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A Study of Association between Symptom Severity, Nasal Endoscopy and CT Scan Findings in Chronic Rhinosinusitis Patients

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Abstract: ***The term rhinosinusitis refers to a group of disorders characterized by inflammation of the ciliated respiratory mucosa of nose and paranasal sinuses.Many otorhinolaryngologists rely on paranasal sinus computed tomography and diagnostic nasal endoscopy to confirm and assess severity of disease, and aid in management decisions.Computed tomography scanning of the paranasal sinuses has become the gold standard in the evaluation and surgical planning for CRS. This study was a prospective observationalstudy, conducted on 100 cases in E.N.T OPD of BharatiVidyapeeth Medical College & Hospital, Sangli between November 2015 to May 2017 to study the association of severity of symptoms with paranasal sinus CT scan findings and diagnostic nasal endoscopy findingsin patients of CRS. The CT scan scores vary with the symptom severity whereas the Nasal Endoscopy scores do not.***

Keywords: Chronic Rhinosinusitis, CRS, CTParanasal sinus, Diagnostic Nasal Endoscopy

1. Introduction

Chronic Rhinosinusitis (CRS) is a very common disease that results in significant impact on economy and quality of life which is comparable or even worse to other chronic debilitating diseases such as diabetes and congestive heart failure. The term rhinosinusitis refers to a group of disorders characterized by inflammation of the ciliated respiratory mucosa of nose and paranasal sinuses, as they are contiguous with each other and it is rare for one to be affected in isolation[1].

In 1997, the TFR set forth diagnostic guidelines for diagnosis of CRS. A key feature of the TFR definitions of rhinosinusitis is its emphasis on symptoms rather than objective findings for establishing a diagnosis. The intent of using a symptom-based criteria was to provide clinicians of all specialities a means of diagnosing rhinosinusitis without requiring expensive modalities such as CT or nasal endoscopy. However, by general clinical practice, many otorhinolaryngologists rely on paranasal sinus computed tomography and diagnostic nasal endoscopy to confirm and assess severity of disease, and aid in management decisions. This study was conducted to study the association of severity of symptoms with paranasal sinus CT scan findings and diagnostic nasal endoscopy findingsin patients of CRS.

2. Materials and Methods

The study was a Prospective Observational type, conducted on 100 cases presenting with symptoms of chronic rhinosinusitis in E.N.T out-patient department of BharatiVidyapeeth Deemed University Medical College & Hospital, Sangli, Maharashtra between November 2015 to May 2017 after obtaining a written informed consent from the patient.

Method of Collection of Data

Inclusion Criteria

1) Age between 16 yrs and 70 yrs
2) Patients who follow the established clinical criteria for diagnosis of Chronic Rhinosinusitis given in the following criteria by Task force on rhinosinusitis [TFR] 1996
3) No history of nasal and paranasal surgery in the past.

Exclusion Criteria

1) Pregnancy
2) Significant psychological problems
3) Inability to comply with the study protocol
4) Age less than 16 years, previous nasal and paranasal surgery
5) Systemic diseases preventing participation in the study
6) Medical and/or surgical treatments influencing the study

An **Informed Written Consent** was taken from all the patient included in the study following which all cases were assigned a number and a total of 100 cases were studied during the study period. . All the patients satisfying the criteria of selection were subjected to

(a) **History:** A detailed history was taken with regards to the symptoms of chronic rhinosinusitisas given by Task force on rhinosinusitis 1996 as given below:

Sign and symptoms associated with diagnosis of Rhinosinusitis

(Task force on rhinosinusitis [TFR] 1996)

Major Factors	Minor Factors
Facial pain/ pressure	Headache
Nasal obstruction	Fever (all non acute)
Nasal discharge/ discoloured post nasal drip	Halitosis
Hyposmia/ Anosmia	Dental pain
Purulent nasal discharge	Fatigue

Fever (acute only)	Cough
	Ear pain/pressure/ fullness

- Two major or One major with two minor criteria required.
- The symptoms were scored between 0 to 3with 0 as no symptoms, 1 for mild, 2 for moderate and 3 for severe symptoms.

(b) Clinical examination :
- Rhinoscopy examination
- Otological
- Throat and neck examination

(c) All cases with clinical features of chronic rhinosinusitis as per TFR 1996 guidelines subjected to DNE and findings scored with Lund-Kennedy scoring system

(d) All cases with clinical features of chronic rhinosinusitis as per TFR 1996 guidelines subjected to CT paranasal sinus and findings scored with Lund-Mackay scoring system

The CT scan finding was also scored in the proforma as per the Lund – Mackay scoring system separately for left and right side. Maxillary, anterior ethmoids, posterior ethmoids, frontal, sphenoid sinuses were scored from 0-2, where 0 was no opacification of sinus cavity, 1 being partial opacification and 2 was complete opacification. Osteomeatal complex was scored as 0 or 2. 0 if it is not blocked and 2 if it is.

3. Observation and Results

Table 1: Sex Distribution

Sex	No.
Male	68
Female	32
Total	100

The male to female ratio was 2: 1 (Male =68, female=32)

Table 2: Age Distribution

Age	No
16-25	12
21-30	18
31-40	27
41-50	23
51-60	14
61-70	6
Total	100

The mean age of patients was 38.53 years. The largest group of patients belonged to the age group 36-45 years (27%) followed by 46- 55 years (24 %)

Table 3: Symptom wise distribution of patient

Sr. no	Symptoms	No of Pts with mild symptoms	No of Pts Mod Symptoms	No of Pts with Severe Symptoms	Total
1	Facial pain/pressure	7	18	6	31
2	Nasal obstruction	21	35	37	93
3	Nasal discharge/PND	19	54	7	80
4	Hyposmia/Anosmia	27	24	14	65
5	Pus on exam	3	3	0	6
6	Fever(Acute)	0	0	0	0
7	Headache	16	27	20	63
8	Fever	1	0	0	1
9	Halitosis	2	1	0	3
10	Dental Pain	0	0	0	0
11	Fatigue	11	4	0	15
12	Chronic cough	3	1	0	4
13	Earache/ fullness	4	1	0	5

The most common presenting complaint was nasal obstruction (93%), followed by nasal discharge (80%), hyposmia/anosmia (65%), headache (63%), Facial pain and pressure/pain (31%). None of the patients suffered from dental pain and acute fever (Table 3)

Table 4: Comparison of CT scan and DNE scores in mild , moderate and severe symptoms

Symptoms	No of Pts Mild Symptoms	CT Scan Score Avg	DNE Score Avg	No of Pts Mod Symptoms	CT Scan Score Avg	DNE Score Avg	No of Pts with Severe Symptoms	CT Scan Score Avg	DNE Score Avg
Nasal Obstruction	21	5.9	4.16	35	6.46	4.34	37	8.63	5.16
Nasal discharge /PND	19	6.5	4.47	54	7.04	4.65	7	8.64	4.43
Hyposmia/ Anosmia	27	6.33	4.18	24	7.61	5.06	14	8.64	4.79
Headache	16	5.69	4.03	27	7.2	4.33	20	7.43	5.13
Facial pain/Pressure	7	3.86	3.07	18	7.12	4.75	6	7.75	4.5
Fatigue	11	3.64	4.13	4	8.5	5.25	0	-	-

The mean CT score of all the patients studied was 7.015 while the mean DNE score was 4.5. The mean of CT scan scores was found to be 5.9 ,6.46 and 8.63 for patients with mild , moderate and severe **nasal obstruction** (n=93) respectively whereas the mean endoscopy scores for the same set of patients were found to be 4.16,4.34 and 5.16.

The mean of CT scan scores was found to be 6.5, 7.04 and 8.64 for patients with mild, moderate and severe **nasal discharge** (n =80) respectively whereas the mean endoscopy scores for the same set of patients were found to be 4.47,4.65 and 4.43.

The mean of CT scan scores was found to be 6.33, 7.61 and 8.64 for patients with mild, moderate and severe **hyposmia/anosmia** (n=65) respectively whereas the mean endoscopy scores for the same set of patients were found to be 4.18, 5.06 and 4.79.

The mean of CT scan scores was found to be 5.69 ,7.2 and 7.43 for patients with mild, moderate and severe **headache** (n=63) respectively whereas the mean endoscopy scores for the same set of patients were found to be 4.03,4.33 and 5.13.

The mean of CT scan scores was found to be 3.86 ,7.12 and 7.75 for patients with mild, moderate and severe **facial pain/pressure** (n=31) respectively whereas the mean endoscopy scores for the same set of patients were found to be 3.07, 4.75 and 4.5.

4. Discussion

Chronic Rhinosinusitis involves all age groups. The mean age of patients in our study was 38.53 years(Range 13 - 73 yrs) with a male to female ratio of 2:1(male = 68, female = 32). In a study done by Wabnitz DA, Nair S, Wormald PJ the mean age of patients were 44.5 years with male to female ratio being 1.3:1. In another study done by Ling FT, Kountakis SE[49] the mean age of patients was 49.4 years with male to female ratio of 1.1: 1. In an Indian study done by Kirtane MV et al, majority of the patients (46,78%) were in third decade which was similar to our study which also had 27% patients in third decade.

The most common symptom in our study was nasal obstruction (93%), followed by nasal discharge/ PND (80%), hyposmia/anosmia (65%), headache (65%), facial pain and pressure (31%), fatigue (15%).Other symptoms were relatively less common. It was similar to a study done by da Lilly-Tariah OB where the symptoms were rhinorrhoea 100%, stuffy nose 97.4%, sneezing 67.6%, anosmia 54.8% and headache 54.8% .

In another study done by Kirtane MV et al the commonest complaints was nasal discharge occurring in 25 patients (78.1%), followed by headache in 22 patients (68.7%) and nasal obstruction in 22 patients (68.7%). The other complaints were sneezing in 6 patients (18.7%), anosmia and cacosmia in 2 patients each (6.25%).

However it would be interesting to note that almost all the studies have used the TFR criteria for diagnoses successfully validating further the importance of the said criteria. However, Hwang PH, Irwin SB, Griest SE, Caro JE, Nesbit GM in their study on radiologic correlates of symptom-based diagnostic criteria for chronic rhinosinusitis concluded that the specificity and predictive value of the current TFR criteria may not be adequate to serve as a diagnostic standard for rhinosinusitis.

CT Scores in patients with mild symptoms were lower than those with moderate and severe symptoms. However the CT scores between moderate and severe symptoms did not show much variation .This difference was seen in all the symptoms and was not limited to any one symptom.

There was no obvious difference in endoscopy scores in patients with mild , moderate and severe symptoms which was again independent of the symptom.

Rosbe KW, Jones KR in their study on usefulness of patient symptoms and nasal endoscopy in the diagnosis of chronic sinusitis found that nasal endoscopy was shown to be moderately sensitive and highly specific in predicting results of CT scanning. This type of a graded system in investigations maybe useful in arriving at a diagnosis if correlation with the symptom severity can be established.

Bhattacharyya N in his study titled radiographic stage fails to predict symptom outcomes after endoscopic sinus surgery for chronic rhinosinusitis, corelated preoperative CT scan stage according to three staging systems: Lund-MacKay, Kennedy, and Harvard and concluded that though CT scan is widely accepted as an accurate diagnostic tool for chronic rhinosinusitis, CT scan stage alone does not significantly predict symptom outcomes after chronic rhinosinusitis, regardless of staging system utilized. This study again does not correlate the severity of the symptoms with respect to the different staging systems used.

However, Arango P, Kountakis SE, in their study "Significance of computed tomography pathology in chronic Rhinosinusitis" mentioned that multiple reports show that the extent of disease on computer tomography (CT) of the sinuses does not correlate with patients' subjective sinus symptom scores, but concluded that the presence of CT disease translates to higher patient symptom scores compared with symptom scores of patients without CT disease. This finding is similar to the findings of our study where the presence of higher symptom score was associated with presence of CT findings.

In another study dealing with symptom severity , Stewart MG, Donovan DT, Parke RB Jr, Bautista MH (study titled, does the severity of sinus computed tomography findings predict outcome in chronic sinusitis) state that Severity as assessed by a pretreatment CT scan is a strong predictor of outcome. Patients with higher symptom severity based on CT scans showed significantly larger improvement and lower absolute levels of symptom severity after treatment. This study links CT scan findings and subjective patient-based outcomes (symptom scores) using a validated outcomes instrument.

More studies comparing severity of symptoms with investigative modalities are not available for comparison with this study. While the conclusion that CT scores vary with severity and endoscopy scores do not, may require further statistical analysis and validation, this study brings out a difference in the two investigative modalities with respect to severity.

5. Conclusion

This study was undertaken with the objective of correlating the diagnostic nasal endoscopy and computed tomographic findings in patients with chronic sinusitis.

The main findings and conclusions from the study are as follows :

a) Majority of the patients were in the third decade and there was male predominance in our study.
b) The commonest symptoms were nasal obstruction followed by nasal discharge hyposmia/anosmia, headache, facial pain and pressure/pain.
c) The mean CT scan scoring for all symptoms was found to be 7.015 . The mean of CT scan scores increased with increasing severity of symptoms.
d) The mean of diagnostic nasal endoscopic score was 4.5. It did not vary with severity of symptoms.

e) Both DNE and computed tomography imaging of PNS are important Pre-operative evaluation tools in detecting pathology and both are complementary to each other.
f) DNE and CT scan is a must prior to any functional endoscopic sinus surgery. They help in assessing the extent of sinus disease and to know the variations and vital relations of the paranasal sinuses. CT scan assists the surgeon as a "road-map" during FESS.

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