



## Extra-Periosteal Orbital Abscess Following Ethmoid Sinusitis: A Rare Case

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**Received:** August 26, 2019; **Published:** September 03, 2019

### Abstract

Orbital complications following sinusitis have high morbidity. Though both acute and chronic bacterial infections of sinuses may involve orbit, it is common following acute sinusitis. Although it occurs in all age group but paediatric patient are commonly affected. Here we are reporting a case of complicated paediatric sinusitis, with extra-periosteal/sub-periosteal orbital abscess, which was managed successfully by endoscopic orbital decompression and intravenous antibiotics.

**Keywords:** Sinusitis; Complication; Orbit; Sub-Periosteal Abscess

### Introduction

Orbital complications following sinusitis are now rarely seen after advent of antibiotics. The incidence is less than 5%, as compared to 26% in pre- antibiotic era [1]. It mostly occurs following acute bacterial sinusitis and more common in paediatric age group [2].

It occurs due to variety of factors, anatomical proximity of paranasal sinuses to the orbit and thin paper like bone, lamina papyracea separating orbit from ethmoidal sinuses, to name a few. The orbit is bounded medially by the ethmoid sinus, inferiorly by the maxillary sinus, posteriorly by the sphenoid sinus, and superiorly by the frontal sinus. Orbital complications are most often associated with infections of the ethmoid sinuses, followed by the maxillary, frontal, and sphenoid sinuses [3].

Chandler gave a method to classify various stages of orbital involvement, which is useful in devising optimal treatment [4]. It was

based on anatomy of orbit, perceived progression of infection, responsiveness to treatment and prognosis.

1. Inflammatory oedema (Preseptal cellulitis) – This occurs because of limited venous flow, causing oedema anterior to orbital septum, presenting with non tender swelling of eyelid, with no chemosis. There is no impairment of extraocular muscle function, vision or proptosis.
2. Orbital cellulitis- It is characterized by inflammation of orbital contents with no abscess. Patient has proptosis, reduced ocular mobility and chemosis. Though vision is normal, but must be monitored repeatedly.
3. Subperiosteal abscess/Extraperiosteal abscess- In this stage there is frank abscess formation between the bone and periosteum, often in medial part of orbit, thus pushing orbital contents in an inferolateral direction. Chemosis and proptosis are the usual signs. Even in this stage, ocular mobility and vision is rarely affected.

4. Orbital abscess- In this there is collection of pus between the orbital contents, causing severe proptosis of globe, complete ophthalmoplegia and vision loss.
5. Cavernous sinus thrombosis- It is characterized by bilateral eye involvement with proptosis, ophthalmoplegia and loss of vision. Also, there is fever, headache and photophobia. Cranial nerves in relation to cavernous sinus are paralyzed. Thus, there is Oculomotor (III), Trochlear (IV), first and second division of Trigeminal (V1, V2) and Abducens (VI) palsy.

Treatment of orbital complications consists primarily of systemic antibiotic therapy with surgical intervention reserved for large or medically unresponsive orbital or subperiosteal abscesses [5].

### Case Report

A 5 yr old male was referred from paediatric department with complaint of fever since 5 days with pain and swelling of right eye since 4 days. Fever was sudden in onset, intermittent type, not associated with chills & rigor with no diurnal variations, relieved on taking medication. Fever was followed by pain and swelling of the right eye, which was sudden in onset and gradually progressive, first started on the medial aspect of eye and then progressively increased. History of trauma to eye or any surgery was not present.

On examination, the patient was febrile and irritable. On local examination of right eye, both upper and lower lids were inflamed (Figure 1). The right eyeball was displaced forwards and outwards, all the extraocular movements were normal except the limited upward movement. Ophthalmologic examination showed normal vision and fundus.



**Figure 1:** Preoperative clinical picture of child with right subperiosteal abscess.

Diagnostic nasal endoscopy revealed crusting in the vestibule with mucosal oedema, congestion and mucoid discharge on the right side, with crowded osteomeatal complex. Plain Computed Tomogram (CT) was done for brain with orbit suggested ethmoidal sinusitis causing subtle disruption of medial wall of right orbit with orbital cellulitis (Figure 2).



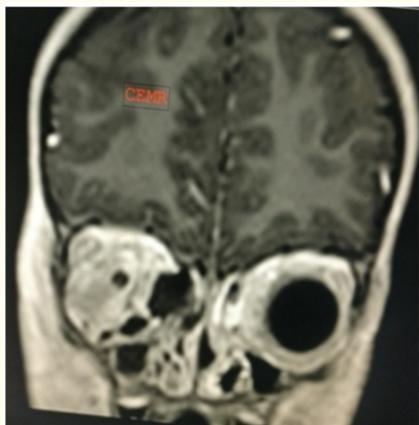
**Figure 2:** Plain Computed Tomogram coronal section showing ethmoidal sinusitis and subtle disruption of medial wall of right orbit with orbital cellulitis.

Complete blood profile was done, which showed raised Total Leukocyte count (TLC) of 15,000/mm<sup>3</sup>. Child was started on Injection Ceftriaxone plus Sulbactam, Injection Metronidazole and Ampicillin plus cloxacillin, all intravenously as per weight and dose, but with no relief and further progression of inflammation after 24 hours, contrast Magnetic resonance imaging (MRI), was done. It revealed, ill defined fluid collection in right orbit in subperiosteal region medially extending along floor with associated inflammation of medial and inferior rectus with associated bilateral ethmoidal and maxillary sinusitis with subtle disruption of lamina papyracea (Figure 3).

With the diagnosis of right subperiosteal abscess with orbital cellulitis and ethmoidal & maxillary sinusitis child was taken for endoscopic orbital decompression and drainage of abscess under general anaesthesia.

Using 0° hopkin's nasal telescope, right uncinectomy, middle meatal antrostomy and anterior ethmoidectomy was done, mucopurulent discharge was seen oozing from maxillary and anterior ethmoidal sinus. There was breach of lamina papyracea with intact

periosteum. Orbital decompression was done by removing portion of lamina papyracea and evacuation of pus from extra periosteal region. The pus was sent for culture and sensitivity. Child was continued on intravenous antibiotics started preoperatively. Proptosis subsided immediately in the post operative period and eye movements became normal (Figure 4). Nasal pack was removed on post operative day two and child was discharged after 1 week of antibiotics and steroids. The pus sent for culture sensitivity showed the growth of methicillin sensitive staphylococcus aureus after 48 hrs of incubation.



**Figure 3:** Contrast Magnetic resonance imaging coronal section showing, ill defined fluid collection in right orbit in subperiosteal region.



**Figure 4:** Post operative picture showing normal position of eye and reduced eyelid swelling.

## Discussion

Paediatric sinusitis complications carry high morbidity and mortality, thus need early intervention, in the form of both medical and surgical therapy. The infection from the sinus may spread through the bony dehiscences in the lamina papyracea, by eroding the lamina along the vessels due to pressure of pus and along the open suture lines in paediatric population.<sup>4</sup> Ethmoid sinusitis and its complications are common in paediatric age group. Retrograde thrombophlebitis through a valveless system of veins in the skin of the face, maxillary sinus and nasal cavity can spread infection to orbit and predisposing to the involvement of cavernous sinus [5]. An ethmoid sinus infection may extend through the medial orbital wall; infection of the frontal sinus may extend into the superior orbit or maxillary sinusitis may break through the orbital floor.

The bacteriology in orbital complications of sinusitis is usually Haemophilus Influenza in small children and Streptococcus pneumoniae and Staphylococcus aureus, in all age groups [6].

Inflammation within the orbit can lead to either temporary or permanent loss of vision. Therefore patients who are being evaluated for orbital infections secondary to rhinosinusitis should have visual acuity checks performed at regular intervals. Despite appropriate antibiotic and surgical intervention, there has been about 10% incidence of permanent blindness with orbital complications of sinusitis [7].

There are several proposed mechanisms by which orbital infections can lead to blindness. The first mechanism is ischemic optic neuropathy secondary to compression of the branches of the central and ophthalmic arteries leading to loss of perfusion to the optic nerve and retina [7]. Unless circulation to the central retinal artery is restored within 100 minutes, permanent blindness can result [8]. The next cause of blindness is compressive optic neuropathy secondary to direct pressure on the optic nerve itself. This pathology is most commonly associated with ethmoiditis. Patients typically present with visual loss and an afferent pupillary defect. Lastly, inflammatory optic neuropathy can result from reactive damage to the optic nerve secondary to an adjacent infection.

In Otorhinolaryngology practise, especially in India, it is not possible to truly estimate the incidence of orbital complications, because many patients are treated primarily and effectively by paediatricians, ophthalmologists or general practitioners. An ophthalmologist consultation to document visual acuity, intraocular pressure, pupillary response, extraocular motion and fundus examination if possible, should be performed in every case.

The suspicion of extra/subperiosteal abscess formation is there when patient on treatment has exaggeration of proptosis. The collection of pus strips the periosteum from lamina, and its position determines the angle of globe displacement, as was seen in our patient, axial proptosis with inferolateral displacement. The movement of the globe may be limited due to the mass or oedema of the orbital structures. Loss of vision may depend upon the extent and how swiftly, collection occurs. Colour vision gets diminished first. There are less chances of recovery, once vision loss has occurred.

Radiological imaging, CT or MRI, is essential to confirm the diagnosis, plan for early intervention and prognosticate. CT scans are preferred in chronic sinusitis and suspected orbital complications, due to better bone delineation. But, MRI is indicated for suspected intracranial involvement or better soft tissue delineation of orbital contents.

Functional endoscopic sinus surgery is the treatment of choice for management of chronic sinusitis and its orbital complications. It avoids external scar, causes minimal tissue damage, allows follow up view of sinuses and has rapid healing, in comparison to external approach. Indications for surgical intervention include abscess formation on CT or MRI scan, impaired vision, decreased ocular motility, or a clinical advancement even after 24 hour of medical treatment [9]. In our case the clinical progression after 24 hour of therapy was an indication for operative intervention.

## Conclusion

The orbital complications following sinusitis have various stages, and it is important to diagnose early and intervene, to avoid high morbidity and mortality.

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**Volume 1 Issue 1 September 2019**

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