

A Retrospective Study of Bony Erosion Patterns in Cases of Fungal Rhinosinusitis

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ABSTRACT

Erosion of bone with or without extension of disease into adjacent anatomic spaces is observed among some patients with fungal rhinosinusitis (FRS). Preoperative computed tomographies is very important to determine the sites of bony erosion. Patients with bony erosions are classified based on the involved subsite and the extent of erosion.

Bony erosions was seen in 37.5% cases. Six patients were having bone erosions on CT scan. 40 % erosions were present in patients belonging to younger age group. Erosion of sinus boundaries were more common in male patients (60%). The ethmoid sinus complex was most commonly involved (46.6%). This was followed in frequency of involvement by the maxillary sinus (26.6%), the sphenoid sinus (20%) and the frontal sinus (6.6%). The most common site of erosion was the lamina papyracea (33.3%), followed by the medial maxillary wall(20%).

Bony erosions due to FRS were mainly due to long-term mechanical compression by the fungal mass. A case of chronic rhinosinusitis with bony erosions in CT scan may indicate a fungal etiology.

Keywords: Bony erosions, Fungal rhinosinusitis, Fungal rhinosinusitis.

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INTRODUCTION

Fungal rhinosinusitis (FRS) is extremely common and its prevalence depends upon age, gender, and geographical location of the population studied. In addition to physical discomfort, it also causes a substantial economic burden to patients in terms of missed workdays due to hospital visits. A definitive diagnosis and timely intervention can reduce morbidity caused by this disease.¹

Fungal rhinosinusitis can be broadly divided into two categories based on histopathological findings: Invasive and noninvasive, depending upon the invasion of mucosal layers. Invasive FRS is further subdivided as acute (fulminant) invasive, granulomatous invasive, and chronic invasive, while noninvasive FRS can be categorized as saprophytic fungal infestation, fungal ball, and fungus-related eosinophilic rhinosinusitis including allergic fungal rhinosinusitis (AFRS).² Allergic FRS represents an intense allergic response against colonizing fungus, giving rise to formation of allergic mucin, mucostasis, and sinus opacification.

Preoperative computed tomography (CT) is important to ensure appropriate treatment for FRS,³ and several studies have reported the CT features of FRS, including an abnormal increase in the density of the sinuses, sinus mucosal thickening, calcification, sclerosis of the sinus lateral wall, and bone erosion.⁴ Calcification in the sinus is believed to be one of the most specific among those features and has a strong suggestive role for this diagnosis.⁵

Bone erosion is a common manifestation of FRS on CT imaging and manifests as discontinuous or inflated thinning of bone.⁶ At this point, patients present with more serious findings, such as visual disturbances, proptosis, and mental status changes.

AIMS AND OBJECTIVES

To investigate bony erosion patterns in FRS.

STUDY DESIGN

Retrospective review.

MATERIALS AND METHODS

The clinical data of all patients with FRS – who received surgical treatment at the Department of ENT and Head and Neck Surgery, Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, Uttar Pradesh, India, from August 2013 to August 2015 – were selected and analyzed retrospectively. The diagnosis of FRS was mainly based on clinical manifestations and microbiological examinations, including microscopic examination of fungal hyphae (KOH staining), fungal culture and polymerase chain reaction (panfungal PCR). All patients underwent CT preoperatively, and bone and soft tissue windows were used, with parallel coronal and axial reconstruction. The

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information extracted from the clinical data included gender, age, initial symptoms, disease course, and CT data. The disease course was calculated as the time of initial symptoms until the date of CT examination. Computed tomography was performed primarily to evaluate the primary sinus and extent of lesions with or without bone erosion and calcification imaging.

Patients who were immunocompromised or who were suffering from comorbid disease – for example, diabetes mellitus, chronic kidney disease – were excluded from the study.

RESULTS

Out of total 40 patients selected, only 15 had bony erosions in paranasal sinuses in the CT scan, which was done at the time of presentation. This suggested that the incidence of bone erosions in cases of FRS was only 37.5% in our study.

The age of patients included in the study ranged from 10 to 60 years. Six patients having bone erosions in CT scan belonged to 21 to 30 years of age. Thus it was found that 40% erosions were present in patients belonging to younger age group, while only one patient belonging to 50 to 60 years of age group showed bone erosion (Table 1). Erosion of sinus boundaries were more common in male patients (60%).

The ethmoid sinus complex was most commonly involved (46.6%), followed by maxillary sinus (26.6%), the sphenoid sinus (20%), and the frontal sinus (6.6%) which was least involved (Table 2).

The most common site of erosion was the lamina papyracea (33.3%), followed by the medial maxillary wall (20%). Distribution of erosion sites is listed in Table 3.

Table 1: Age wise distribution of cases of bony erosions in FRS

Age groups (year)	No. of patients (%)
10–20	2 (13.3)
21–30	6 (40)
31–40	4 (26.6)
41–50	2 (13.3)
51–60	1 (6.6)

Table 2: Incidence of paranasal sinus involvement

Eroded paranasal sinus	No. of patients (%)
Maxillary	4 (26.6)
Ethmoid complex	7 (46.6)
Frontal	1 (6.6)
Sphenoid	3 (20)

Table 3: Incidence of bony erosions by anatomical subsite on preoperative CT imaging

Site of bony erosion	No. of patients (%)
Medial wall of maxillary sinus	3 (20)
Anterolateral wall of maxillary sinus	1 (6.6)
Lamina papyracea	5 (33.3)
Cribriform plate	2 (13.3)
Floor of frontal sinus	1 (6.6)
Roof of sphenoid sinus	2 (13.3)
Orbital floor	1 (6.6)

DISCUSSION

Fungal sinusitis continues to be underdiagnosed because it is often not recognized as a distinct clinical entity.⁷ In the past, fungal sinusitis has been grouped under the broad classification of “fungal sinusitis” rather than being recognized as a separate disease.^{8,9} Recent advances have led to a better understanding of fungal sinus infections. Our CT findings are similar to those previously described by Inci et al.¹⁰ Because our study is a retrospective one in which we evaluated known cases of fungal sinusitis, we cannot conclude that the imaging findings are “highly specific,” as previously suggested.

However, our findings suggest that the presence of a unilaterally opacified sinus associated with sinus expansion, bone remodeling, and increased internal attenuation on unenhanced CT scans should raise the possibility of allergic fungal sinusitis. The mechanism of bone erosion in association with FRS is unclear. Probably, it is due to mechanical compression by the fungal mass.⁷ Early diagnosis and treatment of FRS reduce the incidence of bone erosion.

The incidence of bony erosion in our series (37.5%) is consistent with other reports. There was male predominance for bony erosions in our study. On reviewing the literature, there has been inconclusive data on sex variations in FRS because some studies showed no sex predilection, whereas other studies showed both male and female predominance. Finally, we found that younger patients were more likely to have bony erosion, which concurs with the findings by Seo et al.⁶

Complete removal of the lesions under endoscopy is the preferred method for treating FRS.

The main limitations of this study were as follows. First, CT scan can be performed in different ways. It is not likely that these scans were performed in the most accurate way



Fig. 1: Computed tomography scan showing erosion of roof and floor of frontal sinus

for scientific purpose since they were performed for clinical use. Therefore, small erosions could have been missed. Second, since this was a retrospective study, and most cases had no fungal culture results, an association between bone erosion and fungal taxon could not be ruled out.

In conclusion, bony erosions due to FRS were mainly due to long-term mechanical compression by the fungal mass, and the differential diagnosis of FRS with bone erosion should be considered.

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