

Orbital Cellulitis following Preseptal Cellulitis

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Orbital cellulitis is a vision and life-threatening soft tissue infection localized to the area posterior to the orbital septum. It can complicate pre-septal cellulitis if not treated.

We report a case of a 3-year-old female with left upper eyelid preseptal cellulitis that was diagnosed based on clinical and radiological findings. Despite treatment, the condition progressed to orbital cellulitis requesting integrated care medically and surgically. Streptococcus pyogenes was isolated and showed resistance to initial therapy. This case shows the importance of developing regional antibiotic policies to optimize patient care.

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Orbital cellulitis is a serious soft tissue infection localized to the area posterior to the orbital septum. Preseptal cellulitis is more common than orbital cellulitis, it involves the soft tissue anterior to the orbital septum. The former condition is potentially vision and life-threatening; it increases the risk of optic neuropathy, cavernous sinus thrombosis, intracranial abscess and sepsis. Therefore, prompt diagnosis and treatment are crucial in minimizing these complications¹.

Orbital cellulitis is most commonly caused by acute sinusitis; direct spread of an infection either through the vascular system or bone. Less commonly, it occurs as an extension from an untreated pre-septal cellulitis^{1,2}. Other potential causes include trauma with orbital fracture or foreign body, dacryocystitis, dental infections, ophthalmic surgery and peribulbar anesthesia^{1,3}.

Diagnosis is made clinically and confirmed radiologically. Clinical findings include painful eye movement and restriction, conjunctival edema and proptosis^{3,4}. Confirmation is usually made by CT scan, which may reveal the presence of sinusitis⁴.

The mainstay treatment is the use of IV antibiotics². Pediatric pre-septal cellulitis and orbital cellulitis are both initially managed conservatively with antibiotics. However, those with suspected orbital cellulitis are closely monitored for progression of the disease. If, no signs of improvement or if the condition worsens within 48 hours, surgical intervention is indicated⁵. Other indications for urgent surgical drainage are the presence of large subperiosteal abscess, proptosis, gaze restriction, afferent pupillary defect and reduced visual acuity⁶.

The aim of this presentation is to report a case of pediatric orbital cellulitis in a managed pre-septal cellulitis resulting from trauma to the left upper eyelid.

THE CASE

A three-year-old female presented with left eyelid swelling and erythema associated with fever following trauma to the left upper eyelid one day prior to presentation. Examination of the eyelid revealed upper eyelid laceration with yellowish discharge, upper eyelid erythema and tenderness with

periorbital edema. There was no relative afferent pupillary defect (RAPD), extraocular muscles restriction or obvious proptosis. Visual acuity could not be assessed as the patient was not cooperative.

CT of the head, orbits and sinuses revealed inflammatory changes consistent with pre-septal cellulitis and excluded sinusitis. Other investigations included gram stain and cultures of the discharge and blood. The patient was admitted and started on IV metronidazole 100 mg every 6 hours and IV ceftriaxone 100 mg/kg every 24 hours.

Clinical improvement was noted over the first 24 hours of admission. After 48 hours, however, the patient became irritable and febrile. Proptosis, conjunctival chemosis, full extraocular muscle restriction, and afferent pupillary defect were noted on physical examination. Repeated CT revealed eyelid abscess with globe extension and inferolateral globe displacement. Blood culture result was negative. However, gram stain and culture of the discharge obtained on admission was positive for *S. pyogenes* (group A β -hemolytic streptococcus; GAS), which was only sensitive to tetracycline, linezolid and clindamycin.

Otorhinolaryngology, radiology, pediatric and infectious disease services were consulted promptly. IV linezolid 10 mg/kg every 8 hours and IV clindamycin 10 mg/kg every 6 hours were initiated. Concurrently, maxillofacial surgeon evaluated the patient and scheduled emergency upper eyelid abscess incision and drainage. A single dose of IV dexamethasone 2 mg was administered and followed by 3-day course.

The patient's general condition was improving, vitally stable and afebrile following the treatment. The improvement was noted in the ability to open the eye, degree of chemosis, range of extraocular movement and pupillary reaction and normal fundus examination. However, left eye downward dystopia was present. Repeated CT reported reduced edema without extension to the intracranial cavity.

The patient's condition gradually improved and the dystopia was reduced. After 17-days of admission, nearly full-recovery was achieved. She was discharged on oral antibiotics and followed-up in the outpatient department.

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Figure 1: Patient on Presentation (Consent was Obtained)



Figure 2: Improvement after 10-Days of IV Antibiotics and Post-Upper Eyelid Abscess Incision and Drainage (Consent was Obtained)



Figure 3: The Patient is Showing Improvement with Reduction of the Dystopia and Periorbital Edema of the Left Eye before Discharge (Consent was Obtained)

DISCUSSION

Orbital cellulitis is less common than pre-septal cellulitis¹. Both, however, can occur as a result of the hematogenous or local spread of infection². The organisms that are involved in either condition are associated with sinusitis and skin infections including *Staphylococcus aureus*, *Streptococcus pyogenes* and *Streptococcus pneumoniae*^{1,6,7}. The two conditions share similar clinical features; however, they can be differentiated on examination, as orbital cellulitis presents with proptosis and reduced extraocular movements⁸.

CT is a valuable tool used to define the nature and the extent of inflammation, and aids in confirming the diagnosis^{1,6,9}. Although CT is a useful diagnostic tool; it increases radiation exposure and thus is reserved for specific cases. It is indicated when visual acuity could not be accurately assessed, in the presence of gross proptosis, ophthalmoplegia, bilateral edema, central signs, and deterioration or no improvement within 24 hours⁷.

Orbital cellulitis requires admission and prompt intravenous empirical antibiotic therapy. While pre-septal cellulitis can be managed as an outpatient on oral antibiotics, admission is indicated in some cases⁹. Patients admitted with pre-septal cellulitis are commenced on empirical therapy with intravenous metronidazole and ceftriaxone prior to obtaining culture results. Most pre-septal cellulitis patients respond to medical treatment. However, failure to respond indicates progression of the infection, as seen in our case⁷.

In our case, the clinical features, on presentation, were consistent with a diagnosis of pre-septal cellulitis. Considering the mechanism of injury and inability to assess the visual acuity, in our case, CT was indicated to rule out an orbital fracture, orbital cellulitis and underlying sinusitis. Initial treatments with empirical antibiotics have failed to contain the *S. pyogenes* infection in our case due to resistance to the antibiotics used. Therefore, regional antimicrobial susceptibility trends must be considered when choosing antibiotics. In the United States, *Streptococcus pneumoniae* is the most common organism involved in pediatric pre-septal cellulitis, followed by *S. aureus* and *S. pyogenes*. Similarly, in pediatric orbital cellulitis, the most common causative organisms are *S. aureus* and *Streptococcus* species¹.

Streptococcus pyogenes resistance rate for antibiotics varies worldwide. According to studies, *S. pyogenes* is sensitive to penicillin, which is the antibiotic of choice for GAS infections¹¹. Different regions and centers have variable resistance profiles. Thus, infectious disease services must be consulted to ensure optimum care¹. Developing regionally modified antibiotic policy with infectious disease specialty is crucial in the overall management⁸.

CONCLUSION

Careful history taking, thorough physical examination, appropriate investigations, integrated care, commencement on empirical antibiotic therapy and antibiotic modification based on gram stain and culture results are of paramount importance. Developing regional antibiotic policies in conjunction with infectious disease service is crucial in optimizing patient care.

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