

ARE ORBITAL COMPLICATIONS A PROBLEM WITH RHINOSINUSITIS EVEN TODAY? A CLINICAL EXPERIENCE IN PATIENTS FROM SLUM AREAS OF HYDERABAD

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ABSTRACT

BACKGROUND

Rhinosinusitis remains a common clinical disease encountered in ENT practice. The clinical subtypes include acute, subacute, recurrent acute and chronic. Acute rhinosinusitis most commonly is of viral aetiology superadded by bacteria. Chronic Rhinosinusitis (CRS) is commonly a mixed bacterial infection. Even though, the complications are less common when primary treatment is neglected, the potential of developing intraorbital suppuration, life-threatening intracranial complications will result in high morbidity and mortality. Incidence of such complications remains high among the populations of poor socioeconomic status, overcrowding and those living in areas of industrial pollution. The objective of the present study was to evaluate the incidence, clinical presentations, CT scan findings and different treatment outcomes of orbital complications secondary to sinusitis in patients from slum areas of industrial belt of Hyderabad.

The aim of the study is to evaluate the incidence, clinical presentations and various treatment modalities and their outcomes of orbital complications secondary to sinusitis.

MATERIALS AND METHODS

A retrospective study was conducted at Government ENT Hospital, Koti, Hyderabad, reviewing the patients with orbital complications over a period of 3 years. All the clinical data collected from the case sheets included the clinical presentation, plain and contrast-enhanced CT scan findings, type of treatment adopted, surgical approaches in their management and the final outcome of such patients were analysed.

RESULTS

134 patients presented in the Regional ENT Hospital with orbital complications secondary to rhinosinusitis. Medical treatment was initially successful in 59 (44.02%) patients. Surgical intervention with endoscopic sinus surgery was done in 75 (55.97%) patients. 12 patients (8.95%) were drained externally, which included Caldwell-Luc operations and orbital exenteration. The mortality was in 5 (3.73%) of the total patients. Allergic fungal sinusitis was found in 29 (21.64%) and invasive fungal sinusitis was found in 9 (6.71%).

CONCLUSIONS

Orbital complications secondary to rhinosinusitis have good prognosis if detected early and treated appropriately on priority basis. Awareness among the physicians primarily treating the patients with sinusitis in the community towards this problem and early referral to a tertiary hospital for proper management is essential to avoid mortality and morbidity.

KEYWORDS

Sinusitis, Orbital Complications, Cellulitis, Treatment, Fungal, Invasive, Preseptal and Post Septal.

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BACKGROUND

Among the various pathologies causing orbital complications, sinus infection remains the most common and accounts for 74-85%.¹ Usually, this orbital complication is secondary to acute ethmoidal sinusitis since the ethmoid sinus is separate from the orbit only by the lamina papyracea.² In developing countries, sinusitis is

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undertreated and is one of the leading causes of orbital complications.³ Though, the introduction of antibiotics has altered the course of sinusitis and its complication, orbital complications remains to be kept in mind in treating the sinusitis patients. Before the advent of antibiotics, the morbidity and mortality in patients with orbital complications secondary to sinusitis were 20.5% and 17%, respectively.⁴ With newer and effective antibiotics and newer surgical modalities, rates of morbidity and mortality have declined to 3-11% and 1-2.5%, respectively.⁵ Management strategy of orbital complications of sinusitis depends on the severity of affection at initial presentation. Medical treatment is advocated in mild cases with neither visual affection nor orbital mobility restriction. Severe cases and/or failure of medical treatment mandate surgical interference dealing



with both the affected sinuses and nearby orbit.^{6,7,8} Sinusitis with orbital complications is a critical situation. Without timely diagnosis and appropriate management, it may affect the vision and even become a life-threatening disease.⁹ The present study aims at evaluate the incidence, presentations and outcomes of different treatment modalities of orbital complications secondary to sinusitis.

MATERIALS AND METHODS

The present study is a retrospective clinical study conducted at Government ENT Hospital, a regional tertiary healthcare hospital in Hyderabad attached to Osmania Medical College. The daily average of outpatients is 1000. A retrospective clinical review chart was prepared including 134 patients presenting with orbital complications secondary to rhinosinusitis. The study period was from January 2009 to December 2012. Necessary ethical clearance was obtained from the Institute and due consent was taken from the patients. Data obtained from the charts included: 1. Symptomatic clinical presentation of eyelid oedema, chemosis, proptosis, impaired vision and restricted mobility. 2. Local ENT examination and ophthalmological examination. 3. Findings of CT scan of paranasal sinuses. 4. Type of treatment. 5. Surgical approaches used and their

outcomes. 6. Follow up data of the treatment to assess the final outcome of each case.

Inclusion Criteria

1. Patients of all age groups presenting with orbital symptoms mentioned above secondary to rhinosinusitis.
2. Patients with or without visual impairment.
3. Patients with or without orbital mobility restriction.

Exclusion Criteria

1. Patients with orbital complaints not secondary to rhinosinusitis.
2. Patients who were treated earlier surgically for orbital complications. Diagnosis of preseptal cellulitis was made in patients with symptoms, clinical signs and radiological investigations, periorbital oedema, erythema and increase in local hyperaemia, but without proptosis, ophthalmoplegia and visual impairment. Patients with proptosis, ophthalmoplegia and visual impairment were defined as having post-septal orbital cellulitis. Sinusitis was defined by the presence of opacification or air fluid level on CT scan. Based on the clinical and radiological examination, patients were classified into five groups according to the Chandler classification¹⁰ (Table 1).

Stage	Description
Type I (preseptal cellulitis)	Oedema of the eyelid, no limitation of ocular movement, normal visual acuity
Type II (subperiosteal oedema)	Diffuse oedema of the orbital contents, infiltration with inflammatory cells and bacteria with or without reduction of the visual acuity
Type III (Subperiosteal Abscess) (SPA)	Collection of pus between periorbital and bony wall of orbit, globe is usually displaced
Type IV (orbital abscess)	Collection of pus within the orbital tissues, marked proptosis and chemosis, ophthalmoplegia, visual impairment
Type V (cavernous sinus thrombosis)	Extension of inflammation posterior into cavernous sinus, bilateral eye signs, cranial nerve palsy

Table 1. Showing the Chandler Classification for Orbital Complications of Sinusitis

The treatment adopted was grouped as medical and surgical tailored according to the clinical presentation, site of infection, gross pathology as seen on CT scan.

A. Medical Treatment

Intravenous antibiotic for 7 days (ceftriaxone sodium 50-100 mg/kg) until the patient is free of fever and exhibits a substantial improvement of the orbital signs followed by:

- i. Oral antibiotic (amoxicillin and clavulanate) for the next 2 weeks.
- ii. Saline irrigation.
- iii. Topical and systemic decongestants.
- iv. Anti-inflammatory agents.

B. Surgical Treatment

Undertaken entirely based on endoscopic examination and CT scan findings and in patients not responding to medical treatment within 48 hours. The methods adopted were:

a. Functional Endoscopic Sinus Surgery

Consisting of endoscopic drainage of the sinuses (functional endoscopic sinus surgery) and drainage of orbital suppurations.

b. Open Approaches

Caldwell-Luc surgery, orbital exenteration. The final outcome was measured in terms of total resolution with either medical or surgical treatment. Treatment outcome was measured by assessing the resolution of the complication or the development of permanent visual loss and/or neurological deficit. Follow up CT scans were ordered in a follow up of 9 months period.

RESULTS

All the data was statistically analysed using standard methods of statistics.

OBSERVATIONS AND RESULTS

The age group of 134 patients reporting with orbital complaints in the present study was ranging from 5 to 66 years with a mean age of 39±4.4 years. There were 17 patients (12.68%) belonging to children aged under 15 years. 117 patients belonged to the above 15 years (87.31%). 88 patients were males and the remaining 46 were females with a male-to-female ratio of 1:1.91. Whether the right eye or left eye was affected predominantly was calculated, but was not statistically significant (right eye- 72; left eye- 62). 92 patients belonged to a poor socioeconomic background with less than 1 lakh INR per annum income (68.65%). 27 (20.14%) patients belonged to an annual income more than 1 lakh and below 4 lakhs. The remaining patients 15 (11.19%) were having an annual income more than 4 lakhs. 54 patients (40.29%) gave history of recent onset of Upper Respiratory Tract Infection (URTI). 80 patients (59.70%) gave history of chronic rhinosinusitis. Eyelid erythema and oedema are present in all the patients. 65 patients (48.59%) had proptosis. Restricted eye ball mobility was found in 38 (28.35%) patients. Loss of vision was observed in 09 (6.71%) of the patients (Table-2).

Signs and Symptoms	Number	Percent Affected %
Erythema/Oedema of the eyelids	134	100
Proptosis	65	48.59
Limited extraocular motility	38	28.35
Decreased visual acuity	19	14.17
Lost vision	09	06.71

Table 2. Showing the Incidence of Different Ophthalmologic Signs and Symptoms (n=134)

Chandler Stage	(n = 134)	Eyelid Oedema	Proptosis	Limited Extraocular Motility	Impaired Vision
I	45	45	0	0	0
II	55	55	14	03	1
III	18	18	11	02	2
IV	09	09	18	15	3
V	07	07	22	18	3
Total	134	134	65	38	9

Table 4. Showing Ocular Examination Findings According to Chandler Types, (n=134)

CT scan data was analysed from the case sheets to know the incidence of various radiological findings in the study. Involvement of sinuses in various combinations were noted and shown in the Table 5. 96 patients (71.64%) had unilateral involvement of the orbital contents secondary to rhinosinusitis. The remaining 38 (28.3%) patients showed bilateral involvement of the orbits, but ipsilateral involvement was of severe grade of Chandler types than the contralateral orbit.

Congestion and mucosal oedema was found on endoscopic examination of the nasal cavity in all patients. There were 75 (55.97%) patients with preseptal and 59 (44.02%) patients with post-septal infections. Considering Chandler's classification, the data showed the following breakup- 45 (33.58%) in stage I, 55 (41.04%) in stage II, 18 (13.43%) in stage III and 09 (6.71%) in stage IV and 07 (5.22%) in group V (Table 3). Orbital manifestations of the patients included in the study were staged according to the Chandler typing of the disease (Table 4).

Chandler Stage	Number	Percent %
I	45	33.58
II	55	41.04
III	18	13.43
IV	09	6.71
V	07	5.22

Table 3. Showing the Distribution of Infections by Chandler Typing, (n=134)

Clinical examination of the orbital manifestations of the patients according to Chandler types showed the following findings: (Table 4).

Sinus	No.	(%)
Ethmoidal sinusitis only	61	45.52
Maxillary + ethmoidal + frontal	31	23.13
Maxillary + ethmoidal	25	18.65
Frontal + ethmoidal	13	9.70
Maxillary + ethmoidal + sphenoidal	04	2.98

Table 5. Showing the Distribution of Sinuses Affected, (n=134)

Erosion of lamina papyracea was observed in 64 patients (47.76%). Inward displacement of the periosteum with involvement of adjacent extraocular muscles and formation of preseptal abscess was noted in 23 patients (17.16%). Diffuse oedema of the orbital contents and extraocular muscles as in 15 patients with orbital cellulitis (11.19%). Post-septal abscess formation with ocular muscles involvement was observed in 47 (35.07%). MRI with gadolinium contrast was done in 4 patients with stage V to exclude/confirm the diagnosis of cavernous sinus thrombosis. All the patients were initially treated with medical regimen consisting of IV antibiotics (either ceftriaxone sodium 50-100 mg/kg or amoxicillin with potassium clavulanate 1 gm) for 1 week followed by oral antibiotics consisting of amoxicillin with potassium clavulanate. During this period, the patients were investigated with CT scan and nasal endoscopic examination to confirm the diagnosis and surgical profiles were completed keeping the option of surgical exploration in mind. Other supportive therapy also continued as mentioned in the materials and methods. 59 patients irrespective of their Chandler typing (44.02%) responded well with initial medical treatment. 12 patients out of them (8.95%) relapsed after a period of 2 weeks to orbital symptoms and signs. The remaining 63 (47.01%) patients were subjected to various steps of FESS depending upon their CT scan findings. Table 6 shows the surgical intervention undertaken in this study.

Surgery	No.	(%)
Maxillary antrostomy	65	48.59
Endoscopic ethmoidectomy	44	32.83
Frontal sinusotomy	18	13.43
Endoscopic sphenoidotomy	16	11.94
External ethmoidectomy	5	3.73
Frontal trephination	3	2.23
Caldwell-Luc procedure	12	8.95
Orbital exenteration	3	2.23

Table 6. Showing the Percentage of the Used Surgical Procedures Used to Drain the Intraorbital Abscesses, (n=134)

Among the 134 patients, 2 patients presented with severe bilateral ophthalmoplegia, disturbed level of conscious, developed coma and passed away the same day of presentation despite aggressive management. These patients were later confirmed to have invasive fungal sinusitis with Mucormycosis. The other 4 patients who showed prolonged morbidity were with immune compromised diabetic patient who had severe fungal infection with intracranial extension (cavernous sinus) and underwent orbital exenteration and Caldwell-Luc procedure. Amphotericin B was initiated in all the patients with confirmed fungal invasive disease. The pathology of these patients revealed invasive fungal sinusitis (Mucormycosis). Overall, 118 patients (88.80%) had a good prognosis. None of them developed permanent visual loss or neurological sequelae, even though, at initial presentation, they

presented with diminished vision and restricted ocular movements. Out of 12 patients who showed relapse within 2 weeks, 5 patients (3.73%) continued to present with intermittent eye pain and eyelid oedema were subjected to revision surgery, total ethmoidectomy with middle meatal antrostomy to clear residual sinusitis after which they also had a good outcome with no more complaints.

DISCUSSION

Acute or chronic rhinosinusitis secondary to viral and/or bacterial infection resulting in sinusitis of the paranasal sinus can lead to orbital complication and it remains one of the most common medical problems even in this post antibiotic era.¹¹ It may present as an emergency situation as it leads to loss of vision, restricted mobility of eyeball and further if delayed may lead to intracranial complication with loss of total vision and life.¹² Involvement of orbital contents in the suppuration of sinuses is well described as pre- and post-septal, which distinguish them clinically as well as on CT scan. The more aggressive treatment and surgical intervention in post-septal orbital cellulitis to avoid devastating complications such as meningitis and cavernous sinus thrombophlebitis is well documented.¹¹ Physical examination differentiations between orbital infections from periorbital infections include proptosis, chemosis and ophthalmoplegia.¹³ Early CT scan of paranasal sinuses helps in diagnosis and determining the nature of surgical intervention.¹⁴ Commonly described CT scan radiological signs are contrast-enhanced ring-enhanced lesion or an air-fluid level in the extraconal space, displacement of adjacent rectus muscle, marked proptosis and in advanced cases osteomyelitis of the orbital wall.¹⁵ In the present study, out of 134 patients, 121 patients (90.29%) had undergone the CT scan study. CT scan showed preseptal cellulitis in 75 patients (55.97%) followed by subperiosteal abscess in 59 patients (44.02%) and subperiosteal oedema in 29 patients (21.64%). In five cases, however, an abscess cavity could not be diagnosed radiologically, but was confirmed at surgery and this coincides with Krohel et al who noted that an abscess developing over 24-38 hrs. may produce only nonspecific inflammatory signs on CT scan and not identify an abscess.¹⁶ False negative CT scan finding does not exclude intraorbital abscesses as these studies are relatively nonspecific in showing the point where inflammation and phlegmon becomes liquefied abscess. Hence, the surgeon should undertake surgery in the face of certain clinical features of intraorbital suppuration.¹⁷ The CT scan accuracy in this present study was 85% as the surgical findings could correlate exactly, and in the remaining patients, the CT scan picture was either mild or aggressive vice versa. This coincides with the study done by Demetrios et al who found that CT scans were found to be accurate predictors of subperiosteal abscess in 80%.¹⁸ The most common pattern of sinus involvement causing orbital cellulitis was the combination of maxillary, ethmoidal and frontal sinuses, which is similar to the result of Mortimore et al.¹⁹ It was observed that ethmoidal sinuses were either involved alone in 61 patients (45.52%) or in conjunction with other sinuses

in 73 patients (54.47%). However, the ethmoidal and maxillary sinuses were most frequently involved in the study by Swift et al.²⁰ Pansinusitis indicates the severity of the infection and the continuity of the mucosal lining of the paranasal sinuses.

The decision about the necessity and timing of a subperiosteal abscess surgical drainage is complex and involves the assessment of many factors including response to the antibiotic treatment, age, size and location of the fluid collection.²¹ Going through the data retrospectively in the present study, one can conclude that the protocol of management of orbital complications secondary to rhinosinusitis should be adhered to by all the practicing surgeon of that particular hospital. Surgical intervention should be initiated as early as possible in the event of failed response to medical treatment irrespective of the type of pathology. It is well known that intravenous antibiotics can penetrate the abscess,²² but without draining the abscess, their antibacterial activity is poor.²³ In addition, in the presence of loose areolar tissue in the orbit, an orbital abscess provokes a rapid expansion and infiltration of infection into the orbital contents carrying an extremely high risk of visual impairment. In the present study, 59 (44.52%) patients irrespective of Chandler's classification responded successfully with IV antibiotics and the role of surgery was planned in those patients who did not respond to antibiotics. The route of surgical drainage is determined by localisation of the orbital subperiosteal abscess.²⁴ External surgery may be required if there is difficulty in visualising a subperiosteal abscess located superomedially in the orbit.²⁵

CONCLUSIONS

Orbital complications still pose a serious threat in this antibiotic era when occur secondary to sinusitis affecting the vision and life. If not treated aggressively, after initial suspicion can lead to irreversible damage. Thorough ENT, orbital examination and CT scan are a must before concluding the diagnosis and planning a strict regimen. Application of correct staging, choosing the correct time and nature of surgery helps in restricting further spread and avoiding permanent loss of vision. Medical treatment is efficient in early stages while surgical drainage (endoscopic or external) in preseptal, subperiosteal or orbital abscess. These complications are largely due to ignorance and under treatment on the part of the patients and delayed/missed diagnosis on the part of the clinicians.

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