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Case Report

Case of Rhinosinusitis with Secondary Orbital Cellulitis Complicating further as Cavernous Sinus Thrombosis: A Rare Sequelae

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ABSTRACT

Background: Orbital cellulitis is an acute inflammatory disorder of the orbit. It results from an acute infection spread from the blood, adjacent sinuses and facial skin. Cavernous sinus thrombosis (CST) typically occurs due to an infection originating from regions such as the face, sphenoid and ethmoid sinuses, or the oral cavity.
Case report: An eleven-year-old girl was brought by her parents to our hospital with a complaint of right nasal discharge and fever for the last 10 days. She developed right-sided periorbital oedema for the past six days. She was under treatment at a local hospital. After that her parents noticed an increase in swelling associated with redness in her right peri-orbital region, so she came to our hospital. MRI brain showed changes of cavernous sinus thrombosis. A functional endoscopic sinus surgery (FESS) was performed for right nasal blockage on the second day of admission and about 10 ml of pus was drained. Fragmented fibrovascular tissue bits received from the frontal sinus and maxillary sinus revealed numerous pus cells with Gram-positive bacterial cocci on the third day. She responded to treatment as she was without fever by the day fourth on admission. The aerobic culture of the pus swab was positive and the organism detected was staphylococcus aureus on the eighth day after admission.
Conclusion: Cavernous sinus thrombosis is a serious complication of orbital cellulitis with high morbidity and mortality. Unusually, orbital cellulitis occurs as sequelae of cavernous sinus thrombosis. Gram-positive bacteria noted on the nasal lesion's histopathology helped in starting antibiotics in the patient before the culture report was positive.

Keywords: Orbital Cellulitis, Cavernous Sinus Thrombosis

INTRODUCTION

Orbital cellulitis is marked by inflammation within the orbit, which may result from infection spreading through the bloodstream, adjacent sinuses, or facial skin. Trauma around the eye or dental infections can also facilitate the spread of infection to the orbit [1]. Primary sinus infection is the main cause of orbital cellulitis. It is considered a serious ocular emergency because it can lead to severe complications, including vision loss, cavernous sinus thrombosis, meningitis, and brain abscess, which threaten life.[1,2].

Cavernous sinus thrombosis (CST) in the septic form is an uncommon condition that results from an infection of the face, ethmoidal, sphenoid sinuses, or oral cavity. Orbital sinus or otitis media is the uncommon cause of CST. CST as a sequalae to orbital cellulitis is seen to occur in one percent of cases. The

mortality from CST markedly reduced to 20-30% due to the use of antimicrobials [2].

The infection can spread directly to the cavernous sinus through the ophthalmic veins and centrifugally to the opposite orbit via the dura mater. This mechanism is thought to cause bilateral orbital cellulitis involvement [3-4].
Orbital cellulitis commonly occurs in children, both younger and older. It is observed more frequently in males than in females, with a twofold higher incidence.[3-5].

CASE HISTORY

An eleven-year-old girl arrived at our hospital with her parents with a complaint of nasal discharge for the last 10 days and she developed sudden right-sided periorbital edema from past six days. She was under treatment at a local hospital. After that, her parents noticed an increase in swelling associated with redness so she came to our hospital (Fig. 1). She does not have any dental, ear, nose & throat complaints.

Figure- 1: Clinical photograph: Eleven-year-old child with Right peri-orbital edema which developed after her nasal complaints

Her right eye vision was 6/12 and left eye was 6/6 without glass. The provisional diagnosis was orbital cellulitis with protrusion. The investigation requested were Complete Blood Count (CBC), Renal Function Test, Liver Function Test, C-reactive protein and Serum creatinine. The CBC revealed leucocytosis and there were raised CRP levels.

The MRI brain report from another facility indicated that the right eyeball was protruding, accompanied by significant swelling of the soft tissues in the orbit, consistent with orbital cellulitis. There were collections observed within the orbit and extending intracranially along the orbital roof on the right side. Additionally, the report noted unilateral sinusitis on the right side, with thickening and heterogeneity observed in the right cavernous sinus. These findings confirmed the presence of cavernous sinus thrombosis.

A functional endoscopic sinus surgery (FESS) was performed on the 2nd day of admission at out setup and about 10 ml of pus was drained. Fragmented tissue bits from the frontal sinus and maxillary sinus were sent to our histopathology department. Histopathological examination was done on third day. The report revealed that polypoidal tissue from the frontal sinus and maxillary sinus showed edematous, fibrovascular stroma with areas of hemorrhage with eroded lining epithelium having mixed inflammatory cell infiltrate. Necrotic tissue was noted. The inflammation was chiefly comprised of numerous pus cells with phagocytic debris. (Figure 2). Few bacterial colonies were noted in stromal tissue (Figure 3). On Gram stain (Figure 4), gram-positive cocci suggestive of Staphylocooci were seen. This bacteria was later confirmed on culture after commencement of broad based antibiotics. Fungal filamentous forms & yeast forms were not seen on H&E, PAS and GMS stains.

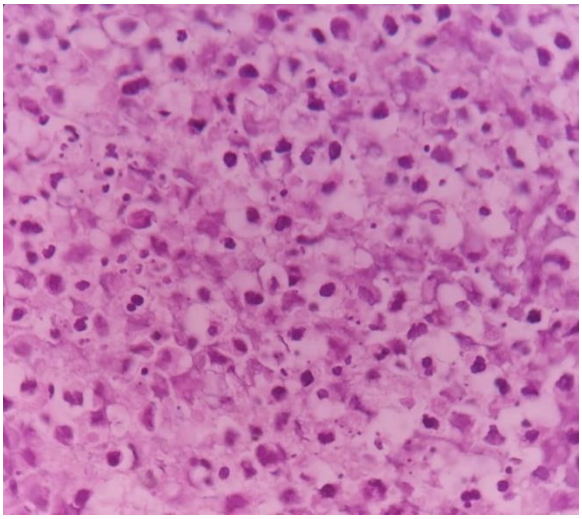

Figure- 2: Microphotograph showing pus cells in necrotic background with phagocytic debris (H&E, x 400).

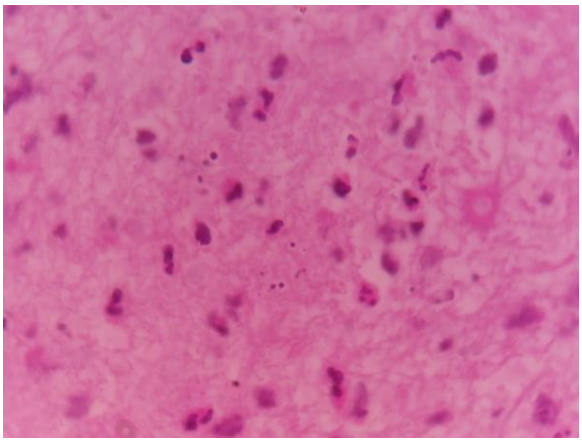

Figure- 3: Microscopic examination revealed cocci bacteria observed amidst neutrophils within fibrous tissue. (H&E, x1000)

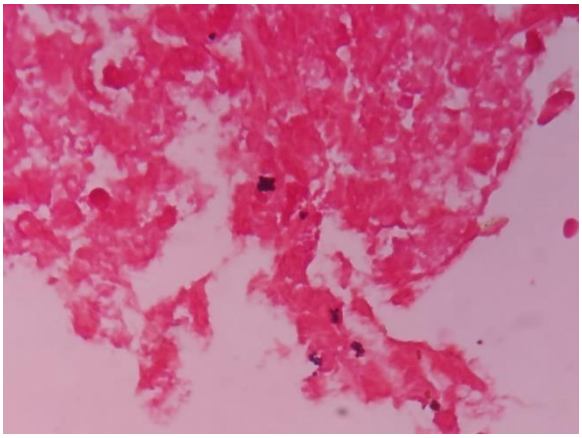

Figure- 4: Microphotograph showing dark-purple colored Gram-positive cocci of spherical shape in clusters resembling bunch of grapes

The aerobic culture of the pus swab was positive & the organism was staphylococcus aureus. Gram-positive bacteria noted on the nasal lesion's histopathology helped in starting broad based antibiotics in the patient before the culture report was positive.

She responded to treatment and became fever-free by the day fourth of post-admission. She was discharged home after eight days in the hospital on tablet metronidazole 200 mg 8 hourly, Augmentin (Amoxycillin/Clavulanate) tablet 325 mg 8 hourly. She was scheduled to return for a check-up in one week. She was, however, lost to follow-up.

DISCUSSION

Sinusitis was predominantly linked with orbital cellulitis (79%), whereas upper respiratory tract infections (68%) and eyelid trauma (20%) were the most common risk factors for periorbital cellulitis. Skin and blood cultures often yield negative results. The most frequently isolated pathogens include Streptococcus pneumoniae, Staphylococcus aureus, and Staphylococcus epidermidis [6].

There is increased demand for prompt, specific therapeutic management in cases of sinusitis with orbital oedema which can complicate as CST and become life-threatening. These infections may spread through venous drainage or via the dehiscence of the orbital bony wall of the orbit. Pterygoid plexus or the cavernous sinus are the drainage sites for these valveless veins [6]. The spread to the cavernous sinus may result in septic thrombosis (CST) and later life-threatening bilateral cavernous sinus infection, brain abscess, or meningitis [1]. Ethmoid sinuses and frontal sinuses do not develop until seven years of age. So ethmoid sinuses are common source of childhood infections for sinusitis [7].

In children under 9 years old, infection typically involves a single aerobic organism. The most commonly isolated bacteria in children are Streptococcus species, Staphylococcus aureus, and Haemophilus influenzae. Yadalla et al. noted that Staphylococcus species were the most frequent microorganisms causing orbital cellulitis in children, followed by streptococci [8].

Our index child in the report presented late to us due to referral from private ENT specialist, 10 days after the onset of symptoms and was well-oriented in time, place, and person. She presented with symptoms of rhinorrhea, right nasal obstruction, right orbital cellulitis, and swelling of the cheekbone, leading to a clinical diagnosis of orbital cellulitis secondary to rhinosinusitis. In children, rarely orbital cellulitis arises after rhinosinusitis. Others with increasing severity include intra-orbital abscess, sub-periosteal abscess and cavernous sinus thrombosis [1].

Radiological investigations, mainly MRI scan is key to diagnose orbital disorders and about CST changes in MRI brain [1].

Even though it was a relatively late presentation of the patient, timely FESS surgery followed by prompt histopathology report which later confirmed the

Staphylococci organism on bacterial culture, help save the child's life as antibiotics was promptly started. Owingly, the childhood orbital cellulitis may have limited the effects in the right eye and curtailed further spread.

In children, the most frequently implicated bacteria causing orbital cellulitis, in decreasing order of frequency, include Haemophilus influenzae, Staphylococcus aureus, Streptococcus species, and anaerobic organisms. Recent studies indicate that Staphylococcus aureus and Streptococcus species are commonly involved in cases of pre-septal or orbital cellulitis [1].

El Mograbi et al. reported that concurrent rhinosinusitis was present in approximately 86%–98% of cases of orbital cellulitis [9].

CONCLUSIONS

Orbital cellulitis resulting from rhinosinusitis can uncommonly progress to serious conditions such as life-threatening cavernous sinus thrombosis and meningitis. This retrograde spread infection can occur in the immunocompetence patient in atypical presentation and prognosis is guarded. Early diagnosis with multi-disciplinary team work can lead to faster treatment and better prognosis in such cases.

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