



A Case Report of Orbital Abscess Complicating Ethmoidal Sinusitis in 15 Months Girl

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Abstract

Objectives: Our study aimed to present a case of right subperiosteal abscess in a 15 months girl secondary to ethmoidal sinusitis.

Study Design: A case report study.

Methods: A 15- month's old girl presented to emergency room, Al-Ahsa, Saudi Arabia by her parents in July 2016 with swelling of the upper and lower lids of the right eye for 3 days duration and fever.

Results: After failure of medical treatment for orbital cellulitis, a diagnosis of right subperiosteal abscess due to ethmoidal sinusitis was made followed by surgical drainage and rapid improvement.

Conclusion: Orbital examination complicated by soft tissue oedema in children is not easy even to efficient clinician to reach a proper diagnosis. Thus, the use of imaging is important to reach a proper diagnosis.

Keywords: Orbital cellulitis; Subperiosteal abscess; Sinusitis

Case Presentation

A 15-month's old girl presented to emergency room, Al-Ahsa, Saudi Arabia by her parents in July 2016 with swelling of the upper and lower lids of the right eye for 3 days duration and fever not responding to antipyretics (Figure 1). Child is healthy and not known to have any systemic disease and she received all her immunization as scheduled. There was no history of trauma or surgery. On examination, the child was febrile and looked ill and not active. Both upper and lower lids on right eye showed significant signs of inflammation (redness, swelling and hotness) and there was tenderness mainly on the medial sides of right upper lid. The vision and intraocular pressure could not be assessed. Extra ocular muscles movement showed decrease right eye elevation, otherwise full movement in both sides was elicited. Pupil showed sluggish reaction on right eye. The right eye showed inferior dystopia and mild proptosis. The right eye showed conjunctival injection more prominent on the superior quadrant of the conjunctiva. Anterior segment and dilated fundus examination was normal. Left eye exam was within normal limits.

Investigation

CBC shows leukocytosis and low hemoglobin (Figure 2). CT scan on the orbit and paranasal

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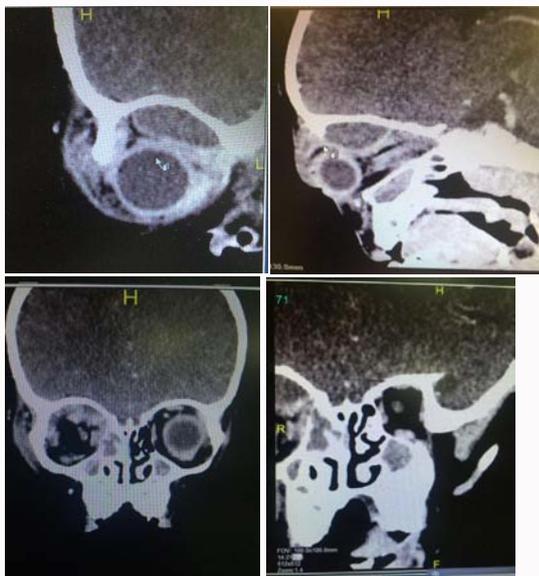
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Figure 1: Right orbital cellulitis.

Test Name	Result	Unit	Normal Ranges
COMPLETE BLOOD COUNT (CBC)			
CELLS COUNT			
WBC COUNT	12.5	$\times 10^9/L$	3.70 - 10.1 (Adult), 6.0 - 15.0 (Child), 10.0 - 26.0 (Newborn)
CELLS COUNT			
CORRECTED WBC COUNT		$\times 10^9/L$	
CELLS COUNT			
RBC COUNT	5.27	$\times 10^{12}/L$	4.06-5.58 (M), 3.60-4.69 (F), 3.50-5.50 (Child), 5.0-7.0 (Newborn)
CELLS COUNT			
Hb	9.94	g/dL	13.5-17.0 (M), 12.0-15.0 (F), 11.0-14.5 (Child), 13.5-19.5 (Newborn)
CELLS COUNT			
HCT	32.6	%	37.7-53.7 (M/F), 32.0-45.0 (Child), 44.0-64.0 (Newborn)
CELLS COUNT			
MCV	61.9	fL	81.1-96.0 (M/F), 75.0-94.0 (Child), 100-120 (Newborn)
CELLS COUNT			
MCH	18.9	pg	27.0-31.2 (M/F), 24.0-33.0 (Child), 31.0-37.0 (Newborn)
CELLS COUNT			
MCHC	30.5	g/dL	31.8-35.4 (M/F), 30.0-37.0 (Child), 30.0-36.0 (Newborn)
CELLS COUNT			
RDW	17.2	%	11.5-14.5
CELLS COUNT			
PLT	334	$\times 10^9/L$	155-366 (M/F), 140-400 (Child), 150-400 (Newborn)
CELLS COUNT			
MPV	11.4	fL	8.0-12.0
MANUAL DIFFERENTIAL			
SEG	17.5	%	
MANUAL DIFFERENTIAL			
BAND			
MANUAL DIFFERENTIAL			
LYMP	62.2	%	

Figure 2: CBC.



Figures 3: CT of the orbit and paranasal sinuses.

sinuses was done and showed in (Figures 3) about 1.9 x 2.6 x 1 cm localised fluid collection with ring enhancement after administration of I.V contrast material seen in the superior medial aspect of the right orbital cavity and pushing the eye globe antero-inferiorly suggestive of abscess formation and retro-orbital cellulitis with surrounding marked soft tissue swelling overlying the right eye, mucosal thickening of both maxillary sinus appears more prominent in the right side with opacification of the right upper nasal cavity and ethmoidal air cell suggestive of sinusitis. The left orbital cavity appears within normal. Both optic nerves appear unremarkable. The extraocular muscles

appear within normal except for the right medial and superior rectus muscles which appears displaced by the fluid collection described above. These findings conclude retro-orbital localised collection in the superior medial right orbital cavity most likely represent abscess with radiological evidence of sinusitis. A diagnosis of right subperiosteal abscess was made.

Management

She was admitted and IV antibiotics was given for five days in the form of Vancomycin 125 mg QID, Cefazidime 420 mg TID and Metronidazole 125 mg TID, but there was no improvement. Then on the fifth day, oculoplasty consultation was requested and patient taken to OR for urgent drainage of the subperiosteal abscess. Lid crease approach was done. Patient was kept on the same antibiotics for one week more including metronidazole.

Post operative

Patient showed significant improvement of the signs of inflammation including the proptosis. By the first day post operatively she was afebrile and she was discharged after one week on oral augmentin for 14 days.

Follow up

She was seen in the outpatient clinic active and afebrile and there were no signs of inflammation or proptosis (Figure 4). CT follow up orbit and paranasal sinuses was done and showed persistent opacification of the right bulla ethmoidalis and adjacent ethmoidal cells with otherwise well-pneumatized right anterior frontal recess cells and right maxillary antrum. There was also satisfactory mineralization of the right lamina papyracea with practically complete resolution of the adjacent intra-orbital extraconal inflammatory changes. There was noticeable regression in the size of previously identified right orbital roof based subperiosteal abscess reduced to



Figure 4: Outpatient clinic active and a febrile and there were no signs of inflammation or proptosis.

a small-thickness ring of granulation tissue surrounded by a regular rim of incorporated periosteal reaction.

Discussion

Orbital cellulitis is a common complication of ethmoidal sinusitis in children [1,2]. It is an acute suppurative inflammation of orbital soft tissue. It is characterized by acute onset with rapid progression and is accompanied by fever. If it is treated ineffectively, complications may develop including cavernous sinus thrombosis, meningitis, frontal abscess, and osteomyelitis, loss of vision and death. Intracranial and intraorbital complications occur in children more frequently than in adults with an incidence of 3 % [15,16]. The potential devastating complications with regards to vision and/or intracranial extension are thankfully rare. Anatomically, the orbit is a quadrilateral pyramid surrounding the eye and its soft tissues. The orbital septum which is a layer of fascia forms a barrier between the deep orbital soft tissue and the superficial structures. Inflammation anterior to the septum causes preseptal cellulitis which accounts for 84- 87% of cases [3] and posterior to the septum causes orbital cellulitis.

At birth only the ethmoidal sinuses are well developed. The maxillary sinus develops within the first two years. The frontal sinuses only start developing in the 6th year of life. The ostia of the sinuses are relatively large compared to the size of the sinuses during early development [3]. The rich venous plexus in the orbit communicates with the facial veins anteriorly. The orbital veins are without valves facilitating a two-way spread of infections. Preseptal cellulitis (first group in Chandler's classification) is characterized by erythema and swelling of the eyelids. The visual acuity, ocular movements are normal. In young children the intense oedema of the lids may sometimes make examination of the eye difficult and the distinction between orbital cellulitis (second group) and it is difficult. Orbital cellulitis is characterized by lid oedema and erythema, chemosis of the conjunctiva, restricted ocular motility and proptosis. Impaired ocular motility and proptosis might be pathognomonic for diagnosis of subperiosteal abscess which is the third group [17-19]. Patients are more likely to present with leukocytosis, fever, and/or a history of upper respiratory symptoms and generalized malaise [8]. Orbital abscess and cavernous sinus thrombosis are the fourth and fifth groups of Chandler's classification [4]. Preseptal cellulitis as a complication to acute sinusitis involves 50-72% of orbital cases

while orbital cellulitis involves 19-50%, and 9-15 % associated with subperiosteal abscesses [9-11]. Orbital examination complicated by soft tissue oedema in children is not easy even to efficient clinician to reach a proper diagnosis. The differentiation between preseptal and deep orbital cellulitis is difficult based on clinical observation and clinical presentation may not always reflect underlying disease severity [7]. Thus, the use of imaging is important to reach a proper diagnosis. Radiation exposure can lead to increased risks of malignancy; leukaemia and primary brain tumours especially in the pediatric population [5,6]. So, decision for ordering CT scan should be under joint ENT & Ophthalmology consultation. Contrast-enhanced CT scanning is the imaging modality of choice as it can identify soft tissue changes while also providing bony detail [8,12,13]. A complete blood count (CBC), CRP and sedimentation rate, should be included in the initial investigations [13]. An elevated white blood cell count may occur in either preseptal or orbital cellulitis, but is more common in orbital cellulitis. The erythrocyte sedimentation rate is often elevated in patients with orbital cellulitis [14]. Patients with orbital complications due to an acute sinusitis have a higher body temperature and white blood cell counts, and elevated values for CRP in peripheral blood when compared to patients with orbital inflammation and swelling due to other causes [17]. The main organisms in orbital infection in affected children are *Streptococcus* (two-thirds of cases) and *Haemophilus* (almost half of cases) and antibiotic choices should reflect this [3]. The treatment of preseptal and orbital cellulitis requires a coordination of a paediatrician, an ophthalmologist and otorhinolaryngologist, with further advice from the neurosurgical and neurology teams if necessary. Frequent evaluation of the child is necessary to check the response to treatment. Examiner should consider conditions that may simulate orbital infections. They are neuroblastoma, rhabdomyo sarcoma, fungal infections, orbital myositis, lymphangioma, Graves's disease, dermoid cyst rupture or inflammation, trauma, or systemic conditions such as sickle cell disease [14]. Preseptal cellulitis may be treated with oral antibiotics and nonsteroidal anti-inflammatory drugs with regular daily clinic review. Orbital cellulitis needs hospital admission and treatment with a combination of intravenous antibiotics covering for both aerobic and anaerobic organisms for 2 weeks followed by oral antibiotics for 1 week. The presence of an abscess needs surgical intervention. Indications for an operative intervention include a visible abscess formation in CT or MRI scan, vision loss, impaired ocular motility, or a clinical progression after 24 h of therapy [17]. A third generation cephalosporin (ceftriaxone or cefotaxime) covers both gram positive and gram negative organisms, however the additional use of flucloxacillin to cover *Staphylococcus aureus* is fruitful. Metronidazole is also used to cover for anaerobic bacteria. The use of clindamycin is recommended in the presence of infections that involve the bone with osteomyelitis or those individuals who are allergic to cephalosporins and penicillins.

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