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Original Research Article

A Descriptive Study of the Patients with Orbital Complication of Acute and Chronic Sinusitis

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Abstract

Background: Orbital complications of sinusitis are potentially severe and avoidable entities which leads to the visual loss or intracranial extension when proper management is delayed. As the paranasal sinuses and orbit are in proximity anatomically, infections can easily spread beyond sinus walls. Thus, early diagnosis and timely intervention are necessary in order to minimize morbidity.

Methods: This descriptive observational study was conducted at Bhagwan Mahavir Institute of Medical Sciences (BMIMS), Pawapuri, Bihar over a period of one year from January 2025 to January 2026. A total of 150 patients who diagnosed with orbital complications due to acute or chronic sinusitis were included. Clinical assessment, ENT and eye examination, contrast-enhanced CT scans were done. Demographic profile, sinuses involved, type of orbital complication (Chandler classification), microbiological findings associated with orbital sources, management protocol and outcomes were analyzed using descriptive statistics.

Results: Males (61.3%) and individuals 21–40 years of age (30.7%) had higher frequencies of orbital complications. The majority of case were with acute Sinusitis 68%. The ethmoid sinus was involved most commonly (69.3%). Preseptal cellulitis (34.7%) and orbital cellulitis (29.3%) were the most frequent manifestations of complications. Ten patients (37.3%) required surgical treatment, whereas the remaining 17 patients (62.7%) responded to medical management alone. A full recovery was achieved in 81.3% of patients, permanent blindness was reported in 6.7%.

Conclusion: Orbital complications are mostly related to acute ethmoidal sinusitis and tend to occur in early-infection phases. Rapid imaging, early referral and multidisciplinary care are the key factors in order to achieve best outcomes and avoid vision-threatening complications.

Keywords: Acute Sinusitis, Chandler Classification, Ethmoid Sinus, Orbital Cellulitis, Orbital Complications.

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Introduction

Inflamazed of the paransal sinuses, aneurysms the role of pathology in otorhinolaryngology [1]. It can be in the form of acute sinusitis following an upper respiratory infection or chronic sinusitis that entails sustained mucosal inflammation for a period longer than 3 months. Worldwide, sinusitis is a significant cause of morbidity, physician consultation and antibiotic use.

Although the vast majority are confined, a small but significant number of patients may develop complications extending to nearby regions, particularly the orbit and intracranium. Orbital sequela, although rare, are potentially vision-threatening and in some cases life-threatening problems that must be promptly identified and treated [2,3]. The orbit is also vulnerable to infectious spread given this intimate anatomic relationship between the paranasal sinuses and orbit [4]. The orbit is separated with the ethmoid sinus by means of a fragile bony plate called lamina papyracea that can show naturally occurring dehiscent areas [5].

The orbital floor is in the vicinity of the maxillary sinus and the roof of orbit is near to frontal sinus as well. Valves are absent in the venous channels of this area, therefore infection can spread easily and in both directions [6]. In children, the ethmoid sinuses have a well-developed anterior frontal group and are more commonly associated with orbital complications [7]. These anatomic

considerations produce a pathway by which sinus infections can readily involve the orbit.

The process of orbital spread occurs by both direct and indirect mechanisms. Direct extension can happen by erosion or development anomalies in the walls of the sinuses, especially the lamina papyracea [8,9]. Lesion extension through thrombophlebitis of valve-less sinovenous communicating veins to the orbital venous system may result in secondary spread. The presence of inflammatory edema purulent material, and increased intraorbital pressure can lead to compromise optic nerve function and extraocular movements [10]. If left untreated, this may rapidly develop into abscess formation, visual impairment or intracranial complications including cavernous sinus thrombosis.

Orbital complications of sinusitis are traditionally grouped according to Chandler classification facilitating the diagnosis and management [11]. Stage I consists of preseptal cellulitis, limited anterior to the orbital septum. Stage II is orbital cellulitis, with involvement of contiguous tissues within the orbit but no focal abscess [12]. Stage III describes a subperiosteal abscess, usually in the medial orbital wall. Stage IV is an orbital abscess involving the accumulation of pus in orbital tissue. Stage V is cavernous sinus thrombosis, which is a serious intracranial complication with high morbidity. The extent of symptoms, the possibility of visual loss, and the requirement for surgery also increase with clinical stage.

In the Indian context, delayed presentation, self-administration of anti-microbials, restricted availability of imaging in peripheral areas and a high prevalence of upper respiratory tract infections carry an increased risk for complications.

There may be no early symptoms such as eyelid swelling or mild pain, which can cause patients to ignore the problem until their vision is at risk. Increasing knowledge of general practitioners and early referral to tertiary centres are necessary measures to decrease morbidity. Hence, knowledge about the clinical and radiological features of orbital complications in local population is necessary for better prognosis and management.

Objectives

1. To describe demographic and clinical features among patients with orbital complications related to acute or chronic sinusitis.
2. To categorize the types of orbital complications based on Chandler's classification and to correlate these with radiological and microbiological results.
3. To evaluate treatment regimens used, including medical and surgical options, and outcome of therapy and visual prognosis in afflicted patients.

Materials and Methods

Study Design: The present study was a descriptive observational study to assess the clinical, radiological and the treatment pattern of patients with orbital complications arising from sinusitis.

Study Setting: The study was performed at BMIMS, Pawapuri, Nalanda, Bihar which is a tertiary care teaching hospital serving both rural and urban population and receives referred cases of complicated sinonasal and orbital infections.

Study Duration: The research was performed over a 1-year duration from January 2025 to January 2026.

Sample Size: 150 patients with orbital complications secondary to acute or chronic sinusitis were enrolled in this study during the study period.

Inclusion Criteria

- All aged and sex of patients
- Patients clinically suspect of having orbital complication secondary to sinusitis
- Radiographic evidence of sinusitis with extension to the orbit on CT or MRI
- Those with orbital extension even in acute and chronic sinusitis apparent cases

Exclusion Criteria

- Orbital complications resulting from trauma
- Orbital lesions secondary to neoplastic or tumor involvement
- Fungal infections of non-sinonasal origin
- Infections of the orbit resulting from systemic diseases other than sinusitis

Data Collection: All patients meeting the selection criteria were subjected to a thorough clinical examination. A detailed history was taken, including the duration of symptoms, history of previous sinusitis, history of medications, and any systemic disease. Nasal discharge, mucosal swelling, polyps and sinus tenderness were evaluated using detailed ENT examination. Ophthalmological examination included assessment of determining eyelids swelling, proptosis, ocular movements, visual acuity, pupillary reflexes and fundoscopic findings.

Radiological assessment, such as contrast-enhanced CT scan of the paranasal sinuses and orbit, helped in identifying the involved sinus, bony erosion and orbital involvement. Selected cases included MRI when intracranial extension was suspected. Laboratory studies were unremarkable including complete blood count, inflammatory markers, and glucose. Pus or nasal discharge aspirates, when

available, were cultured for aerobic bacteria and anaerobes.

Statistical Analysis: Utilising descriptive statistics, data analysis was carried out. Once it was necessary, the results were shown in tables with frequency, percentage, mean, and standard deviation.

Results

During the study time, 150 patients with orbital problems caused by sinusitis were checked out.

Table 1: Demographic Profile of Patients

Variable	Category	Number (n)	Percentage (%)
Age Group (years)	0–10	28	18.7
	11–20	32	21.3
	21–40	46	30.7
	41–60	30	20.0
	>60	14	9.3
Gender	Male	92	61.3
	Female	58	38.7

The most common age group 21-40 years were orbital complications, which follows through adolescents as well as young adults. In male predominance, observing a higher rate of exposure into the infections and there are delayed the healthcare-seeking behavior.

Table 2: Type of Sinusitis

Type of Sinusitis	Number (n)	Percentage (%)
Acute sinusitis	102	68.0
Chronic sinusitis	48	32.0

The common orbital complications are related to acute sinusitis and highlight the aggressive nature which is spreading beyond from the sinuses of acute infections.

Table 3: Sinuses Involved

Sinus Involved	Number (n)	Percentage (%)
Ethmoid	104	69.3
Maxillary	72	48.0
Frontal	38	25.3
Sphenoid	16	10.7

The most commonly affected ethmoid sinus consists of a thin medial orbital wall (lamina papyracea) that is simplifies the spread of infection.

Table 4: Types of Orbital Complications (Chandler Classification)

Complication Type	Number (n)	Percentage (%)
Preseptal cellulitis	52	34.7
Orbital cellulitis	44	29.3
Subperiosteal abscess	28	18.7
Orbital abscess	18	12.0
Cavernous sinus thrombosis	8	5.3

The most common symptoms demonstrate the preseptal cellulitis. A significant proportion was improved by the abscess formation, emphasize with the importance of early intervention.

Table 5: Clinical Presentation

Symptom/Sign	Number (n)	Percentage (%)
Periorbital pain	118	78.7
Eyelid swelling	136	90.7
Proptosis	64	42.7
Vision changes	36	24.0
Fever	96	64.0

Eyelid swelling and pain were the most common presentations. Almost one quarter had visual changes suggestive of possible severe orbital disease.

Table 6: Radiological Findings

Radiological Feature	Number (n)	Percentage (%)
Medial orbital wall erosion	48	32.0
Subperiosteal collection	28	18.7
Orbital abscess cavity	18	12.0
Intracranial extension suspected	10	6.7

CT scan frequently revealed erosion of the medial wall, emphasizing the involvement of ethmoidal sinus in orbital extension.

Table 7: Microbiological Findings

Organism Identified	Number (n)	Percentage (%)
Staphylococcus aureus	38	25.3
Streptococcus species	30	20.0
Mixed aerobic organisms	24	16.0
No growth	58	38.7

The predominant isolate was Staphylococcus aureus. Antimicrobial treatment given outside of the hospital before presentation could also explain the high rate of non-growth.

Table 8: Management Given

Treatment Modality	Number (n)	Percentage (%)
Medical only	94	62.7
Surgical + Medical	56	37.3

The majority of early-stage complications were managed with intravenous antibiotics, and abscesses underwent surgical drainage.

Table 9: Outcome

Outcome	Number (n)	Percentage (%)
Complete recovery	122	81.3
Residual complications	18	12.0
Permanent vision loss	10	6.7

Most of them had good prognosis upon prompt treatment. Nevertheless, the presence of vision loss in 6.7% indicates that delayed or fulminant orbital infection can be a severe condition.

Discussion

Orbital complications of sinusitis were seen more frequently in children and young adults, predominantly boys, in the present study.

This pattern of age and sex distribution with male predominance, the higher incidence may be attributed to higher environmental exposure, outdoor activities and delayed healthcare seeking behaviour. Age distribution from developing countries with a higher average age as reported in some developed countries maybe indicative of the availability of better early intervention and health care.

Pattern of Orbital Complications in Acute and Chronic Sinusitis: The present study showed that orbital complications were more common in acute than chronic sinusitis. Preseptal and orbital cellulitis were the commonest presentations with the late complications of subperiosteal abscess and orbital abscess being less frequent. These data correspond to Chandler's system-based investigations which indicate that early complications are more frequent. Chronic infectious sinusitis was more with severe complications because of longer inflammation, bone-resorption and delayed presentation.

Sinus and Orbital Structures Involved: Ethmoid sinuses were dominant form in this study, then maxillary and frontal sinuses. The proximity of the ethmoid sinuses to orbit, especially the delicate lamina papyracea, enables easy dissemination of infection. Orbital cellulitis was the predominant orbital complication observed. Studies from South India and Southeast Asia have also reported similar findings, further corroborating the importance of ethmoid sinusitis as a primary contributor to orbital extension.

Role of Imaging in Early Diagnosis: Radiological Imaging played a crucial role for the early diagnosis and classification of orbital complications in the current study. CT Contrast of the paranasal sinuses and orbit were the imaging techniques used and helped identify the extent of sinus disease, orbital involvement, and presence of abscesses. Early imaging helped early decision making with respect to conservative or surgical care. This corresponds with the global recommendation that in suspected orbital complications, particularly with visual symptoms

or reduced ocular movements (with/without cellulitis), CT imaging is mandatory.

Management Strategies and Clinical Outcomes: The majority of patients in this study demonstrated a positive response to conservative therapy with intravenous antibiotics, nasal decongestants and supportive management. Surgical treatment, which involved endoscopic sinus surgery and abscess drainage, was performed in patients with insufficient medical treatment response or abscess formation. There was a good result in most of the patients, few had long-term sequelae. These findings are consistent with the observations, emphasizing the role of prompt diagnosis and multidisciplinary care (ENT surgeon and ophthalmologist).

Comparison Table Present Study vs. Existing Literature

Table 10: Comparison of present Study with previous study

Study	Study Type	Sample Size	Key Findings
Present Study	Descriptive observational	150 patients	Orbital complications observed in both acute and chronic sinusitis with ethmoid sinus most commonly involved; preseptal cellulitis and orbital cellulitis were dominant; early imaging led to effective management with good outcomes (majority responded to conservative and surgical where indicated).
Study 1 [13]	Retrospective observational	66 patients	Predominantly pediatric cases (95.5%); preseptal cellulitis most common; subperiosteal and orbital abscess seen; 13.6% required surgery; complete recovery with early diagnosis and multidisciplinary management.
Study 2 [14]	Retrospective clinical analysis	143 patients	Compared classification systems; ethmoid and maxillary sinuses frequently involved; stratified orbital complications showed differing rates of hospitalization and surgery requirement; demonstrated importance of CT imaging and classification in management decisions.
Study 3 [15]	Prospective observational	616 patients	Orbital complications found in 5.8% of sinusitis patients; most common in children; preseptal cellulitis most frequent, followed by orbital cellulitis and abscess; ethmoid sinus predominated in children while mixed involvement more common in adults.

Conclusion

The current study illustrates several key clinical and epidemiologic patterns in patients with orbital complications resulting from acute and chronic sinusitis. Involvement of orbit was seen more in younger patients, with male preponderance. Acute sinusitis was the most common underlying disease, and the ethmoid sinus was identified as the site most frequently involved. Preseptal cellulitis was the most common presentation, followed by orbital cellulitis and subperiosteal abscess among different spectrum of complications. Although rare, advanced complications including orbital abscess and cavernous sinus thrombosis were associated with higher risk of visual or systemic morbidity. Early radiological assessment, and especially contrast-enhanced CT scanning was paramount in determining the degree of sinus disease and orbital involvement. The timely identification of cellulitis versus abscess formation provided by the prompt imaging allowed medical and surgical management to be instituted. Whereas the results of this study demonstrate the importance of early referral to a tertiary care facility, as this was associated with better outcomes and lower risk of permanent visual defects. Multidisciplinary approach otorhinolaryngologists, ophthalmologist, radiologist and microbiologists were essential for the holistic care of these two patients. The majority of patients were successfully treated with early medical therapy, and surgery was performed in complicated cases. These results show how important it is to have a clinical suspicion, get an imaging test right away, and coordinate care for sinusitis in order to avoid major problems.

Limitations

As it was a single-center study, these results may not be applicable to general population. The follow-up time of 1 year may not reflect the occurrence of seasonal variation for sinus infection. There was no long-term follow-up of patients, and thus the evaluation for delayed complications or recurrence could not be made. Furthermore, a descriptive type of study could not identify causality or risk factors for development of severe orbital complications.

Recommendations

Early radiological assessment in particular by CT scanning is strongly considered in patients with sinusitis who present with ocular symptoms of swelling, pain or visual disturbance. Greater

education of primary care colleagues in early signs and symptoms of orbitial complications is important to ensure no delay in referral.

Further, multicentric studies with longer follow-up are recommended in order to study the risk factors, regional patterns and long-term sequel of orbital complications of sinusitis.

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