



Original Research Article

Orbital Complications of Acute Sinusitis: Evaluation, Management and Outcome

Havle Abhay*, Purohit Gautam**, Jain Vishal**

*Professor, **Resident,
Department of ENT, Krishna Institute of Medical Sciences, Karad. 415110, Maharashtra.

Corresponding Author: Havle Abhay

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ABSTRACT

Sinusitis with orbital complication is a potentially fatal disease that has been known since the days of Hippocrates. Primary sinus infection is the most common cause of orbital cellulitis and if not diagnosed early and managed aggressively it poses life-threatening intracranial complications such as meningitis, cavernous sinus thrombosis and brain abscess.

Aims: The aim of present study is to evaluate the clinical features, bacteriology, possible predisposing factors and treatment with its outcome in cases of orbital complication of acute sinusitis.

Study Design: A Prospective study.

Methods: In present study, all clinico-radiologically diagnosed cases of sinogenic orbital cellulitis from April 2011 – April 2014 were included. The diagnosis was determined based on anterior rhinoscopy, X-ray PNS and CT scans. Intensive treatment was initiated with a combination of cephalosporines, aminoglycosides and metronidazole in all cases and surgical intervention was provided whenever needed.

Results: 10 patients with orbital complication of sinusitis and its management were studied. The mean age was 19.3 years. Female: Male ratio was 1.5: 1. Ethmoid sinus involvement was the most common. Anemia was noticed as a prominent associated factor in 5 cases. The most common causative pathogen isolated by culture study was Staphylococcus aureus. Amongst the complications, the orbital cellulitis was common to all cases and was associated with lid abscess in 1, sub periosteal abscess in 1, orbital abscess in 1 and subdural empyema in 1 case. 7 cases responded to conservative treatment alone whereas in remaining 3 cases surgical intervention was required.

Key Words: Sinusitis intracranial spread, Orbital complications, Cavernous sinus thrombosis, Chandler's classification.

INTRODUCTION

Orbital complication of sinogenic origin is an age old clinical entity described since the days of Hippocrates. ⁽¹⁾ The methods of treatment for these complications are often debated between conservative and surgical or combined. Surgical options include both endoscopic

and open surgery. However, in the present era, the endoscopic surgery of the nose and para nasal sinuses has not yet established clear advantages over open surgery. In present study we presented the experience of conservative and wherever indicated open surgical management.

MATERIALS AND METHOD

A prospective study of 10 cases of sinogenic orbital complications presented to Otorhinolaryngology services of the medical college teaching hospital over the period of three years was carried out. The clinical presentation, laboratory examinations, radiological findings, bacteriological study and treatment methods employed were analyzed.

All clinico-radiologically diagnosed cases of sinogenic orbital cellulitis over the period from April 2011 – April 2014 were included in the study. Of these 10 cases 4 were males and 6 were females. The inclusion criterion was orbital complications of sinogenic origin based on clinical signs and symptoms, laboratory test and radiological investigation. However, any orbital pathology other than sinogenic infection was excluded. All cases were also subjected to ophthalmic and medical examination. They were categorized into 5 groups based on Chandler's Classification.⁽²⁾ All cases were treated with IV antibiotics, and topical and systemic nasal decongestants and few indicated cases were subjected to surgical intervention. Medical treatment was continued till there was symptomatic and clinico-radiological return to normalcy. Findings were noted in all patients during the treatment period and outcome was analyzed. All cases were followed up clinically as well as radiologically for period of 3 months after the treatment.

RESULTS

The mean age of 10 patients studied (Figure-1) was 19.3 years. Of these 4 (40%) patients were with age less than 14 years, 3 (30%) were with age less than 20 years, while remaining 3 were between 21-40 years of age. The male to female ratio was 1:1.5.

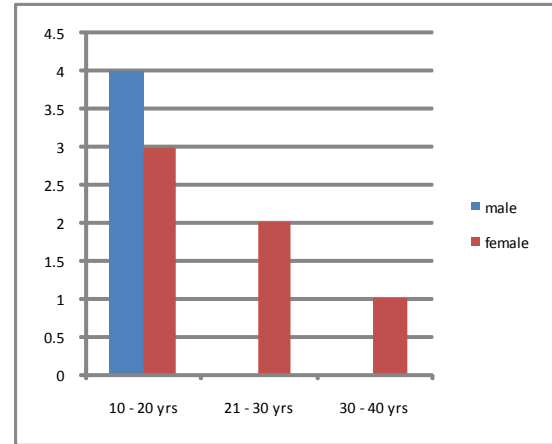


Figure 1: Age & sex wise patients with orbital complications of sinogenic origin

In present study in addition to constitutional symptoms of acute infection like fever, headache and generalized weakness the most common symptoms noted on the day of admission (Figure 2), were lid edema and erythema in 10 (100%) cases associated with purulent rhinorrhea in 5 (50%), proptosis in 3 (30%), restricted eye mobility in 3 (30%), subperiosteal abscess in 1(10%), lid abscess in 1(10%) and impairment of vision in 0 (0%).

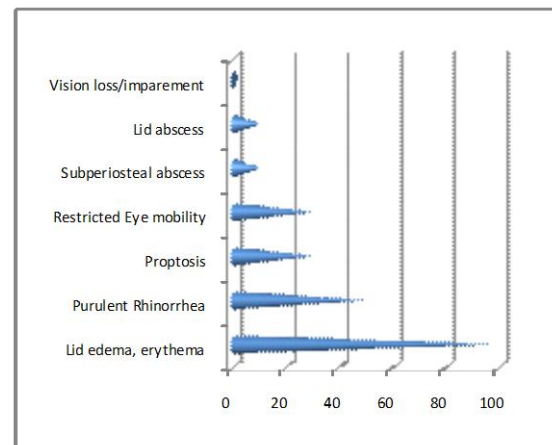
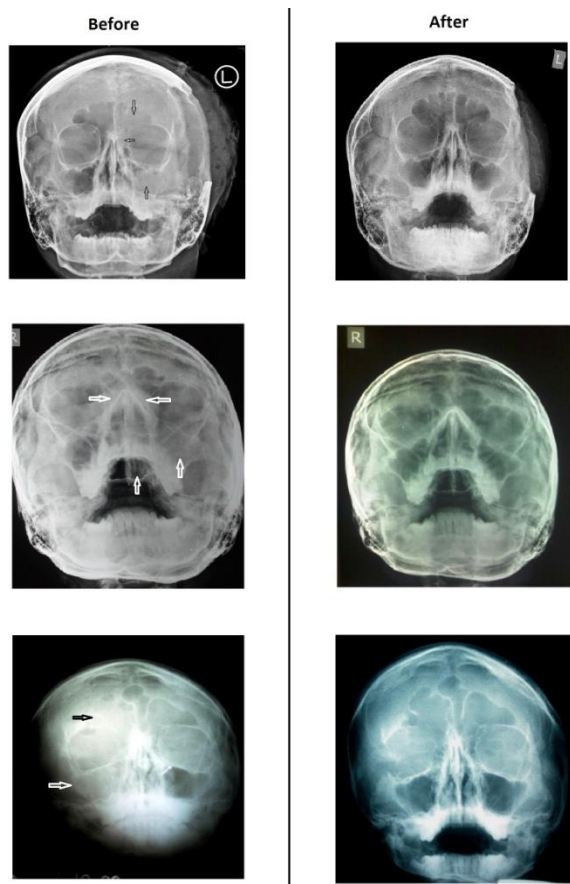


Figure 2: Percentage of different clinical features of orbital cellulitis

All the cases were managed with broad spectrum antibiotics administered parenterally IV covering gram positive/negative pathogens-(Inj Ceftriaxone with Tazobactam 1.125gm BID, Inj.

Amikacin 500 mg BID), as well as for anaerobes- (Inj. Metronidazole 400 mg TID) for initial 5-7 days, and were subsequently transferred over to oral administration for total period of 6 weeks. All patients also received systemic and topical nasal decongestants.

X-ray and Computerized Tomography of the paranasal sinuses (PNS) was done in all cases. It showed (Table-1) solitary ethmoid sinusitis in 30%, and Maxillary Sinus in 10%, followed by combined involvement of Ethmoid, Frontal and Maxillary Sinuses in 20%, all four sinuses in 10% and Ethmoid and Frontal Sinuses in 10%, Ethmoid and Maxillary Sinuses 20%. Treatment response was assessed using repeat X-ray PNS Water's view (Figure-3).



Water's view of paranasal sinuses before and after treatment

Figure 3: Pre and post treatment X-ray PNS

Table 1: Distribution of involvement of sinuses on Computerized Tomography of the paranasal sinuses (PNS)

Involved sinuses	Number	Percentage
Isolated Ethmoid	3	30%
Isolated Maxillary	1	10%
Combined E+M+F	2	20%
Combined E+M	2	20%
Combined E+F	1	10%
Combined E+M+F+S	1	10%

E-Ethmoid, M-Maxillary, F-Frontal, S-Sphenoid

Table 2: Distribution of causative organisms

Organism	Number	Percentage
Staphylococcus aureus	6	60%
β Haemolytic streptococcus	2	20%
H. Influenza	2	20%

Table 3: Chandler's Classification

Groups	Diagnosis	Treatment
I	Inflammatory edema of lid	Conservative
II	Orbital cellulitis without abscess	
III	Subperiosteal abscess	Surgical
IV	Orbital abscess and/or visual impairment	
V	Cavernous sinus thrombosis and/or visual impairment	

Table 4: Distribution of cases according to Chandler's grades

Chandler's grade	Number	Percentage
I	2	20 %
II	4	40 %
III	1	10 %
IV	1	10 %
V	1	10 %

In present study, 1 case of eyelid abscess found difficulty in placement as per Chandler's groups

The pus culture study of middle meatal discharge showed (Table-2) staphylococcus aureus (60%) as the most common pathogen followed by beta hemolytic streptococci (20%), H influenza (20%).

The mean haemoglobin level was 8.85 gm/dl. Five cases had haemoglobin level less than 10 gm/dl. Range of Hb of ther 5 cases was between 10.4 to 12.6 gm/dl.

Computerized tomography showed orbital cellulitis in all 10 cases (100%) in association with subperiosteal abscess in 1 (10%), lid abscess in 1(10%), and orbital abscess in 1 (10%), Sub dural empyema as intracranial complication in 1 (10%). All cases were grouped according to Chandler's classification (Table 3).

6 cases were having preseptal orbital cellulitis (Figure-4) and classified as per the Chandler's classification into groups I and II.



Clinical photos Before and after treatment

Figure 4-Orbital cellulitis clinical photos before and after Treatment.

These cases responded well to antibiotics. 1 case had subperiosteal abscess (Chandler's grade III) which was managed by lateral orbitotomy as per the Chandler's classification's treatment guideline. 1 case had left upper eyelid abscess without any visual impairment or any intracranial complication endangering life of the patient. The chandler's description of orbital complications did not mention about the lid abscess in any of its groups leading to difficulty in planning the management of this case. In present study this case was managed using conservative approach alone successfully however, a close monitoring for clinical improvement without visual impairment or any intracranial spread of infection in such cases is highly essential. (3) 1 case had orbital abscess accordingly categorized into Chandler's group IV requiring surgical intervention – (orbital decompression). (2) 1 case had intracranial complication-left subdural empyema accordingly categorized into Chandler's group V requiring neurosurgical intervention –craniotomy. (2) -(Figure-5)

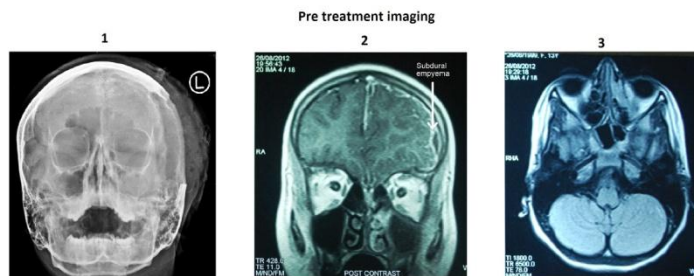


Figure 5- Clinical Photos of a case of Subdural empyema.

DISCUSSION

The paranasal sinus is a group of air-filled spaces in the skull that surround the nasal cavity extending superiorly to the skull base and laterally to encompass the medial wall and floor of the orbit. ⁽⁴⁾ Paranasal sinus infection is the most frequently encountered clinical entity. The spread of sinogenic infection to surrounding areas such as orbit is known. Orbital infection further spreads to cavernous sinus, and other intracranial areas like meninges, subdural and extradural spaces, brain parenchyma. If not diagnosed early and treated adequately, the spread of infection occurs through the neurovascular foramina via congenital and or acquired bony dehiscence, also indirectly through the valve less ophthalmic veins draining the sinuses and orbit as a consequence of thrombophlebitis and embolism. ⁽⁴⁻⁶⁾ The erosion and destruction of paper-thin separating bone between the ethmoid sinus and orbit (lamina papyracea) provides the most common pathway for the contagious spread of infection to the orbit. ⁽⁷⁾ Orbital complications of sinusitis include edema, orbital cellulitis, subperiosteal abscess, orbital abscess, cavernous sinus thrombosis which further may lead to potentially lethal intracranial serious complications such as meningitis and brain abscess blindness. ⁽⁷⁾ Hence these complications must be foreseen and best prevented and if occur needs to be managed as an emergency aggressively.

In present study, female patients dominated male patients with a ratio of 1.5:1. Also, younger patients were found to be affected more. The most commonly occurring complication is palpebral inflammatory oedema, which Moloney referred to as preseptal cellulitis and reported it as being encountered more often in children; this was noted in present study too. ⁽⁸⁾ The upper eyelid becomes swollen and hyperaemic due to a blockage of venous

drainage from an ethmoidal sinusitis. Chemosis and proptosis are absent, both of which usually indicate postseptal infection. Vision and eyeball movement remains unaffected in preseptal cellulitis. Usually, the oedema is most in the morning and persists throughout the day, with a slight reduction. This diurnal variation is absent in postseptal inflammation. The appearance of proptosis indicates an advance orbital infection towards cellulitis. Proptosis, as well as chemosis, indicates the spread of an inflammatory process in the anterior of the orbit. The movements of the eyeball begin to become limited, and vision starts to weaken from the pressure on the optic nerve. Conservative treatment does not produce a fast reduction of the symptoms; therefore, surgical intervention is obligatory when vision is endangered. ^[9]

In subperiosteal abscess of the orbit, there is an accumulation of pus between the lamina papyracea and the periorbita. Proptosis, chemosis and limited movement of the eyeball are present, but the eyeball is turned laterally and downwards. Pain is experienced when the superior-medial corner of the orbit is involved. We had 1 case of subperiosteal abscess which was managed by incision and drainage through lateral orbitotomy (Figure-6). Suppurative complications generally require prompt surgical drainage. An exception to this is the patient with a small subperiosteal abscess and minimal ocular abnormalities for whom intravenous antibiotic treatment for 24 to 48 hours is recommended while performing frequent visual and mental status checks. ⁽¹⁰⁾ Accordingly one case of eyelid abscess (Figure-7) was successfully managed by conservative treatment alone with close monitoring for any life threatening complication. Inadequate and improper treatment of orbital cellulitis leads to abscess formation. An accumulation of pus begins in the retroorbital adipose tissue. This is a more

severe complication because it makes up the precedents for the septic thrombosis of the cavernous sinus, or the passing of the infection through nervous routes into the intracranial space. Besides the common symptoms, exophthalmos, ophthalmoplegia and a weakening or loss of vision can also occur. The patient experiences constant pain and the affected eyeball is very tender. We had 1 case of orbital abscess which underwent surgical drainage and orbital decompression.

Younger age patients, respond better to conservative treatment. This is an observation in accordance with others. (11)



Figure 6- Immediate post lateral orbitotomy

CONCLUSIONS

In present study, orbital complication of acute sinusitis was common in younger age as well as in females. In majority of cases (50%) anaemia was an associated factor. CT scan and X-ray PNS Water's view remains an important diagnostic tool. The involvement of ethmoid sinus was the most common (90%) followed by combination of ethmoid, frontal and maxillary sinuses. Staphylococcus aureus was a most common (60%) isolate followed by β -hemolytic streptococci and H. influenza. Cases belonging to Chandler's group I and II were managed successfully by conservative approach. 1 case of Chandler's

Complications of sinusitis, irrespective of in acute or chronic may sometimes have a fatal outcome. Compared to previous decades, these conditions have been declining due to above average clinical acumen and timely communication, advanced diagnostic tools and the availability of emergency interventions. All clinicians especially otorhinolaryngologists and ophthalmologists and general physicians must be aware of symptoms of orbital complications of sinusitis.



Figure 7-MRI showing right upper eyelid cellulitis with abscess

group III was managed using surgical modality as per Chandler's criteria. Another case of eyelid abscess which was difficult to place and manage as per Chandler's classification was successfully treated using conservative approach alone, however, a close monitoring for visual impairment or fatal intracranial complications in management of such case is a must. Chandler's group IV and group V required surgical management. All cases were successfully managed without any mortality.

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Conflicts of interest: None

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