Original Research Article

Chronic rhinosinusitis and its correlation with endoscopic anatomy of nose and paranasal sinuses: a cross-sectional study

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ABSTRACT

Background: Chronic rhinosinusitis (CRS) is a common condition characterized by inflammation of nose and paranasal sinuses and is associated with significant morbidity and healthcare expenditure. The study was undertaken to evaluate the endoscopic findings in different cases of CRS and correlating those findings with the clinical features and severity of symptoms.

Methods: A cross-sectional study was carried out at the outpatient Department of Otorhinolaryngology, R. G Kar Medical College and Hospital, Kolkata in a span of 18 months. A total of 56 patients who attended the outpatient department during the study period and met the inclusion criteria as well gave consent for participating in the study were taken as the sample size. The data was collected using history taking proforma.

Results: Out of 56 patients, 51.8% were female, the most commonly affected age group was 31-40 years with 28.57% of patients. Majority of the patients 30.40% presented within one year of onset of symptoms, all the variables of clinical symptoms shows positive correlation statistically with the endoscopic findings, the most common anatomical variation was deviated nasal septum (DNS) present in 51.78% patients.

Conclusions: A more extensive and detailed study needs to be done to determine conclusively whether the severity of symptoms can be used to predict the severity of disease in patients diagnosed as having chronic rhinosinusitis.

Keywords: Chronic rhinosinusitis, Anatomical variations, Endoscopic findings

INTRODUCTION

Chronic rhinosinusitis (CRS) is a common condition characterized by inflammation of nose and paranasal sinuses and is associated with significant morbidity and healthcare expenditure.[1,2] Most guidelines now have adopted the term 'rhinosinusitis' instead of sinusitis and have framed guidelines regarding definitions, diagnosis and management of this condition.[3] Chronic rhinosinusitis in adults is defined as inflammation of the

nose and the paranasal sinuses characterised by two or more symptoms, one of which should be either nasal blockage/obstruction/congestion or nasal discharge (anterior/posterior nasal drip), ±facial pain/pressure, ±reduction or loss of smell, lasting ≥12 weeks without complete resolution in symptoms; and either endoscopic signs of nasal polyps, and/or mucopurulent discharge primarily from middle meatus and/or oedema/mucosal obstruction primarily in middle meatus and/or CT scan findings of mucosal changes within the osteo-meatal

complex and/or sinuses. Anatomic variations, such as deviation of the nasal septum, concha bullosa or paradoxical middle turbinate, hypertrophic ethmoidal bulla, agger nasi cell, lateral or medial bending of uncinate process (UP) are common. Sometimes uncommon anatomic variations, in addition to those mentioned above, can increase the risk of surgical complications, especially when the operator lacks experience, and inadequate management of these anatomic conditions may be associated with residual disease or recurrence.[4-10]

Functional endoscopic sinus surgery (FESS) is a popular technique in the treatment of patients with chronic and recurrent sinusitis. However, the monocular vision and limited scope of the operative field inherent to endoscopy, as well as the close proximity of such vital structures as the orbit and skull base, mandate an intimate understanding of the variability in sino-nasal anatomy.[11] The purpose of this study is to clinically determine the presence of CRS and then to correlate between the clinical and endoscopic findings. With this background the study was undertaken to evaluate the endoscopic findings in different cases of CRS and correlating those findings with the clinical features and severity of symptoms.

METHODS

A descriptive cross-sectional study was carried out at the outpatient Department of Otorhinolaryngology Head and Neck Surgery, RGKMCH, Kolkata in a span of 1 January 2014 to 30 June 2015 (18 months).

This descriptive study was cleared by the institutional ethical committee and informed consent was obtained from all the participating patients. The patients meeting the clinical criteria for rhinosinusitis under EPOS 2012 guidelines were selected.[2] A thorough history was taken along with appropriate clinical examination and endoscopic evaluation of paranasal sinuses were performed to arrive at a firm diagnosis in most of the cases. A total of 56 patients were included in this study, using the following inclusion and exclusion criteria.

Inclusion criteria

Inclusion criteria patients with complaints of blockage of nose, rhinorrhoea, post nasal drip, hyposmia or anosmia and clinically suspected to have chronic rhinosinusitis using EPOS 2012 criteria.[2]

Exclusion criteria

Exclusion criteria were age <12 years, patients having previously undergone any surgery in nose, nasopharynx, paranasal sinuses due to any cause, patients having any sino-nasal neoplasm and history of exposure to radiation in head and neck.

The EPOS 2012 criteria for clinically evaluating patients is inflammation of the nose and the paranasal sinuses characterised by two or more symptoms, one of which should be either nasal blockage/obstruction/congestion or nasal discharge (anterior/posterior nasal drip).[2] ±facial pain/pressure, ±reduction or loss of smell, and lasting ≥12 weeks without complete resolution of symptom.

All the patients who attended the outpatient department during the study period and met the inclusion criteria as well gave consent for participating in the study were taken as the sample size. A total of 56 patients were taken as the sample size.

The data was collected using history taking proforma; ENT clinical examination set; rigid Karl Storz 4mm nasal endoscope (0^0 and 30^0); the data was tabulated in microsoft excel - 2010 software and analysed with the help of SPSS 20.0 and represented in the form of chart, table, bar diagram etc. Correlation between different variables were done and relevant correlation co-efficient was calculated wherever necessary.

RESULTS

The study was done at Department of ENT, R.G. Kar Medical College and Hospital, Kolkata during the period of January 2014 to June 2015 (18 months). It was a descriptive cross-sectional study. The epidemiological and endoscopic parameters, anatomical variations and histopathology were studied and correlated as described here. A total of 56 patients were included in this study selected using inclusion and exclusion criteria. Out of 56 patients, 27 were male 48.2% and 29 were female 51.8% with a male: female ratio 1:1.1.

Table 1: Sex composition of patients as per age group.

Age group (in years)	Male	Female	Total (%)
≤ 20	7	3	10 (17.85)
21-30	5	9	14 (25.0)
31-40	7	9	16 (28.57)
41-50	6	4	10 (17.85)
51-60	2	4	6 (10.71)
Total (%)	27 (48.21)	29 (51.78)	56 (100.0)

Table 2: Distribution of patients as per duration of symptoms.

Duration of symptoms (year)	Number	Percentage (%)
<1	17	30.4
1 to <2	14	25.0
2 to <4	11	19.6
>4	14	25.0
Total	56	100.0

Table 3: Distribution of patients as per severity of symptoms.

Severity of symptoms	Mild (%)	Moderate (%)	Severe (%)	Total (%)
Nasal obstruction	2 (3.57)	37(66.07)	17(30.35)	56 (100)
Anterior nasal discharge	4 (7.14)	45 (80.35)	7 (12.50)	56 (100)
Posterior nasal discharge	35 (62.50)	20 (35.71)	1 (1.78)	56 (100)
Facial pain/pressure	14 (25.01)	38 (67.85)	4 (7.14)	56 (100)
Hyposmia/anosmia	16 (28.57)	35 (62.50)	5 (8.92)	56 (100)
Overall severity	6 (10.71)	49 (87.50)	1 (1.78)	56 (100)

Table 4: Correlation among clinical symptom scores and endoscopic findings (Lund-Kennedy score).

Variables	Mean	SD	r value	P value
Nasal obstruction	6.63	1.532	0.321	0.016
Anterior nasal discharge	5.39	1.806	0.173	0.202
Posterior nasal discharge	2.64	2.022	0.228	0.090
Facial pain/pressure	4.75	2.209	0.298	0.026
Hyposmia/anosmia	4.54	2.404	0.605	0.000
Total symptom score	23.95	5.854	0.577	0.000
Overall discomfort score	6.48	1.206	0.358	0.007

As seen in (Table 1), the minimum age of patients is 13 years, maximum age was 58 years with a mean of (33.73±12.184) years. The most commonly affected age group was 31-40 years with 28.57% of patients and least common affected age group was 51-60 years with 10.71%.

Only patients whose symptoms lasted for more than 3 months were considered as cases of chronic rhinosinusitis. Majority of the patients, 17 (30.40%) presented within one year of onset of symptoms and 14 (25%) patients presented after more than four years of onset of symptoms.

Using a visual analogue scale (VAS) the patients were asked to grade the severity and their overall discomfort on a scale of 1 to 10. A score of 0-3 was considered as mild, 4-7 was considered as moderate and 8-10 was considered as severe.

Table 6: Anatomical variations in nose and paranasal sinuses of patients (n=56).

Anatomical variations of nose and PNS	Number	Percentage (%)
Deviated nasal septum	29	51.78
Concha bullosa	8	14.29
Inferior turbinate hypertrophy	9	16.07
Enlarged bulla	3	5.56
Paradoxical middle turbinate	1	1.78
Adenoid enlargement	5	8.94
Double middle turbinate	1	1.78
Total	56	100

The various symptom scores obtained by visual analogue scale were statistically analysed and correlated with the Lund-Kennedy score (based on endoscopic findings). Lund-Kennedy score varied from 0 to 12, with mean of (5.50±2.676). The statistical data has been detailed below.

From the above table it can be inferred that all the variables of clinical symptoms show positive correlation statistically with the endoscopic findings.

Out of 56 patients, the most common anatomical variation was deviated nasal septum (DNS) present in 29 (51.78%) patients, and the least common variation was paradoxical middle turbinate and double middle turbinate present in 1 (1.78%) patient each in both the cases.

DISCUSSION

This study was undertaken to clinically diagnose patients of chronic rhinosinusitis using the EPOS 2012 criteria, study their epidemiological parameters and grade the disease severity using a visual analogue scale. Furthermore, these patients underwent diagnostic nasal endoscopy of paranasal sinuses and the disease severity was scored using Lund Kennedy staging systems. The data thus collected was statistically analysed. In this study, out of 56 patients, 27 (48.2%) were male and 29 (51.8%) were females, with a male: female ratio of 1:1.1. There was a slight preponderance of chronic rhinosinusitis in females. Collins et al, also found predominance in females with a male: female ratio of 1:1.5.[12] In our study the youngest patient was 13 years old and the oldest patient was of 58 years. The mean age of the patients was 33.73 years with standard deviation (SD) of 12.184. In the study done by Bhattacharyya et al the mean age of patients was 44 years and, in the study,

done by Wabnitz et al the mean age was 44.5 years.[13,14] Most of the patients with chronic rhinosinusitis present early to the otorhinolaryngologist. 17 (30.40%) presented within one year of onset of symptoms and up to 55.4% presenting within two years of onset of symptoms. Almost a quarter of patients, 14 (25.0%) presented quite late, with a delay of more than 4 years before they consulted a specialist or a definite diagnosis was made. This delay adds a significant morbidity to the quality of life of patient. On being asked to grade using a VAS scale the overall discomfort faced due to their disease, most of the patients felt that their symptoms were of moderate 87.50% degree. Six patients 10.71% felt that his/her symptoms were of mild degree. Only 1 (1.78%) of the patients described their symptoms as severe. In our study the symptom score was obtained by grading the severity of the symptoms using a VAS. The overall discomfort experienced by the patient was also similarly graded using a VAS. This VAS score was then correlated with the Lund Kennedy score (based on endoscopic findings) using a statistical software SPSS version 20.

Nasal obstruction had a mean score of 6.63 with SD=1.532. It showed a statistically significant positive correlation with the endoscopic Lund Kennedy score (r=0.321, p=0.016). Anterior nasal discharge had a mean value of 5.39 with SD=1.806. It showed a statistically non-significant positive correlation with the endoscopic findings (r=0.173, p=0.202). Posterior nasal discharge had a mean of 2.64 and SD=2.022. It had a statistically non-significant positive (r=0.228, p=0.090) with the endoscopic findings. Agius found post nasal discharge was a strong predictor of chronic rhinosinusitis.[16] Other studies failed to corroborate this finding.[13-17] Facial pain/pressure had a mean of 4.75 with a SD of 2.209. It showed a statistically significant positive correlation with the endoscopic (r=0.298, p=0.026). None of the studies showed a statistically significant correlation between facial pain/pressure and neither does our study. Facial pain/pressure is probably a poor predictor of chronic rhinosinusitis. Hyposmia/anosmia had a mean of 4.54 and SD=2.404. It had a statistically significant positive correlation (r=0.605, p=0.000) with the endoscopic findings. This indicates that it is a good predictor of severity of disease. Studies by Kenny et al, Agius and Liu et al have also found a positive correlation between the severity of hyposmia and the severity of disease.[15-17] Liu et al found a strong degree of statistically significant positive correlation between hyposmia and endoscopic findings (r=0.53, p<0.01). Degree of hyposmia can probably be used to predict the severity of disease in patients carefully diagnosed as having chronic rhinosinusitis using EPOS 2012 criteria. The sum of the individual VAS scores or the total symptom mean score was 23.95 with SD of 5.854. It showed a significant positive correlation with endoscopic Lund Kennedy score (r=0.577, p=0.000). Liu et al found no correlation between the sum of the sino nasal symptom score and endoscopic score.[17] The overall discomfort score showed a mean of 6.48 and a SD of 1.206. It also had a

statistically significant positive correlation with the endoscopic Lund Kennedy score (r=0.358, p=0.007) indicating that the discomfort felt by the patient can also be used as an indicator for severity of disease. However, none of the previously published studies have found a correlation between them.[15-19]

Among the 56 patients who were diagnosed with chronic rhinosinusitis based on their symptoms, nasal endoscopy was abnormal in 49 patients 87.5%. It can be seen that out of 56 patients having chronic rhinosinusitis, 39 (69.64%) patients had polyp and 17 (30.36%) patients had no polyp. Patients having chronic rhinosinusitis, most common anatomical variation was deviated nasal septum (DNS) presented in 29 (51.78%) of patients and least common variation was paradoxical middle turbinate and double middle turbinate both occurring only 1 (1.78%) patient. Other significant findings are inferior turbinate hypertrophy (16.07%), concha bullosa 14.29%, adenoid enlargement 8.94% and enlarged bulla 5.56%. Selcuk et al found some relationship with variations of maxillary sinus and accompanying anatomical structures with severity and symptoms of chronic rhinosinusitis.[20] Stallman et al found relationship with the incidence of concha bullosa and nasal septal deviations with paranasal sinus disease.[21]

CONCLUSION

The study was concluded that if patients were selected based on EPOS 2012 guidelines, then severity of some symptoms (nasal obstruction, hyposmia, total symptom score, overall discomfort index) could provide some indication about severity of disease. Although our study was in agreement with some parameters of other studies, it was in disagreement with some other parameters. This difference could be due to the different demographic aspects of the study population. The difference could also arise as a result of more careful diagnosis of chronic rhinosinusitis using the EPOS 2012 guidelines in our study. However, our study population was very small (n=56) and may not be a true representation of the general population. A more extensive and detailed study needs to be done to determine conclusively whether the severity of symptoms can be used to predict the severity of disease in patients diagnosed as having chronic rhinosinusitis using EPOS 2012 guidelines.

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