging (MRI) may be required to understand the extent of larger infections.
- In cases where abscess is present, surgical excision may be required.

CONCLUSION

Preseptal cellulitis is an infection within the eyelid anterior to the orbital septum. If preseptal cellulitis is identified and treated promptly, the prognosis for complete recovery without ocular or CNS complication is excellent. Treatment involves management of predisposing conditions, antibiotic therapy, and close observation.

REFERENCES

- Sowka JW, Gurwood AS, Kabat AG. Preseptal cellulitis. *The Handbook of Ocular disease Management*. 15th edition. June 2013.

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