

## Original Research Article

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# Correlation between diagnostic endoscopy, computed tomography and operative findings in patients with chronic rhinosinusitis

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## ABSTRACT

**Background:** The varied symptomatology and diagnostic difficulties pose a great challenge to the Otorhinolaryngologists in treating chronic rhinosinusitis. Both diagnostic nasal endoscopy and computed tomography (CT) has been used to analyse the pathological/anatomical changes associated with chronic rhinosinusitis. Various studies have been done to evaluate the efficacy of both these methods to analyse the changes associated with chronic rhinosinusitis. In this study, the authors contemplate to determine which one is better as a preoperative diagnostic tool.

**Methods:** In this study 30 patients (60 sides) suffering from chronic rhinosinusitis underwent functional endoscopic Sinus Surgery after being thoroughly evaluated by diagnostic endoscopy and CT scan. The various factors affecting the sinus drainage were analysed and compared between each modality.

**Results:** The findings of diagnostic endoscopy correlated very well with the operative findings except for conditions where there was severe anatomic or pathologic obstruction which hampered visualisation. Extent of disease in each sinus is very well recognised on CT.

**Conclusions:** Both diagnostic endoscopy and CT are important preoperative evaluation tools in detecting anatomic variations or pathologic changes within sinuses, although for the surgeon, the operative findings remain the gold standard in the management of the disease.

**Keywords:** Chronic rhinosinusitis, CT, Diagnostic endoscopy, Functional endoscopic sinus surgery

## INTRODUCTION

The symptoms of chronic sinusitis are multiple, and often vague and nonspecific, as physical examination is limited since the sinuses cannot be examined directly.<sup>1</sup> Nasal endoscopy provides the ability to accurately access these areas for the evidence of localized disease, or for anatomical defects that compromise ventilation and mucociliary clearance.<sup>2</sup>

Diagnostic endoscopy and systematic understanding of the lateral nasal wall with computed tomography (CT) in

the coronal plane has become the corner stone in the evaluation of the para nasal sinus (PNS) disease.<sup>3</sup> Thus, this precise knowledge of the existing anatomical variations, pathological changes and the relative position of the neighboring vital structures like the orbit, optic nerve, cranial cavity, internal carotid artery etc. has an immense value and is an essential diagnostic aid for a functional, safe and effective endonasal sinus surgery.

### Objectives

The objectives of the study were to correlate diagnostic endoscopic, computed tomography and functional

endoscopic sinus surgery findings in patients with chronic sinusitis.

## METHODS

Study duration was one year cross sectional study done between July 1999 to June 2000.

### Source of data

All the patients attending the ENT out-patient department of KLES Hospital and Medical Research Centre, Belgaum who had a proven upper respiratory tract infection with sinusitis for more than three months duration not responding to the full course of antibiotics, analgesics and decongestant, in whom CT scan could be done and were willing to undergo functional endoscopic sinus surgery were taken for the study. Sample size was 30.

Patients with chronic rhinosinusitis who responded to medical treatment, those in whom CT scan was not possible and those who were not willing to undergo FESS were excluded from the study.

All the patients in active stage of the disease were treated with course of suitable antibiotics, systemic antihistamines and local decongestants. Additionally, they underwent a systematic diagnostic nasal endoscopy and CT of nose and PNS during the quiescent stage of sinusitis.

### CT scan

Done using machine having specifications: matrix size 512; slice thickness 10 mm, 5 mm to 1 mm, Kv 133; gantry tilt available up to +25°.

Standard technique of Messerklinger, as has been popularized and advocated by Stammberger and Kennedy was followed.

### Statistical analysis

Routine parameters were analyzed using rates, ratios and percentages using descriptive statistics. The correlation between the diagnostic nasal endoscopic findings along with CT and operative findings were analyzed using Chi-square test.

## RESULTS

The age of the patients varied from 21 years to 53 years (mean- 32.6 years).

Majority of patients (79.99%) were in the third and fourth decades of life.

### Sex distribution

Male preponderance of 63.33% was seen. The male to female ratio was 1.7:1.

### Findings on diagnostic nasal endoscopy

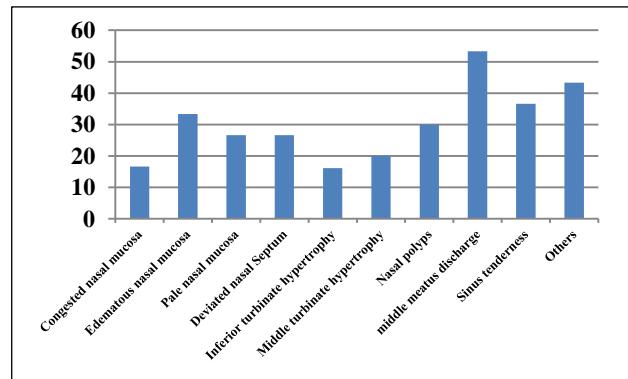


Figure 1: Percentage of various signs.

In this study, according to Figure 1, nasal mucosal congestion and edema were present in 5 patients (16.66%) and 10 patients (33.33%) respectively. While a pale mucosa was found in 8 patients (26.66%), mucopurulent discharge was seen in the middle meatus in 7 patients (23.33%). In 9 patients (30%), mucoid discharge was present. Inferior turbinate hypertrophy was present in 5 patients (16.16%) and middle turbinate hypertrophy was present in 6 patients (20%). Nasal polyps were present in 9 patients (30%), while sinus tenderness was present in 11 patients (36.66%).

### CT patterns in our study

The infundibular type was the commonest pattern encountered in this study with a prevalence of 25% (Table 1). The sphenoethmoidal type of pattern was present in 10% while the sinonasal polyposis type and osteomeatal type of pattern was present in 23.33% each. The unclassifiable or sporadic type of pattern was least commonly seen (1.66%).

Table 1: CT patterns.

Type	Number of sides	%
Normal	10	16.66
Infundibular	15	25
Osteomeatal	14	23.33
Sinnasal polyposis	14	23.33
Sphenoethmoid	6	10
Unclassified (sporadic)	1	1.66
<b>Total</b>	<b>60</b>	<b>100</b>

### Endoscopic operative procedures performed

Out of 30 patients, 20 underwent bilateral procedures. Thus, a total of 50 procedures were carried out. Of these,

maximum (17) underwent frontal recess clearance with total ethmoidectomy and middle meatal antrostomy while along with this sphenoidectomy was done in 15 procedures. Frontal recess clearance with anterior ethmoidectomy and middle meatal antrostomy was done in 2 procedures.

Polypectomy was done in 16 procedures of which maximum (12) procedures were polypectomy, middle meatal antrostomy along with frontal, total ethmoidal and sphenoidal clearance while in 4 procedures polypectomy, middle meatal antrostomy along with frontal and total ethmoidal clearance was done (Figure 2). Apart from this septoplasty was done in 7 cases. Both septoplasty and polypectomy whenever indicated was done along with functional endoscopic sinus surgery.

From Table 2, it is seen that diagnostic endoscopic findings were very well correlated with operative findings, but only drawback was that in some cases all the findings could not be visualized due to presence of some anatomical or a pathological variation preventing the passage of the endoscope. CT findings also correlated very well with the operative findings.

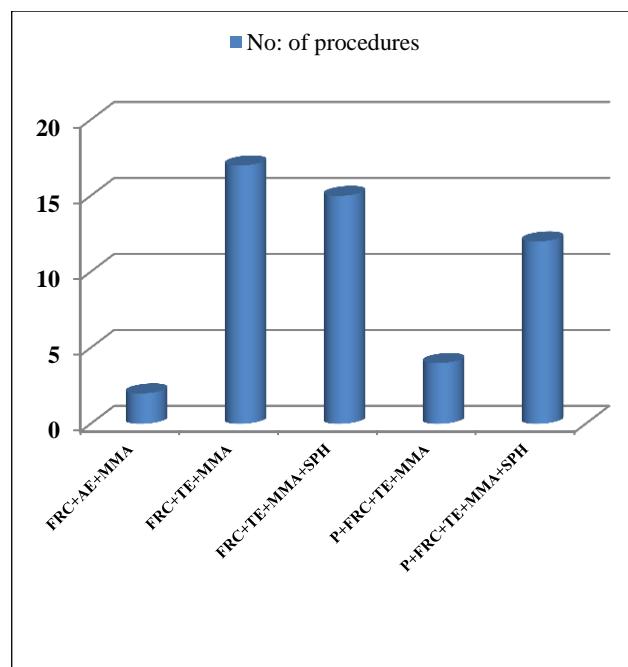


Figure 2: Number of procedures.

Table 2: Correlation of diagnostic endoscopy, CT and operative findings.

	Diagnostic endoscopy			CT		Operative findings	
	Normal	Abnormal	Not visualised	Normal	Abnormal	Normal	Abnormal
<b>Inferior turbinate</b>	43	7	0	43	7	43	7
<b>Middle turbinate</b>	19	26	5	20	30	20	30
<b>Septum</b>	22	8	0	22	8	22	8
<b>Inferior meatus</b>	45	5	0	45	5	45	5
<b>Middle meatus</b>	14	33	3	12	38	17	33
<b>Uncinate</b>	14	29	7	14	34	14	34
<b>Hiatus semilunaris</b>	18	19	13	6	44	18	32
<b>Bulla ethmoidalis</b>	15	13	22	14	36	15	35
<b>Sphenoethmoid recess</b>	16	2	22	31	19	26	24
<b>Frontal recess</b>	25	18	7	27	23	25	25
<b>Aggernasi cells</b>	18	13	7	18	20	18	20
<b>Haller cells</b>	0	0	50	1	1	1	1
<b>Accessory maxillary ostium</b>	0	4	1	0	5	0	5
<b>Anterior ethmoids</b>	0	0	50	21	29	8	42
<b>Maxillary sinus</b>	0	0	50	10	40	11	39
<b>Posterior ethmoids</b>	0	0	50	25	22	26	21
<b>Sphenoid</b>	0	0	50	14	13	13	14

## DISCUSSION

The operative findings are taken as the Gold Standard in chronic rhinosinusitis. The prevalence of each of the Diagnostic Endoscopic findings as mentioned in Figure 1 is comparable with the studies conducted by Venkatachalam et al, and Kirtane et al.<sup>4,5</sup>

## CT pattern

Out of the 30 cases (60 sides), the percentage of the infundibular, the osteomeatal and the sphenoethmoid recess pattern were in agreement with studies done by Babbel et al, and Yadav et al. Sinonasal polyposis pattern was higher (23.33%) in this study owing to many cases of sinonasal polyposis who presented to us as opposed to

reports of Babbel et al, (10%) and Yadav et al, (16%) respectively. The unclassified type had the least in this study (1.66%). This was contradicting to the results of Babbel et al, (25%) and Yadav et al (4%). This could be due to higher incidence of mucoceles, retention cysts and mild mucoperiosteal thickening in their studies.<sup>6,7</sup>

The anterior ethmoidal sinus was most commonly affected. This was followed by maxillary sinus and frontal sinusitis. Hence, total ethmoidectomy with middle meatal antrostomy along with frontal recess clearance was the most commonly done procedure (Figure 2). This was in agreement with studies done by Zinreich, Stammberger, Lloyd, Lund et al, and Bolger et al.<sup>8-14</sup> This is because the anterior ethmoid complex has clefts and fissures where areas are in contact with each other. Mucosal edema in this area leads to blockage which leads to stasis and infection and a vicious cycle result. The anterior end of middle turbinate bears the brunt of atmospheric pollutants; allergens etc., and are prone to edema and hypertrophy. Certain anatomical factors like paradoxically curved middle turbinate, concha bullosa, laterally curved uncinate and enlarged bulla ethmoidalis are other factors which block the space in the middle meatus.

#### **Correlation of diagnostic endoscopy, CT and operative findings**

The diagnostic endoscopic findings correlated well with the operative findings. In significant proportion of cases, not all parameters could be visualized due to presence of gross pathology or severe anatomical abnormality that made it impossible to pass the endoscope beyond a certain point. The CT findings correlated well with confirmed findings at operation.

#### **CONCLUSION**

Both diagnostic endoscopy and CT imaging of the nose and PNS are important preoperative evaluation tools in detecting pathology and both are complementary to each other. The findings of diagnostic endoscopy correlate well with the operative findings except in cases where it is not possible to negotiate the endoscope due to anatomical or pathological obstructions. CT scan helps to know the variations and vital relations of the PNS. Further, a clearer understanding of the background prevalence of such variations in normal patients is needed to reduce the possibility of false positive diagnosis of sinusitis on CT scan.

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*Ethical approval: The study was approved by the Institutional Ethics Committee*

#### **REFERENCES**

1. Muniraju M, Anand K, Nair S. A study of anatomical variations of lateral wall of nose and paranasal sinuses by CT scan. *Paripex-Ind J Res.* 2017;6(4):83-6.
2. Mendiratta V, Baisakhiya N, Singh D, Datta G, Mittal A, Mendiratta P. Sinonasal anatomical variants: CT and endoscopy study and its correlation with extent of disease. *Ind J Otolaryngol Head Neck Surg.* 2015;68(3):352-8.
3. Kumar PS, Prasad TR, Santhaiah K. Comparative Study of Endoscopic Findings and CT-para nasal sinuses appearances in chronic sinusitis. *IOSR-JDMS.* 2017;16(3):34-42.
4. Venkatachalam VP, Bhat A. Functional endoscopic sinus surgery- a new surgical concept in the management of chronic sinusitis. *Ind J Otolaryngol Head Neck Surg.* 2000;52(1):3-16.
5. Nayak S, Kirtane MV, Ingle MV. Functional endoscopic sinus surgery--II (a preliminary study). *J Postgrad Med.* 1991;37(1):31.
6. Babbel R, Harnsberger HR, Nelson B, Sonkens J, Hunt S. Optimization of techniques in screening CT of the sinuses. *AJR.* 2000;157:1093-8.
7. Yadav SPS, Asrurddin, Yadav RK, Singh J. Low dose CT in chronic sinusitis. *Ind J Otolaryngol Head Neck Surg.* 2000;52(1):17-22.
8. Zinreich SJ, Kennedy DW, Rosenbaum AE, Gayler BW, Kumar AJ, Stammberger H. Paranasal Sinuses: CT imaging requirements for endoscopic surgery. *Radiology.* 1987;163:769-75.
9. Stammberger H. An endoscopic study of tubal function and the diseased ethmoid sinus. *Arch Otolaryngol.* 1986;243:254-9.
10. Stammberger H, Wolf G. Headaches and sinus disease: the endoscopic approach. *Ann Otol Rhinol Laryngol.* 1988;134:3-23.
11. Lloyd GAS. CT of PNS: study of a coronal series in relation to FESS. *J Laryngol Otol.* 1991;105:181-5.
12. Lund VJ, Holmstrom M, Scadding GK. Functional endoscopic sinus surgery in the management of chronic rhinosinusitis. An objective assessment. *J Laryngol Otol.* 1991;105:832-5.
13. Bolger WE, Parsons DS, Butzin CA. Paranasal sinus bony anatomic variations and mucosal abnormalities: CT analysis for endoscopic sinus surgery. *Laryngoscope.* 1991;101(1):56-64.
14. Parsons DS, Batra PS. Functional endoscopic sinus surgical outcomes for contact point headaches. *Laryngoscope.* 1998;108(5):696-702.

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