RETROSPECTIVE STUDY OF 100 CASES CORRELATION BETWEEN PRE-OPERATIVE COMPUTED TOMOGRAPHY AND OPERATIVE FINDINGS IN FUNCTIONAL ENDOSCOPIC SINUS SURGERY

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ABSTRACT   *Introduction:* Chronic rhino sinusitis (CRS) is a wide spread inflammatory disorder of nose and paranasal sinuses and is one of the most common health complaints in individuals every year worldwide and its prevalence is rising[1-2.] The osteomeatal complex is the key area to pathogenesis of chronic rhinosinusitis[3]. Endoscopic surgery aims to eliminate disease in the primary site and allow resolution of the secondary infection in the larger sinuses[4] .pre-operative CT scan has proven invaluable to otolaryngologists[5&8].In some cases of chronic rhinosinusitis there may be variations in findings between pre-operative CT scan and FESS. So, in this study we aim at correlation between pre-operative CT scan findings of anatomical defects and mucosal assessment and operative finding during endoscopic sinus surgery.

Method: 100 patients with chronic rhinosinusitis were studied for one Year CT scan findings were correlated with intraoperative findings during functional endoscopic sinus surgery.

Result: it is more common in males and between age group 20-30, in mucosal disease maxillary sinusitis was better identified in CT, anterior and posterior ethmoid sinutitis was seen well in endoscopy. Structural abnormalities of middle turbinate were better identified in ESS.

Uncinate process attachment variations, agar, were better accessed on CT.In the assessment of sphenoethmoidal recess, accessory maxillary ostium, sphenoid sinus ostium, adenoid status, inferior turbinate abnormality, lateral sinus, DNS endoscopy is better.In delineating anatomical variations of sphenoid sinus, ethmoid roof, optic nerve course, internal carotid artery, olfactory fossa, frontal sinus pneumatization, vomer pneumatization, maxillary sinus hypoplasia, intrasinus mucosal disease CT is better.

Conclusion: CT is mandatory as preoperative evaluation in patients undergoing ESS, as it provides a road map to surgery. Sometimes the disease could be missed on CT but present on endoscopy in the same way findings seen on CT may be missed on endoscopy

INTRODUCTION

Chronic rhino sinusitis (CRS) is a wide spread inflammatory disorder of nose and paranasal sinuses and is one of the most common health complaints in individuals every year worldwide and its prevalence is rising1-2. Pathophysiology of sinus disease is related to three factors:
1. osteomeatal complex (patency of Ostia),
2. function of cilia
3. The quality of the nasal secretions.

Alteration in any one of these factors alone or in combination, can change the physiology and lead to sinusitis. The osteomeatal complex is the key area to pathogenesis of chronic rhinosinusitis3. The diagnosis of chronic rhino sinusitis relies heavily on the combination of clinical judgment, endoscopy of the lateral nasal wall and CT scan of the paranasal sinuses. Functional endoscopic sinus surgery (FESS) aims to eliminate the disease from its primary site and allow the resolution of secondary infection from the larger sinuses4. CT scan should be interpreted in the context of history and endoscopic examination as the prevalence of incidental mucosal changes in an asymptomatic population is quite significant. CT scan of PNS has become the standard diagnostic tool for the diagnosis of chronic rhino sinusitis5. It depicts the anatomical complexities of osteomeatal complex and relationship of sinuses with surrounding important structures in much simpler way, delineates the extent of disease, if possible the underlying cause6, clinical diagnosis of chronic rhinosinustis7 and acts as a roadmap for endoscopic sinus surgery.

There are various comparative studies on clinical symptomatology, histopathology, culture pattern, anatomical variations and mucosal disease by intranasal endoscopy and also on imaging studies including CT scan. But a clear correlative study between pre-operative CT scan findings and findings in a case of CRS during functional endoscopic sinus surgery (FESS) is lacking. Both the investigative modalities are expensive and both, having their own merits and demerits. This study will help in having an insight into necessity, if either of two or both in combination is required in diagnosis of sinonasal pathologies.

Materials and method:
Source of data:
Data for this study was collected from otorhinolaryngology department of ACSR, nellore who underwent CT scan of PNS and ESS Method of collection of data

Study design- prospective study
Duration: one year
EQUIPMENT – Dual slice CT scan
SCANNING TECHNIQUE –
The imaging protocol consists of acquisition of 2mm thin axial and coronal scans through the paranasal sinuses with special attention to osteomeatal units.

METHOD OF STUDY:
All patients presenting to ENT OPD with complaints related to nose and paranasal sinuses in 1years were examined clinically and investigated with CT scan. Patients diagnosed with chronic sinusitis were selected and planned for FESS. CT scan findings were discussed with consultant radiologist and anatomical variations or intrasinus mucosal disease were noted. After that patients underwent ESS, during which anatomical variations and intrasinus mucosal disease were noted. Both the findings were tabulated and correlated.

Inclusion criteria:
Age -15-70y
All cases of chronic sinusitis examined clinically and confirmed by pre-operative CT and ESS thereafter.

Exclusion criteria:
Age- below 15 and above 70y
Cases of rhino sinusitis which could be treated medically.
Patients with complicated sinusitis, aggressive fungal infection and infiltrating tumours.
Patients medically unfit for surgery.

STATISTICAL ANALYSIS:
Using various methods of statistical analysis like kappa, chi square, student't' tests etc. Results will be depicted in the form of tables, bar diagrams etc.

Parameters for Study:
OBSERVATION AND RESULTS

Table 1: Age wise Distribution of CRS

Age in years	No. of cases	Percentage
0 – 20	6	6
20- 40	73	73
40- 60	20	20
>60	1	1

More common in 20- 40y age group

Table 2: Distribution of cases according to nature of symptoms

Symptoms	Number	Percentage
Headache	80	80
Nasal discharge	80	80
Nasal obstruction	60	60
Facial pain(pressure)	60	60
Impaired smell	30	30
Sneezing	70	70

Most common complaint seen was headache and nasal discharge

Preoperative CT Scan evaluation:
Table 3: Deviated Nasal Septum

Findings	No.	Percentage
Right	30	30
Left	48	48

Left DNS was commonly seen

Table 4: Middle turbinate hypertrophy on CT

Middle turbinate	Right		Left	
	No.	%	No.	%
Typical	52	52	62	62
Concha	32	32	28	28
Paradoxical	16	16	10	10

Concha bullosa was commonly seen in 32 cases right and 28 left

Table5: Concha bullosa distribution on CT

Concha bullosa classification	Right		Left	
	No.	%	No.	%
Bulbar cells	6	6	4	4
Lamellar cells	14	14	18	18
True concha bullosa	20	20	12	12
Tota	40	40	34	34

True concha bullosa type was commonly seen

Table6: Assessment of hiatus and infundibulum on CT

Nasal discharge/post nasal drip	Normal		Obstructed		Narrowed	
	No.	%	No.	%	No.	%
Right hiatus semilunaris	40	40	44	44	16	16
Left hiatus semilunaris	24	24	48	48	28	28
Right infundibulum	40	40	48	48	12	12
Left infundibulum	32	32	48	48	20	20

Hiatus semilunaris and ethmoid infundibulum were obstructed commonly

Table 7: Frontal sinus and frontal recess assessment on CT

Frontal sinus	Normal		Hypoplastic		Hyperpneumatize	
	No.	%	No.	%	No.	%
Right	68	68	12	12	20	20
Left	56	56	16	16	28	28
Frontal recess	Normal		Obstructed		Narrowed	
	No.	%	No.	%	No.	%
Right	68	68	18	18	14	14
Left	66	66	24	24	10	10

Frontal sinus was normal in 68% of cases and frontal recess was obstructed commonly

Table 8: Ethmoidal fovea on CT

Pattern	No. of cases	Percentage
1-symmetrical	68	68
2-asymmetrical	32	32
a-right lower	18	18
b-left lower	14	14

Ethmoid fovea was asymmetrical in 32 cases

Table 9: Sphenoid sinus configuration on CT

Pattern	No. of cases	Percentage
Symmetrical	46	46
Asymmetrical	54	54

Sphenoid sinus was asymmetrical in 54% of cases

Diagnostic nasal Endoscopic Findings

Table 10: Deviated nasal septum and adenoids

Findings	No. of cases	Percentage
Adenoid hypertrophy	8	8
Right sided DNS	32	32
Left Sided DNS	52	52

Adenoid hypertrophy was seen in 8% cases and left DNS was commonly seen

Table 11: Middle turbinate assessment on endoscopy

Middle turbinate	Right		Left	
	No.	%	No.	%
Typical	58	58	67	67
Concha	32	32	27	27
Paradoxical	10	10	6	6

Concha bullosa was seen in 32 cases on right and 27 on left

Table 12: Concha bullosa distribution on endoscopy

Concha bullosa classification	Right		Left	
	No.	%	No.	%
Bulbar cells	6	6	6	6
Lamellar cells	12	12	16	16
True concha bullosa	22	22	12	12
Total	40	40	34	34

True concha bullosa type was most commonly seen.

Table 13: Assessment of hiatus and infundibulum on endoscopy

Findings	Normal		Obstructed		Narrowed	
	No.	%	No.	%	No.	%
Right hiatus	44	44	42	42	14	14
Left hiatus	22	22	50	50	28	28
Right infundibulum	38	38	50	50	12	12
Left infundibulum	30	30	52	52	18	18

Hiatus semilunaris and ethmoid infundibulum were obstructed commonly

Table 14: Frontal recess assessment on endoscopy

Frontal sinus	Normal		Obstructed		Narrowed	
	No.	%	No.	%	No.	%
Right	64	64	24	24	12	12
Left	66	66	22	22	12	12

Frontal sinus was obstructed most commonly

Table 15: Sphenoid ostium on endoscopy

Side	Oval	Slit	Rounded	Not seen
Right	44	6	4	46
Left	46	4	6	44

Most of the cases sphenoid ostium was not seen, oval type was common among seen

Table 16: Lateral sinus and accessory maxillary ostium on endoscopy

Lateral sinus			Accessory maxillary ostium		
Side	Present	Absent	Side	Present	Absent
Right	3	97	Right	15	85
Left	0	100	Left	13	87

Lateral sinus was present in 3 cases on right. Accessory ostium was present in 15 cases on right and 13 cases on left.

Radiologist's CT findings were correlated with surgeon's operative findings using formula for Kappa's agreement.

(% of observed agreement) - (% of expected agreement by chance)
Kappa = 100 - (% of expected agreement by chance)

Kappa value:
Below 40% is considered as poor correlation,
Between 40% and 70% is considered as not a good correlation
Between 70% and 80%> is considered as good correlation
Above 80%> is considered as excellent correlation

Table 17: correlation between CT scan findings and operative findings

Category	right	Left
DNS	K=0.950	K=0.920
Inferior turbinate	K=0.957	K=0.942
Middle turbinate	K=0.897	K=0.901
Concha bullosa	K=0.965	K=0.961
Uncinate attachment	K=0.881	K=1.000
Hiatus semilunaris	K=0.935	K=0.968
Ethmoid fovea	K=0.966	K=0.935
Agar nasi	K=0.918	K=0.915
Haller cell	K=0.884	K=0.918
Frontal recess	K=0.881	K=0.961
Maxillary sinus	K=0.911	K=0.612
Anterior ethmoid sinus	K=0.692	K=8.856
Posterior ethmoid sinus	K=0.705	K=0.673

All of them showed good correlation except maxillary sinus on left, anterior ethmoid sinus on right and posterior ethmoid sinus on left.

Discussion: our study was comparable in terms of age, symptomatology, middle turbinate hypertrophy, hiatus semilunaris, frontal sinus and recess, ethmoid fovea, sphenoid sinus, sphenoid ostium, lateral sinus and accessory maxillary ostium with sheetal et al[5].DNS with priyanjal gautam et al[9].concha bullosa with bolger et al[10] and ashok et al[11].

CONCLUSION AND SUMMARY
It was concluded that chronic rhinosinusitis is more common in males and commonly seen in age group of 20-40 years.

Obstruction of middle meatus due to gross abnormalities in infundibulum, Hiatus semilunaris, and frontal recess indicates intrasinus mucosal disease.

In mucosal disease maxillary sinusitis was better identified in CT, anterior and posterior ethmoid sinutitis was seen well in endoscopy. Structural abnormalities of middle turbinate were better identified in ESS.

In the assessment of accessory maxillary ostium, sphenoid sinus ostium, adenoid status, inferior turbinate abnormality, lateral sinus, DNS endoscopy is better.

In delineating anatomical variations of sphenoid sinus, ethmoid roof, olfactory fossa, frontal sinus pneumatization, CT is better.

CT is mandatory as preoperative evaluation in patients undergoing ESS, as it provides a road map to surgery. Sometimes the disease could be missed on CT but present on endoscopy in the same way findings seen on CT may be missed on endoscopy. Hence, CT and endoscopy are complimentary in assessment of anatomical variations of OMC and intrasinus mucosal disease.

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