BRIEF REPORT

A PEDIATRIC CASE OF ORBITAL CELLULITIS WITH PANSINUSITIS AND SUBPERIOSTEAL ABSCESS

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Orbital cellulitis

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ABSTRACT:

While less common than preseptal cellulitis, orbital cellulitis can have severe complications. With the proper use of a computed tomographic (CT) scan, physicians can more quickly recognize the clinical signs of orbital cellulitis and begin interventions to properly treat the condition. This case report highlights the importance of timely diagnosis and successful intervention for orbital cellulitis by recognizing infection progression.

INTRODUCTION

Orbital cellulitis, also known as postseptal cellulitis, can be described as an infection that involves the tissues posterior to the orbital septum. It is most often a result of bacterial sinusitis, usually derived from within the ethmoid sinus that spreads through the lamina papyracea to the medial orbital space.[1] Although the causative organisms of orbital cellulitis are often difficult to identify, recent studies from multiple countries recognized streptococci, *Staphylococcus aureus* and *Haemophilus influenzae* as the most common organisms.[2–6] Fungi, such as *Aspergillus* and *Mucor species*, are also observed in immunocompromised individuals. Orbital cellulitis is predominantly seen within the pediatric population but can affect all age groups.[1]

The distinguishing factor of orbital cellulitis from preseptal cellulitis is the involvement of the extraocular muscles, which can result in ophthalmoplegia.[7] Symptoms of fever, chemosis and periorbital edema have been associated with both orbital cellulitis and preseptal cellulitis. Computed tomographic (CT) scan is the modality of choice to confirm orbital cellulitis; the CT scan frequently displays inflammation of the extraocular muscles in the posterior region of the eyes. Continued monitoring of the disease with CT scans is also recommended. Although it is not as common as preseptal cellulitis, orbital cellulitis can have severe complications, such as ophthalmoplegia, cavernous sinus thrombosis, subperiosteal abscess and potential loss of vision.[7] In this report, we discuss a case that initially was diagnosed as preseptal cellulitis, explaining the clinical thought process that led to the final diagnosis and treatment of orbital cellulitis.

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CASE PRESENTATION

A 9-year-old African American female with a past medical history of asthma, eczema, recurrent sinusitis and allergic rhinitis presented to her primary care physician with left eye swelling, redness and discharge for 3 days. Her symptoms progressively worsened over the next 2 days, leading to the development of left eye pain and decreased vision. Associated symptoms included eye pruritus, photophobia, sinus pressure and headache. Antipyretics and antihistamines did not provide relief of her symptoms. She denied fever, cough, wheezing, neck pain, neck stiffness, abdominal pain, constipation, diarrhea, nausea, vomiting, muscle aches or rash. Her mother noted that when the patient had similar, less severe symptoms in previous years, her symptoms resolved with the use of ophthalmic corticosteroid drops. The patient denied recent sick contacts or secondhand tobacco smoke exposure. Immunizations were up-to-date, and she had no known drug allergies. Surgical history included adenoidectomy 7 years ago.

Vital signs were significant, with an elevated blood pressure of 122/67 mm Hg, an elevated pulse of 127 beats per minute and an axillary temperature of 100.5°F (38.06°C). On physical examination, the patient had significant left eye edema with surrounding erythema and mild proptosis (Figure 1). Pupils were equal, round and reactive to light bilaterally. She was noted to have restricted extraocular movements with limited left eye abduction due to involvement of the lateral rectus muscle, as well as mucopurulent left eye discharge (Figure 2). Right tympanic membrane was dull and full. Nose appeared congested with clear rhinorrhea and posterior oropharyngeal erythema. Tonsillar swelling was noted 1+ bilaterally without tonsillar exudates. Neck was supple with normal range of motion. No meningeal signs were present. The patient was diagnosed with preseptal cellulitis, but orbital cellulitis could not be ruled out, so she was admitted to the general pediatric ward for further investigation and management.

FIGURE 1:

Left eye edema with surrounding erythema and proptosis

FIGURE 2:

Limited left eye abduction with mucopurulent eye discharge

On admission, blood cultures were taken, and the patient was started on intravenous (IV) ceftriaxone 50 mg/kg every 24 hours and vancomycin 15 mg/kg every 8 hours. Laboratory investigation was significant for elevated sedimentation rate at 55 mm/hour (normal is 0–22 mm/hour) and elevated C-reactive protein of 6.3 mg/dL (normal is 0.00–0.60 mg/dL). White blood cell count was normal at 12.7 x 103/µL (normal is 4.5–13.5 x 103/µL), but absolute neutrophil count was elevated at 9.3 x 103/µL (normal is 2.3–7.8 x 103/µL) and absolute monocyte count was elevated at 1.5 x 103/µL (normal is 0.3–0.9 x 103/µL). Platelets were increased at 443 x 103/µL (normal is 141–359 x 103/µL).

The CT scan showed periorbital cellulitis, pansinusitis and a subperiosteal abscess in the medial aspect of the left orbit exerting some mass effect on the superior oblique muscle with mild proptosis (Figures 3–5). Blood cultures remained negative after 5 days. Subsequently, vancomycin was changed to clindamycin.

FIGURE 3:

Axial CT scan of the orbits shows inflammation of the retrobulbar fat (A) and proptosis of the left globe (B)

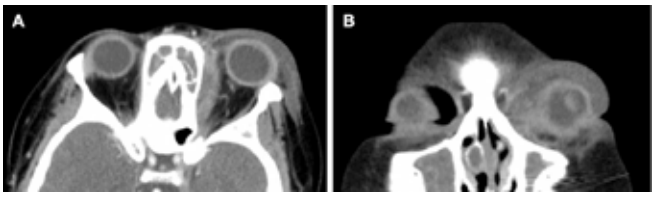
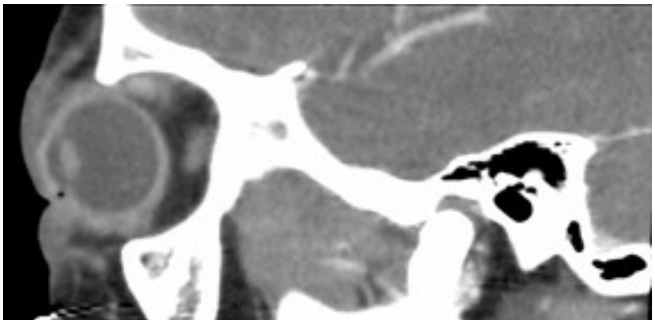


FIGURE 4:

Coronal CT scan of the paranasal sinuses demonstrating pansinusitis

FIGURE 5:

Sagittal CT scan of the left orbit shows a subperiosteal abscess



The patient's extraocular muscles and swelling clinically improved by day 3 of her hospital stay. Vital signs returned to normal. Physical examination prior to discharge revealed mild swelling of the left eyelid and injected conjunctiva with minimal mucopurulent discharge (Figure 6). Extraocular movements showed that abduction of the left eye markedly improved with full range of motion (Figure 7). The patient was discharged home to continue an 11-day course of oral antibiotics consisting of clindamycin 10 mg/kg 3 times daily and a third-generation cephalosporin—cefdinir—7 mg/kg twice daily, in addition to gentamicin 0.3% ophthalmic solution applied to the left eye every 4 hours.

At an outpatient follow-up 1 week later, the patient was noted to have some persistent mild swelling and discoloration of the left eyelid. Extraocular movements were intact with full range of motion bilaterally. No eye discharge or adenopathy was noted on examination. A Welch Allyn Spot® Vision Screener—which is used to detect potential vision issues, including common refractive errors, amblyopic risk factors and strabismus—was normal.

FIGURE 6:

Improved swelling of the left eyelid with injected conjunctiva and minimal mucopurulent discharge

FIGURE 7:

Normal examination of extraocular movements of the left eye

DISCUSSION

Orbital cellulitis often originates in the sinuses and spreads to the orbit. Contiguous extension from the periorbital structures to the orbit is facilitated by the thin medial orbit wall, lack of lymphatics, valveless veins of the orbit, and the foramina of the orbital bones.[7] A study in Canada observed that pansinusitis and subperiosteal abscesses were observed in 15.7% and 31.5% of cases in children, respectively.[6] Our patient had evidence of pansinusitis and a subperiosteal abscess on CT scan. Subperiosteal abscesses usually occur as a complication of bacterial sinusitis due to the accumulation of purulent fluid between the periorbita and the orbital bone.[7] Subperiosteal abscesses in children 9 years old and younger typically can be treated with medical management alone, as was the case with our patient.[6] Patients at least 9 years old who do not respond to medical therapy or who have more severe complications, such as complete ophthalmoplegia, large abscess formation or significant visual impairment, may require surgical intervention.

The potential sight- and life-threatening complications of orbital cellulitis make it imperative to distinguish the characteristics of orbital cellulitis from preseptal cellulitis to prevent further progression. Preseptal cellulitis is an infection of the eyelid and superficial periorbital soft tissues without the involvement of the globe and the orbit. Preseptal and orbital cellulitis share symptoms which may include swelling, pain, and rarely chemosis, fever and leukocytosis. The features of orbital cellulitis that differ from preseptal cellulitis are the presence of pain with eye movements, ophthalmoplegia, proptosis and vision impairment.[7] These are signs of infection progression that warrant a CT scan. This patient did not have evidence of leukocytosis but did exhibit pain with eye movements, proptosis and vision impairment. Due to the high clinical suspicion of orbital cellulitis identified by vision changes and limited ocular motility, this patient was able to undergo imaging to confirm the diagnosis and receive successful treatment.

Standard of care for patients with suspected orbital cellulitis should be treated empirically with broad-spectrum antibiotics to include agents that target *Staphylococcus aureus*, streptococci, gram-negative organisms and anaerobes. Possible options include a third-generation cephalosporin, such as ceftriaxone, combined with vancomycin when methicillin-resistant *Staphylococcus aureus* (MRSA) is suspected. The geographic region where our patient resides has a high prevalence of MRSA, providing additional justification to add vancomycin to the patient's antibiotic regimen. Our patient began IV ceftriaxone 50 mg/kg every 24 hours and vancomycin 15 mg/kg every 8 hours until blood cultures remained negative after 5 days. The patient then switched from vancomycin to clindamycin, which can be continued as outpatient orally and requires less monitoring of therapeutic levels. Management of preseptal cellulitis includes dicloxacillin or cephalexin to cover for *Staphylococcus aureus* and streptococci if MRSA is not suspected or clindamycin if MRSA is suspected. Treatment may be completed as outpatient for 7–10 days if the patient is at least 2 years old and there are no signs of systemic illness or orbital cellulitis.

Since most infections causing preseptal and orbital cellulitis begin as sinusitis, treatment with appropriate antibiotics and adjunctive osteopathic manipulative treatment (OMT) can prevent progression of the infection. OMT techniques for sinusitis include, but are not limited to, myofascial release, ethmoid articulation and facial effleurage.[8] Addressing somatic dysfunction in the neck, shoulder and upper thoracic regions with myofascial release promotes lymphatic drainage. Ethmoid articulation aids in the drainage of the ethmoid and sphenoid sinuses. Facial effleurage improves lymph motion and circulation. The combination of these techniques allows the antibiotics to function more efficiently through increased blood flow and lymphatic drainage related to the sinuses.

CONCLUSION

The ability to distinguish orbital cellulitis from preseptal cellulitis through clinical findings is essential for successful outcomes. To minimize associated complications, it is key to promptly recognize the clinical signs of orbital cellulitis. With the proper use of CT scan to confirm the diagnosis and early implementation of IV antibiotics, the incidence of morbidity and mortality associated with orbital cellulitis will continue to decline. Uncomplicated orbital cellulitis can be managed medically with IV antibiotics and close observation. Lack of response to medical therapy may

necessitate surgical treatment. This case report highlights the importance of timely diagnosis and successful intervention for orbital cellulitis by recognizing infection progression.

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