



STUDY COMPARING INTRA-OPERATIVE FINDINGS OF FUNCTIONAL ENDOSCOPIC SINUS SURGERY AND PRE-OPERATIVE COMPUTED TOMOGRAPHY SCAN FINDINGS IN PATIENTS OF CHRONIC SINUSITIS

Surgery

Dr. G. S. Keerthi

Assistant Professor, Department of ENT, CMR Institute of Medical Sciences, Medchal

KEYWORDS

INTRODUCTION

Paranasal sinus disease is a significant health problem affecting a large cluster of population. An increased rate of coincidental mucosal changes in paranasal sinuses were reported from clinical studies. Anatomic and diagnostic details relative to osteomeatal complex (OMC) in patients with chronic sinusitis are crucial and advised to be checked for before functional endoscopic sinus surgery. It is also critical to avoid unnecessary interventions by identifying regions without any pathology as well as to determine the extension of the disease prior to operation, and to determine anatomic abnormalities. All these data are necessary to perform an effective surgical intervention, and to avoid intracranial and intraorbital complications. Review articles on rhinosinusitis have suggested that atopy predisposes to its development. Both conditions share the same trend of increasing prevalence and are frequently associated. It has been postulated that swelling of the nasal mucosa in allergic rhinitis at the site of the sinus ostia may compromise ventilation and even obstruct sinus ostia, leading to mucus retention and infection. However, critical analysis of the papers linking atopy as a risk factor to infective rhinosinusitis (chronic or acute) reveal that whilst many of the studies suggest a higher prevalence of allergy in patients presenting with symptoms consistent with sinusitis than would be expected in the general population, there may well have been a significant selection process, because selection involved often had an interest in allergy. A number of studies report that markers of atopy are more prevalent in populations with chronic rhinosinusitis.

MATERIALS AND METHODS

Patients attending the out-patient/in patient department of ENT OPD, CMR Institute of Medical Sciences & Hospital, Medchal, suffering from chronic rhinosinusitis were taken for the study after obtaining written informed consent. Cross sectional study a total of 50 cases between 15-80 years were taken up for the study for 18 months (January 2022 to June 2023)

OBSERVATION AND RESULTS

The total number of participants involved in the study were 50 during the 18 months study. After a thorough work-up and pre-operative preparation, participants who fulfilled the inclusion criteria were taken up for the study. The age distribution of the patients is represented in Table 1 and Figure 1. Majority of patients belonged to the 31-40 age group.

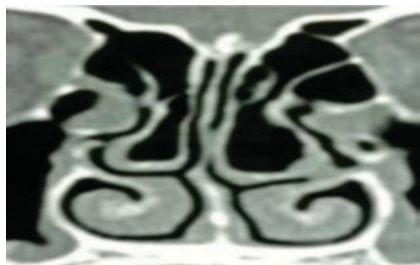


Table 1: Age Distribution Of Patients

Age group(yrs)	No of Patients
<20	6 (12%)
21-30	11 (22%)
31-40	24 (48%)
41-50	6 (12%)
51-60	2 (4%)
> 60	1 (2%)
Total	50

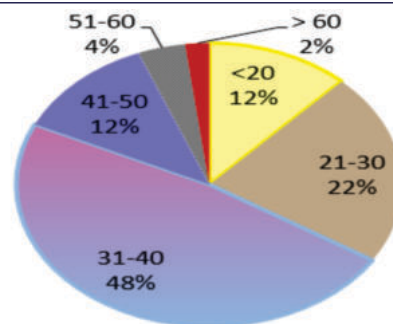


Figure 1: Age Distribution Of Patients

Deviated Nasal Septum was found in 29(58%) cases on CT scan, DNS towards the left in 16 cases and DNS towards the right in 13 cases. While on Endoscopic sinus surgery it was seen in 36 (72%) cases, DNS towards the left in 19 cases and DNS to the right in 17 cases. The results obtained were tabulated in table 2. In seven cases reported as normal septum on CT scan by the radiologist, there was a caudal dislocation of the septum observed in 4 cases during surgery. There was a mild C-shaped DNS noted in 1 case, High DNS to the Left in one case and one case with right inferior spur intra-operatively. The nature of DNS in these 7 cases, which did not correspond with CT scan findings or not reported, is represented in Table 3.

Table 2: Comparison Of Deviated Nasal Septum Between Ct Scan And Intra-operative Findings.

	DNS Present	DNS Absent
CT PNS	29(58%)	21
Intra op	36(72%)	14

Table 3: Type Of Deviated Nasal Septum In Cases Reported As Normal On Ct Scan

Type of DNS	No. of cases
Caudal Dislocation	4
High DNS	1
Spur	1
C-shaped (Mild)	1

Maxillary Sinus was noted to be inflamed in 39 (78%) cases on pre-operative CT Scan, 13(26%) cases on the left side, 4(8%) cases on the right side, and 22(44%) cases presented with bilateral involvement. Intra-operatively 43 (86%) cases were found to be involved, 23(46%) cases presented with bilateral involvement, 14(28%) cases on the left side and 6(12%) cases on the right side. The results are shown in table 4 and the distribution is represented with a line diagram in figure 2.

Table 4: Comparison Of Maxillary Sinus Involvement Between Ct Scan And Intra-operative Findings.

	Left Maxillary Sinus involved	Right Maxillary Sinus involved	Bilateral Maxillary Sinus involved	Normal Maxillary Sinus
CT PNS	13 (26%)	4 (8%)	22 (44%)	11(22%)
Intra op	14(28%)	6 (12%)	23(46%)	7(14%)

Ethmoid Sinus involvement was seen in 33(66%) cases on pre-operative CT Scan, 28(56%) cases presented with bilateral involvement, 3 (6%) cases on the left side, 2 (4%) cases on the right side and normal findings in 17 cases. Operative findings revealed 34(68%) cases to be involved. 28(56%) cases presented with bilateral involvement, 4(8%) cases on the left side and 2(4%) cases on the right

side and 16 normal cases. The results of which are represented in table 5.



Figure 2: Comparison Of Maxillary Sinus Involvement Between Ct Scan And Intra-operative Findings.

Table 5: Comparison Of Ethmoid Sinus Involvement Between Ct Scan And Intra-operative Findings

	Left Ethmoid Sinus involved	Right Ethmoid Sinus involved	Bilateral Ethmoid Sinus involved	Normal Ethmoid Sinus
CT PNS	3(6%)	2(4%)	28(56%)	17
Intra op	4(8%)	2(4%)	28(56%)	16

Frontal Sinus was seen to be involved in 20(40%) cases on pre-operative CT scan, 9 cases presented with bilateral involvement, 6(12%) cases on the left side, 5(10%) cases on the right side and normal findings in 30 cases. Operative findings revealed only 18(36%) cases to be involved intra-operatively. 8(16%) cases presented with bilateral involvement, 6(12%) cases on the left side, 4(8%) cases on the right side and 32 normal cases. The results represented in table 6 and the distribution represented in figure 3.

Table 6: Comparison Of Frontal Sinus Involvement Between Ct Scan And Intra-operative Findings

	Left Frontal Sinus involved	Right Frontal Sinus involved	Bilateral Total Frontal Sinus involved	Normal Frontal Sinus
CT PNS	6(12%)	5(10%)	9(18%)	30
Intra op	6(12%)	4(8%)	8(16%)	32

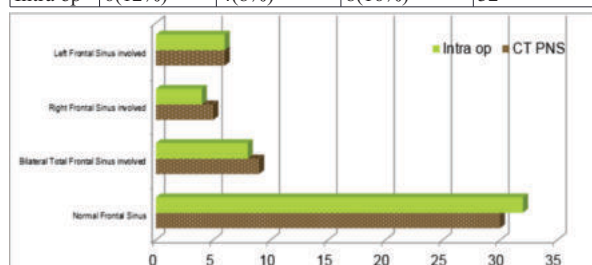


Figure 3: Comparison Of Frontal Sinus Involvement Between Ct Scan And Intra-operative Findings

Sphenoid sinus was involved in 25(50%) cases on pre-operative CT scan 8(16%) cases on the left side, 6(12%) cases on the right side, and 11(22%) cases presented with bilateral involvement. Intra-operatively only 24(48%) cases were found to be involved. While 10(20%) cases revealed bilateral involvement, 8(16%) cases on the left side and 6(12%) cases on the right side. The results are tabulated in table 7.

Table 7: Comparison Of Sphenoid Sinus Involvement Between Ct Scan And Intra-operative Findings

	Left Sphenoid Sinus involved	Right Sphenoid Sinus involved	Bilateral Total Sphenoid Sinus involved	Normal Sphenoid Sinus
CT PNS	8(16%)	6(12%)	11(22%)	25
Intra op	8(16%)	6(12%)	10(20%)	26

Osteo-meatal Complex was blocked in 44(88%) cases on CT Scan. 23(46%) cases presented with bilateral OMC block, 14(28%) cases with left OMC block, 7(14%) cases with right OMC block and normal findings in 6 cases. Endoscopic sinus surgery findings revealed 47(94%) cases with OMC block. 25(50%) cases presented with bilateral OMC block, 15(30%) cases with left OMC block and 7(14%) cases with right OMC block and normal findings in 3 cases.

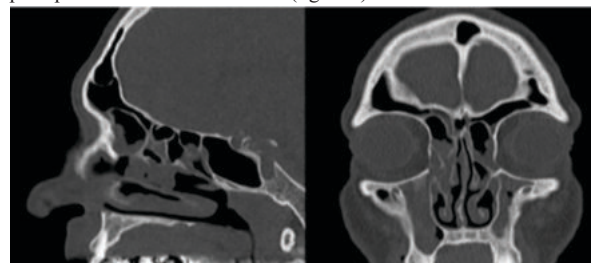
The status of middle meatus was assessed in all cases that were reported as OMC occlusion. This was done to assess the nature and

type of inflammation to evaluate the disease process, its severity and extent of involvement. Upon Endoscopic examination during surgery, some cases had thick mucosal discharge, Purulent discharge, Polyps or Congestion.

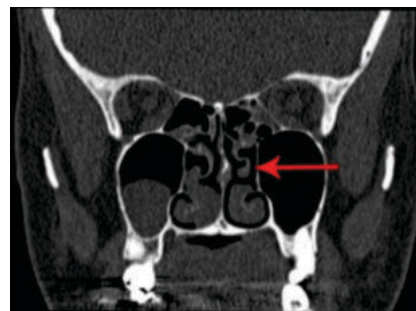
Haller Cell was seen in 5(10%) out of 50 cases in this study on pre-operative CT scan evaluation (figure 4). **Onodi Cell** was seen in 6 (12%) cases in this study on pre-operative CT scan evaluation in this study.



Agger Nasi Cell was seen in 11(22%) out of 50 cases in this study on pre-operative CT scan evaluation (figure 5).



Paradoxical Middle Turbinate was observed in 12(24%) cases, 2(4%) cases with bilateral Paradoxical Middle Turbinate, 4(8%) cases with left Paradoxical Middle Turbinate, 6(12%) cases with right Paradoxical Middle Turbinate and normal findings in 38 cases both on pre-operative CT scan and Endoscopic sinus surgery as seen in figure 6.



Superior attachment of the Uncinate Process was studied in this study. Attachment to the Lamina Papyracea (Type I) was seen in 34 (68%) cases, attachment to Base of the Skull (Type II) was seen in 10 (20%) cases and attachment to middle turbinate (Type III) was seen in 6 (12%) cases. **Kero's assessment** was done for all cases in this study to ascertain the depth of the Olfactory fossa. Majority of cases had Type 2 Keros in this study with 41(82%) cases. 5(10%) cases had type 1 keros and 4(8%) cases had type 3 keros.

CONCLUSIONS

CT scan is the most sensitive investigation which serves as a road map for the variations of the PNS. It is non-invasive, rapid, convenient investigation which helps in documentation and education. It shows progressively deeper structures uncinat process, bulla ethmoidalis, ground lamella, sphenoid sinus in an coronal and axial planes therelationship of these structures to important areas such as skull bone and lamina papyracea. Bony Dehiscences of sinus walls are better visualised upon CT scan.

Certain findings however may not correlate well with the operative findings like the nature of disease whether purulent discharge, mucosal discharge, polypoidal tissue or acute exacerbation of CRS with congestion of mucosa. Correlative study revealed that while

correlation is excellent for factors like Osteomeatal complex and paradoxical middle turbinate, it is good ethmoid and frontal disease and only moderate for Maxillary sinus disease. Apart from the study of the sinus disease, the anatomical variations also correlated well with the operative findings. The Extent of involvement of each sinus and anatomical details like attachment of uncinate, depth of olfactory fossa, presence of onodi cell orbit are not assessed with any other modality of investigation except for CT scan. The information with respect to these structures is imperative to minimise post-operative complications. Optical brilliance, clear field of vision, Ability to look around corners with deflecting angles gives an edge for Endoscope over CT scan to assess the nature of the disease and range of its extension. Discrepancies do exist between the CT scan findings and operative findings for almost all cases, which is mostly with respect to the extent of the disease process. Although, rarely discrepancies do occur also with respect to nasal anatomy, sinus anatomy and all other anatomical structures adjacent to the Nose and the Paranasal Sinuses. Although some differences between CT findings with operative findings have been noted, the effectiveness of the CT scan to assess the disease process cannot be refuted. Hence it can be concluded that CT scan is a crucial investigation in the preoperative preparation for Functional Endoscopic Sinuses Surgery to assemble information concerning various vital structures and their relationship with the sinuses.

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