

ANATOMICAL VARIATION OF NOSE AND PARANASAL SINUSES AMONG PATIENTS WITH CHRONIC RHINOSINUSITIS ON COMPUTER TOMOGRAPHY

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ABSTRACT

Introduction

Chronic rhinosinusitis is one of the commonest diseases of sinonasal cavity seen in Ear nose throat clinic. Although chronic rhinosinusitis is a clinical diagnosis, CT scan imaging studies helps in accessing the disease and gives a clear anatomy of sinonasal cavity. Chronic rhinosinusitis is a group of disorders that is characterized by inflammation of the mucosa of the nose and paranasal sinuses of at least 12 consecutive weeks duration.

There are number of factors that play role in the development of rhinosinusitis, including both host and environmental factors. CRS is a more persistent problem that requires a specific treatment approach.

Methodology

This is a prospective comparative study which was conducted in Department of otorhinolaryngology of Birat Medical College and Teaching Hospital from 1st August 2020-31st Dec 2020. This study was approved by Institutional Review Committee of Birat Medical College and Teaching Hospital. 124 patients were taken in the study. The primary objective of the study was to determine the anatomical variation of nose and paranasal sinuses among patients with chronic rhinosinusitis on computer tomography. Informed and written consent was taken from all the subjects participating in the study.

Result

A total of 124 patients was included in the study. Out of which 68 (54.76%) were men and 56 (45.24%) were female. The age of patients with CRS ranged from 15-75 years. Highest number of patients with CRS was in the range of 35-44 years. Mucosal thickening was more common in maxillary sinus (91.12%) followed by ethmoidal (67.74%), sphenoid (55.64%) and frontal (54.03%).

Conclusion

CT scan is the most common tool to know the anatomical variations of the nose and para nasal sinuses. Moreover it is highly recommended for the patients suffering from chronic rhinosinusitis. CT scan provides all the sinonasal variations and then it becomes easier for the treating physician for better surgical planning and overall management of chronic rhinosinusitis.

KEYWORDS

Chronic Rhinosinusitis, computer tomography, concha bullosa, deviated nasal septum



INTRODUCTION

Chronic rhinosinusitis is one of the commonest diseases of sinonasal cavity seen in Ear nose throat clinic. Although chronic rhinosinusitis is a clinical diagnosis, CT scan imaging studies helps in accessing the disease and gives a clear anatomy of sinonasal cavity. Chronic rhinosinusitis is a group of disorders that is characterized by inflammation of the mucosa of the nose and paranasal sinuses of at least 12 consecutive weeks duration.²

There are number of factors that play role in the development of rhinosinusitis, including both host and environmental factors. CRS is a more persistent problem that requires a specific treatment approach. It is sometimes overlooked by both patients and healthcare providers because the symptoms are more low-grade and chronic.

Endoscopic sinus surgery (ESS) is a frequently performed procedure for chronic rhinosinusitis. Certain anatomic variants are thought to be predisposing factors for the development of sinus diseases and thus it becomes essential to know about the anatomical variations. Detail radiological description of the anatomy and its anatomical variations of nose and paranasal sinuses is required before performing the surgery.³ Numerous sinonasal variants exist and are frequently seen on CT scan. The most common ones are septal deviation, inferior turbinate hypertrophy, concha bullosa, Agger nasi cells, infraorbital ethmoidal (haller) cells, sphenoidal (onodi) cells. Nasal septal deviation is most common and is seen in more than one half of the population. Concha bullosa is the pneumatization of the middle turbinates involving its inferior bulbous and its usually bilateral.⁴

METHODOLOGY

This is a prospective comparative study which was conducted in Department of otorhinolaryngology of Birat Medical College and Teaching Hospital from 1st August 2020- 31st Dec 2020. This study was approved by Institutional Review Committee of Birat Medical College and Teaching Hospital. 124 patients were taken in the study. The primary objective of the study was to determine the anatomical variation of nose and paranasal sinuses among patients with chronic rhinosinusitis on computer tomography. Informed and written consent was taken from all the subjects participating in the study. All the patients aged above 15 years who underwent CT scan of nose and paranasal sinuses for chronic rhinosinusitis was taken in the study. Age less than 15 years, Patients with surgical or traumatic antecedents in sinonasal region, invasive fungal sinusitis, sinonasal malignancies, history of previous sinonasal surgery and those who did not give consent were excluded from the study. All patients underwent plain non contrast computer tomography (NCCT) of Nose and Paranasal sinuses using 64 slice MDCT scanner (Somatom Perspective, Siemens, Erlangen, Germany) to see the area of nose and PNS involved using standard protocol of the

institute from skull base to angle of mouth in supine position using 2 mm slice thickness and 32 x 0.2 mm collimation. CT scan was done both for bony and soft tissue window. The anatomical variations of the nose and paranasal sinus was noted and the data was entered in microsoft excel and was exported to Microsoft SPSS 19 for analysis. Frequency, percentage, mean, sensitivity and specificity were calculated.

RESULTS

A total of 124 patients was included in the study. Out of which 68 (54.76%) were men and 56 (45.24%) were female. The age of patients with CRS ranged from 15-75 years. Highest number of patients with CRS was in the range of 35-44 years.

Table 1: Age distribution of patients with chronic rhinosinusitis.

Age	Number	Percentage (%)
15-24	2	1.61
25-34	24	19.35
35-44	36	29.03
45-54	20	16.12
55-64	15	12.09
65-75	27	21.77

Table 2: Sex distribution of patients with chronic rhinosinusitis.

Sex	Number	Percentage (%)
Male	68	54.76
Female	56	45.24

Table 3: Signs and symptoms of patients with chronic rhinosinusitis.

Signs and symptoms	Frequency	Percentage (%)
Nasal obstruction	118	95.16
Headache	109	87.90
Nasal discharge	85	68.54
Facial Fullness	24	19.35
Sneezing	47	37.90
Hyposmia	59	47.58
Anosmia	18	14.51

Most of the patients had symptoms of nasal obstruction (95.16%) followed by headache (87.90%) and nasal discharge (68.54%).

Table 4: CT scan findings in patients with chronic rhinosinusitis

CT findings	Frequency	Percentage (%)
DNS	84	67.74
IT hypertrophy	63	50.80
Concha bullosa	43	34.67
Nasal Polyp	57	45.96
Variation in uncinata process	19	15.32
Septal spur	10	8.06
Agger Nasi cell	3	2.41
Haller cell	2	1.61
Onodi Cell	2	1.61
Pneumatization of nasal septum	2	1.61
No variation	11	8.87

On computer tomography deviated nasal septum was seen in 63.70% more common on the left side (30.64%), inferior turbinate hypertrophy in 50.80%, concho bullosa was seen in 36.29% more common on the left side (14.51%), nasal polyp in 45.96% more common on the right side 20.16%.

Table 5: Clinical examinations findings in patients with chronic rhinosinusitis.

Finding	Number	Percentage (%)
Facial tenderness	40	32.25
Post nasal drip	55	44.35

On clinical examination most of the patients had post nasal drip (44.35%) followed by facial tenderness (32.25%).

Table 6: Laterality of CT findings in patients with CRS

Findings	Frequency	Percentage
DNS		
No	40	32.25
Left	38	30.64
Right	30	24.19
S-shaped	16	12.90
Concha bullosa		
No	81	65.32
Left	18	14.51
Right	16	12.90
Bilateral	9	7.25
Polyp		
Left	9	7.25
Right	25	20.16
Bilateral	23	18.54
Absent	67	54.03

Table 7: Mucosal thickening in different sinuses in CT scan of patients with chronic rhinosinusitis.

Mucosal thickening	Total	Percentage (%)
Maxillary sinuses	113	91.12
Ethmoid sinuses	84	67.74
Sphenoid sinuses	69	55.64
Frontal sinuses	67	54.03

Mucosal thickening was more common in maxillary sinus (91.12%) followed by ethmoidal (67.74%), sphenoid (55.64%) and frontal (54.03%).

DISCUSSION

To perform endoscopic sinus surgery a detail knowledge about the variation of nose and paranasal sinus is beneficial. Computer tomography of nose and paranasal sinus is performed by otorhinolaryngologist to delineate the anatomy of sinus, identifying the anatomical variations, severity of disease and planning for the surgery.

Male predominance was seen in our study. It showed male to female ratio of 1.21:1 which was similar to study conducted by Pandey et al (1.5:1)⁵ and K Sinha et al (1.6:1)⁶.

Out of 124 patients in our study, 113 patients (91.12%) had at least one type of variation while 11 patients (8.87%) had no variations. Our study is similar to the study by Karygusuz et al in which the anatomical variations was noted in 89.4% of the patients.

In our study population the most common presentation was nasal obstruction (95.16%) which was followed by headache (87.90%) and nasal discharge (68.54%). Our study is in accordance with the study conducted by Asruddin et al⁷ where nasal blockage and nasal discharge was the most frequent symptom followed by headache. Similarly, study by Pandey et al⁵ revealed nasal discharge, headache and nasal blockage as the major presenting symptom in patients with CRS. In the study conducted by Kirtane et al⁸ the commonest complaint was nasal discharge occurring in 25 patients (78.1%) followed by headache in 22 patients (68.7%) and nasal obstruction in 22 (68.7%).

Our studies showed deviated nasal septum as the most common anatomical variations which accounted for 67.74% followed by inferior turbinated hypertrophy (50.80%) and concha bullosa (34.67%). Our study is supported by studies conducted by Stallman Et al⁹ in which they found 60% and in Mamatha et al¹⁰ it was 65%. Similarly the study conducted by Kundan et al¹¹ in Nepal showed DNS in 64.50% of the population. Whereas the prevalence of DNS in study conducted by Dutra et al¹² and Dua et al¹³ was low. The prevalence of concha bullosa was 26% in a study conducted by Katra A. Shpilberget al.¹⁴ The variations ranges from 14-67.5%.¹⁵⁻²⁰

The prevalence of high deviated nasal septum might be associated with geographic variation and the other reason may be the deviation of nasal septum leading to defective mucociliary clearance and obstructed osteomeatal complex which finally leading to chronic rhinosinusitis.

DNS was common on the left side 30.86%, right side was 24.19%, S shaped DNS was seen in 12.90% while no DNS was

seen in 32.25%. Similar results were seen in studies conducted by Kamble et al which showed 31.5% left sided DNS and S shaped DNS was seen in 3.5% of the population.²¹ Maxillary sinus was the most commonly involved sinus accounting for 91.12% followed by ethmoidal sinus 67.74%, sphenoid sinus 55.64% and frontal sinus 54.03%. This study is supported by study conducted by Nair et al²² where maxillary sinus involvement was seen in 72.90%, ethmoidal sinus 65.80%, sphenoid sinus 35% and frontal sinus 55%. This study is also supported by Dar Lone in which maxillary sinusitis was the most common presentation with 70.31%.²³

CONCLUSION

CT scan is the most common tool to know the anatomical variations of the nose and para nasal sinuses. Moreover it is highly recommended for the patients suffering from chronic rhinosinusitis. CT scan provides all the sinonasal variations and then it becomes easier for the treating physician for better surgical planning and overall management of chronic rhinosinusitis.

RECOMMENDATION

Computer tomography of nose and para nasal sinus is highly

recommended in patients suffering from chronic rhino sinusitis. It provides all the anatomical variation and helps the surgeon for surgical planning and minimizing complication in the patients.

LIMITATION OF THE STUDY

This study was conducted in a small group of population attending ENT OPD of Birat Medical College and Teaching Hospital with features of chronic rhino sinusitis. Similar study has to be conducted in large population to know the more about the anatomical variation of nose and para nasal sinuses.

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CONFLICT OF INTEREST

None

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