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Research Article

A STUDY OF RADIOLOGICAL FINDINGS IN CHRONIC RHINOSINUSITIS IN SOUTHERN INDIA

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ABSTRACT

Chronic rhinosinusitis (CRS) is one of the most frequent otorhinolaryngology diseases encountered in everyday practice. It is a common medical condition but one in which the diagnosis and prognosis depend on symptoms, signs and radiological evaluation and appropriate treatment. CT has become the standard diagnostic tool in evaluation of paranasal sinuses.

Aims and objectives

- To study the Computed Tomography findings in clinically diagnosed cases of chronic rhinosinusitis.
- To study the incidence and role of anatomical variations of the osteomeatal complex in chronic Rhinosinusitis

Materials and Methods: Total 54 patients were studied. Patients came with complaints of nasal obstruction, nasal discharge, Headache, facial pain etc .., were included in this study. NCCT with slice thickness of 3mm of para nasal sinus of patients with chronic symptoms was done using Toshiba 16 slice machine.

Results: The present study was conducted in JJMMC and Chigateri hospital, Davangere, Karnataka Total 54 patient's were studied. Male to female ratio was 1.45: 1. Out of 54 patient's maximum number of patients had bilateral maxillary sinus involvement and followed by bilateral maxillary and ethmoidal sinusitis. Majority of patients in our study presented with complaints nasal obstruction followed by post nasal drip, headache/ facial pain and nasal discharge.

Conclusions: Computed tomography of para nasal sinus helps in accurate diagnosis of chronic rhino sinusitis. A study of 54 cases of chronic rhino sinusitis helped in understanding of the underlying disease process has led to an evolution in the treatment of CRS.

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INTRODUCTION

Sinus infection lasting for months to years is called chronic sinusitis. Most important cause of chronic sinusitis is failure of acute infection to resolve. Acute infection destroys normal ciliated epithelium impairing drainage from the sinus. Pooling and stagnation of secretions in the sinus invites infection. Persistence of infection causes mucosal changes, such as loss of cilia, oedema and polyp formation, thus continuing the vicious cycle. Mixed aerobic and anaerobic organisms are often present. Clinical features are often vague and similar to those of acute sinusitis but of lesser severity. Purulent nasal discharge is the commonest complaint. Foul - smelling discharge suggests anaerobic infection. Local pain and headache are often

not marked except in acute exacerbations. Some patients complain of nasal stuffiness and anosmia.

| Major | Minor |
|---|--|
| Facial pain/pressure | Headache |
| Facial congestion/fullness | Fever (nonacute) |
| Nasal obstruction/blockage | Halitosis |
| Nasal discharge/purulence, discolored posterior drainage | Fatigue |
| Hyposmia/anosmia | Dental pain |
| Purulence on nasal exam | Cough |
| Fever (acute rhinosinusitis only) | Ear pain, pressure, and/or fullness |

Diagnosis of rhinosinusitis requires two major or one major and two minor symptoms.

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MATERIALS AND METHODS

This study was conducted in the Department of Otorhinolaryngology- Head and neck surgery. Those patients who were diagnosed to have chronic rhinosinusitis, attending ENT outpatient department in Chigateri district hospital and Bapuji hospital attached to JJM Medical College, Davangere from November 2015 to February 2017 were enrolled for the study. Informed consent from all the patients and the ethical committee clearance was taken to conduct the study. 54 patients were made to undergo CT scan of Paranasal sinus and results were analysed.

Sample Size

Total of 54 patients are included in the study.

Inclusion Criteria

All consecutive patients aged between 15 to 70 yrs undergoing fess for chronic rhinosinusitis in jjmmc and chigateri hospital.

Exclusion Criteria

1. Polypoidal or other expansile lesions
2. Patients with facial anamologies
3. Patients with surgical or traumatic antecedents in nasosinusal region
4. Patients with acute infections
5. Patients with fungal sinusitis
6. Patients with malignancy
7. Patients with altered ciliary motility like

Immotile cilia syndrome

- Kartageners syndrome
- Downs syndrome
- Cystic fibrosis

RESULTS

The present study was conducted in J.J.M.M.C and Chigateri hospital, Davangere, Karnataka, India. The study included 54 patients diagnosed with chronic rhinosinusitis undergoing Functional Endoscopic Sinus Surgery (FESS) from November 2015 to February 2017, in whom we searched for salient features of chronic rhinosinusitis in Computed tomography and the anatomical variations in these patients. Male to female ratio was 1.45: 1. Out of 54 patient’s maximum number of patients had bilateral maxillary sinus involvement and followed by bilateral maxillary and ethmoidal sinusitis.

Age Distributions

The age of the patients in our study varies from 15 to 70 yrs. 74 % of patients were relatively young as they were either equal to or less than 40 yrs of age with equal proportion of patients in the age groups of 21 to 30 yrs and 31 to 40yrs.

Sex Distribution

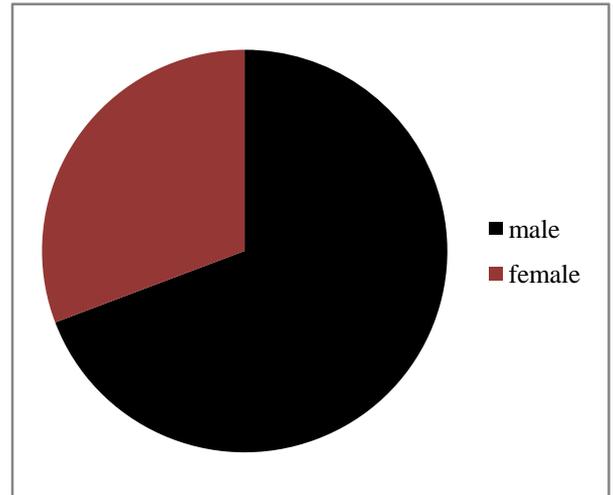
Our study showed male preponderance i.e 59.3% male and 40.7% female. Thus male to female ratio was 1.45:1

Table 1 Age distribution of study subjects

| Age group | Frequency | Percentage |
|-----------|-----------|------------|
| 11-20 | 12 | 22.2 |
| 21-30 | 14 | 25.6 |
| 31-40 | 14 | 25.9 |
| 41-50 | 7 | 13.0 |
| 51-60 | 5 | 9.3 |
| 61-70 | 2 | 3.7 |
| Total | 54 | 100 |

Table 2 sex distribution of study subjects

| Sex | Frequency | Percentage |
|--------|-----------|------------|
| Male | 32 | 59.3 |
| Female | 22 | 40.7 |
| Total | 54 | 100 |



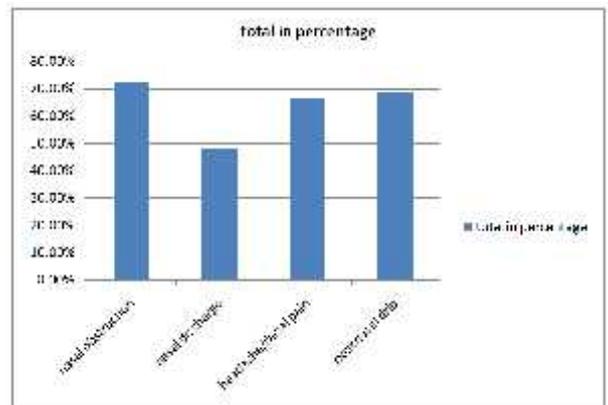
Graph 1 Sex distribution of study subject

Symptoms

Majority of patients in our study presented with complaints nasal obstruction followed by post nasal drip, headache/ facial pain and nasal discharge.

Table 3 symptoms presentation of study subjects

| Symptoms | Frequency percentage | Total no./ percentage |
|-----------------------|----------------------|-----------------------|
| Nasal obstruction | 39 | 72.2% |
| Nasal discharge | 26 | 48.1% |
| Headache/ facial pain | 36 | 66.6% |
| Post nasal drip | 37 | 68.5% |

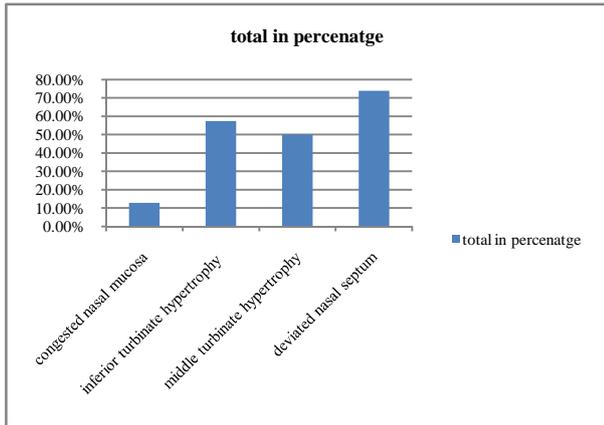


Graph 2 symptom presentation of the subjects

Signs: In our study deviated nasal septum was found in 74% of patients followed by inferior turbinate hypertrophy. Middle turbinate hypertrophy was seen in 50% of the cases and only 13% of the cases had congested nasal mucosa as the presenting sign either alone or in combination with other signs.

Table 4 signs presentation of the subjects

| Signs | Frequency | Total in percentage |
|--------------------------------|-----------|---------------------|
| Congested Nasal mucosa | 7 | 12.9% |
| Inferior turbinate hypertrophy | 31 | 57.4% |
| Middle turbinate hypertrophy | 27 | 50% |
| Deviated nasal septum | 40 | 74% |



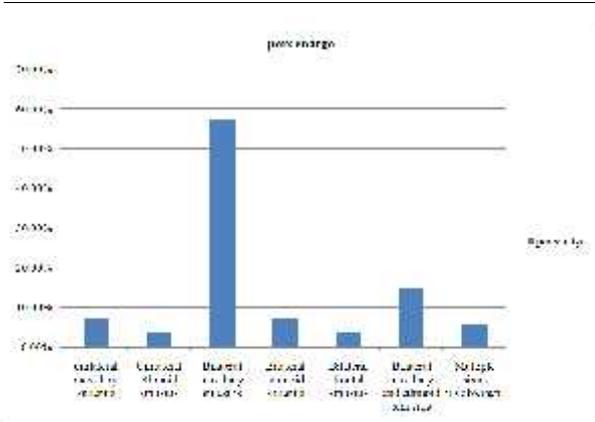
Graph 3 Signs presentation of study subjects

Diagnosis

54.7% of the cases were diagnosed as bilateral maxillary sinusitis while in 5.6% of cases multiple sinuses were involved

Table 5 Distribution of study subjects by diagnosis

| Diagnosis | Frequency | Percentage |
|---|-----------|------------|
| Unilateral maxillary sinusitis | 4 | 7.4 |
| Unilateral ethmoid sinusitis | 2 | 3.7 |
| Bilateral maxillary sinusitis | 31 | 57.4 |
| Bilateralethmoid sinusitis | 4 | 7.4 |
| Bilateral frontal sinusitis | 2 | 3.7 |
| Bilateral maxillary and ethmoid sinusitis | 8 | 14.8 |
| Multiple sinus involvement | 3 | 5.6 |
| Total | 54 | 100 |



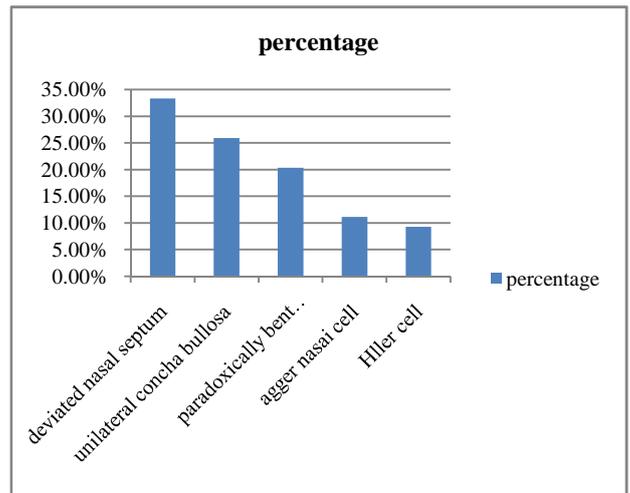
Graph 4 Distribution of study subjects by diagnosis

Anatomical Variations

In our study it was observed that 53.7% of the chronic sinusitis cases had 2 or more anatomical variations and 33.3 % of cases had single anatomical variations

Table 6 prevalence of anatomical variations in study subjects

| Anatomical variations | Frequency | Percentage |
|-------------------------------------|-----------|------------|
| Deviated nasal septum | 18 | 33.3% |
| Unilateral concha bullosa | 14 | 25.9% |
| Paradoxically bent middle Turbinate | 11 | 20.37% |
| Agger nasi cell | 6 | 11.1% |
| Haller cell | 5 | 9.25% |
| Total | 54 | 100 |



Graph 5 Prevalence of anatomical variation in study subjects

Deviated nasal septum was found to be the most common amongst the anatomical variations in chronic rhinosinusitis cases in the present study which was followed by unilateral concha bullosa and paradoxically bent middle turbinate. agger nasi cell and haller cell were seen in one case each.

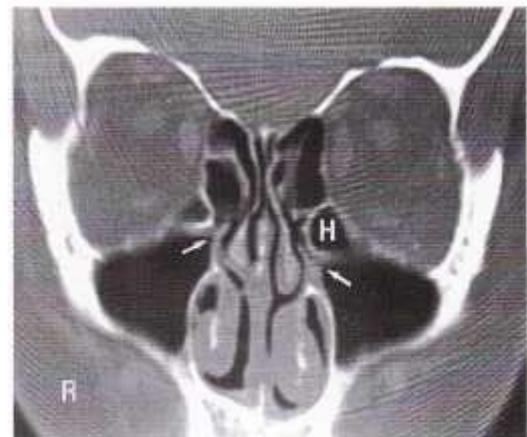


Figure1 Haller cell

Sinus Involved

In our study we found that 85.2% of subjects had maxillary sinus involvement followed by involvement of ethmoid sinus, frontal and sphenoid sinus respectively



Figure 2 Concha bullosa



Figure 3 paradoxically curved middle turbinate

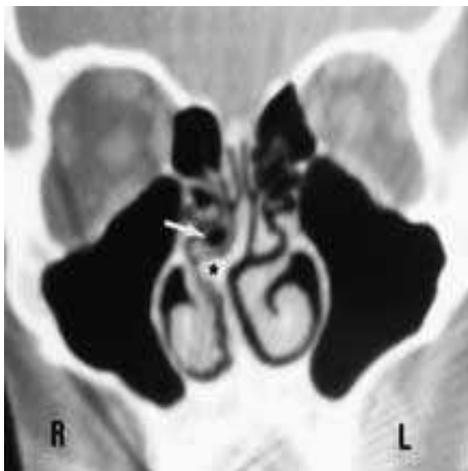


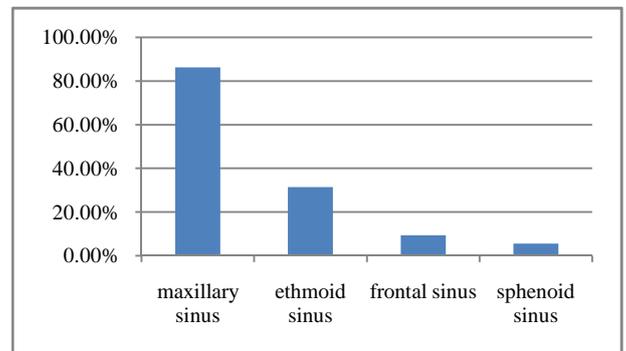
Figure 4 Nasal Septal Deviation



Figure 5 Agger Nasi Cell

Table 7 frequency of sinus involvement in the study subjects

| Sinus involved | Present (%) | Total (%) |
|-----------------|-------------|-----------|
| Maxillary sinus | 46 | 85.2 |
| Ethmoid sinus | 17 | 31.5 |
| Frontal sinus | 5 | 9.3 |
| Sphenoid sinus | 3 | 5.6 |



Graph 6 frequency of sinus involvement in study subjects

DISCUSSION

The High resolution of CT images clearly shows air spaces, opacified sinuses, and the fine structural architecture of bony anatomy therefore, the gold standard for delineating inflammatory sinus disease and evaluating mucosal abnormalities, sinus ostial obstruction, anatomic variants, and sinonasal polyps. Anatomic variants that may predispose to disease include septal deviation, concha bullosa, Haller cells, hypoplasia of the maxillary sinus, and narrowing or obstruction of the osteomeatal complex.

In our study we found anatomical variation in osteomeatal complex of 87% of patients with chronic rhinosinusitis, out of which 53.7% had two or more anatomical variations and the remaining 33.3% had single anatomical variation.

Nasal Septal Deviation - 74.1% of the patients in our study presented with the nasal septal deviation as shown in figure 4. Similar findings were observed by [Perez et al](#) (1) who reported the prevalence of deviated nasal septum to be about 80%. [Dua et al](#)(2) and [Asruddin et al](#)(3) found prevalence of 44% and 38% of deviated nasal septum in their respective studies.

Concha Bullosa- has been implicated as a possible etiological factor in the causation of recurrent chronic rhinosinusitis. It is due to its negative influence on paranasal sinus ventilation and mucociliary clearance in the middle meatus as quoted by [tonia](#) (4). Concha bullosa was seen in 53.7% of patients (unilateral 33.3%, bilateral 20.4%) which almost similar to as reported by [Bolger et al](#) (5) and [Yousem et al](#) (6) respectively. The prevalence of concha bullosa in our study is on the higher side when compared to the findings of [Stallman et al](#) (7), [Maru et al](#) (8), [Alkire A et al](#) (9) who reported it to be 44%, 42.6%, 41.7% and 40.8% respectively.

Paradoxically Curved Middle Turbinate- The middle turbinate may be paradoxically curved i.e bent in the reverse direction. This may lead to impingement of middle turbinate of middle meatus and thus to sinusitis. In our study it was found in 14.8% of patients, the prevalence is similar to that of 12% noted by [Asruddin et al](#) (10) and 15% by [LLYOD](#) (11). lesser prevalence of paradoxically curved middle turbinate was observed by [Wani et al](#) (12) 2009.

Agger Nasi Cell- agger nasi cell lie just anterior to the anterosuperior attachment of the middle turbinate and frontal recess. These can invade the lacrimal bone or the ascending process of maxilla. These cells were least observed in our study i.e. about 1.9%. Similar results were observed by [Lui X et al](#) (13) and [Llyod et al](#) (11) who reported the prevalence of agger nasi cell as 0.7% and 3% in chronic rhinosinusitis patients.

Haller Cell- They are considered as ethmoid cells that grow into floor of the orbit and may narrow the adjacent ostium of the maxillary sinus especially if they become infected. The prevalence of haller cells in our study was found to be 1.9%. similar findings were observed by [Lui X et al](#) (13) who reported the prevalence of about 1% of haller cells in 297 patients of chronic rhinosinusitis cases in a study conducted in sun yat sen university of medical sciences. This is again less as compared to that reported by [Dua et al](#) (2)16%, [Llyod et al](#) (11) 15%, [Bolger et al](#) (5) 45.9%.

Limitation of This Study

Study was conducted in two different hospitals i.e JJMMC and CG HOSPITAL, by different radiologists. Few of the Computed tomography findings were found to be on higher side. eg The prevalence of concha bullosa in our study is on the higher side when compared to the findings of [Stallman et al](#) (7), [Maru et al](#)(8), [Alkire A et al](#) (9) who reported it to be 44%, 42.6%, 41.7% and 40.8% respectively.

CONCLUSION

Majority of patients were in relatively younger age group i.e from 31-40 yrs of age as mentioned in table1. There was male preponderance of 59.3% (table 2, graph 1).

The commonest symptom were nasal obstruction i.e 39 patients of 54 (table 3, graph 2) followed by post nasal drip and headache.

The commonest signs were deviated nasal septum followed by inferior turbinate hypertrophy and middle turbinate hypertrophy. Maxillary sinus was most commonly involved sinus, bilateral maxillary sinusitis was the commonest which was found in 57.4% of cases followed by bilateral maxillary and ethmoidal sinusitis i.e in 14.8% of cases (table 5, graph 4). Deviated nasal septum was the most common anatomical variation encountered in our study followed by concha bullosa.53.7% of patients had more than two anatomical variation (table 6, graph 5). Computed Tomography must be done prior to FESS to assess the extent of sinus disease and to know the anatomical variation.

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