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Sinonasal Anatomical Variations in Chronic Rhinosinusitis

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ABSTRACT

Background: The anatomy of the sinonasal area has a very wide range of anatomical variations.

Materials and methods: This hospital based retrospective study was conducted in the department of ENT, SMGS Hospital, and Jammu from March 2018 to April 2019. A total of 120 patients with diagnosis of chronic rhinosinusitis, undergoing endoscopic sinus surgery in the department of Otorhinolaryngology and Head and Neck Surgery were studied with the help of computed tomography and the sinonasal anatomic variations were recorded and analyzed. **Results:** 120 patients were included in the study Out of 120 patients, 96(80%) patients had at least one anatomical variation. Among the anatomic variations studied, DNS was the common variation found followed by concha bullosa seen in 44(36.67%) patients, large ethmoid bulla (32.50%), paradoxical middle turbinate (23.3%), hypertrophied uncinate process(20%), agar nasi cells (16.67%), haller cells (12.5%) and onodi cells (6.67%). 86(71.67%) out of 120 patients had bilateral chronic rhinosinusitis while 34(28.33%) had unilateral CRS. Out of 86 patients with bilateral CRS, 38(44.18%) patients had bilateral involvement, followed by left sided involvement seen in 21(24.44%) patients, right sided in 17 (19.76%) patients and no variation in 10(11.62%) patients.

Keywords:study of anatomical variations by doing CT scan prior to surgery can help the surgeon during Endoscopic sinus surgery

INTRODUCTION

Chronic rhinosinusitis (CRS) is defined as group of disorders characterized by inflammation of mucosa of nose and paranasal sinuses for at least 12 weeks duration. Patients with CRS may have acute flare-ups in such conditions the disorder is called acure exacerbation of chronic sinusitis.^[1]

Nasal and sinus mucosa produces approximately 1 L of mucus per day, which is cleared by mucociliary transport.^[2]Osteal obstruction may lead to fluid accumulation and stagnation, creating a moist, hypoxemic environment ideal for growth of pathogens.^[3]

Major anatomic variants leading to osteomeatal obstruction are deviated nasal septum, concha bullosa, paradoxical middle turbinate and infraorbital haller cells.^[4]

CRS sometimes doesn't get cured by medical line of management, necessitating surgical intervention. The complexities of the anatomy of nose and paranasal sinuses as its anatomical variation may create technical difficulties during surgery.

This study was undertaken to assess the sinonasal anatomical variations and their prevalence in patients

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with CRS with the help of Computerised tomography.

MATERIALS AND METHODS

This hospital based retrospective study was conducted in the department of ENT, SMGS Hospital, and Jammu from March 2018 to April 2019. A total of 120 patients with diagnosis of chronic rhinosinusitis, undergoing endoscopic sinus surgery in the department of Otorhinolaryngology and Head and Neck Surgery were studied with the help of computed tomography and the sinonasal anatomic variations were recorded and analyzed.

Inclusion criteria:

Patients of any age and both the genders presenting with clinical diagnosis of chronic rhinosinusitis were included.

Exclusion criteria:

Patients with history of previous sinus, facial trauma or benign or malignant tumors of sinonasal mucosa and patients with any condition causing immunosuppression were excluded. Generalized systemic examination was performed followed by detailed local examination.

Detailed ENT examination was carried out to find out any dental infection, tonsillar pathology or head and neck malignancy.

All the patients were subjected to undergo coronal CT scan of the nose and parnasal sinuses. Anatomical variations were recorded and noted down.

Statistical Analysis

Data was entered in Microsoft excel and analysis was done using SPSS version 20. Descriptive statistical analysis was done. Results on categorical measurements are presented as percentages.

RESULTS AND OBSERVATIONS

120 patients were included in the study. Following observations were made:

Out of 120 patients, 96(80%) patients had atleast one anatomical variation. In our study, 80 patients had DNS. Out of these 80 patients 34(42.5%) patients had DNS to left, 30(37.5%) patients had DNS towards right and 16(20%) patients had S shaped DNS. Figure 1 shows distribution of DNS on CT scan.



Figure 1: distribution of patients according to DNS.

Among the anatomic variations studied, DNS was the common variation found followed by concha bullosa seen in 44(36.67%) patients, large ethmoid bulla (32.50%), paradoxical middle turbinate (23.3%), hypertrophied uncinate process(20%), agar nasi cells (16.67%), haller cells (12.5%) and onodi cells(6.67%). Figure 2 shows the distribution of patients according to anatomical variations observed.



Figure 2: Distribution of patients according to anatomic variations on CT Scan.

86(71.67%) out of 120 patients had bilateral chronic rhinosinusitis while 34(28.33%) had unilateral CRS. Of 34 (28.33%) patients with unilateral CRS, 14(11.67%) patients had left sided involvement and 20(16.67%) patients had right sided involvement.

Out of 86 patients with bilateral CRS, 38(44.18%) patients had bilateral involvement, followed by left sided involvement seen in 21(24.44%) patients, right sided in 17 (19.76%) patients and no variation in 10(11.62%) patients. Figure 3 shows distribution of laterality of anatomic variations of patients with bilateral CRS.



Figure 3: Distribution of laterality of anatomic variations in patients with bilateral CRS.

DISCUSSION

The anatomy of paranasal sinuses is very complicated. To evaluate the anatomy and to diagnose the diseases at this area, physical

Volume 2, Issue 5; September-October 2019; Page No.201-205 © 2019 IJMSCR. All Rights Reserved examination and conventional radiographic examinations are not always able to provide sufficient information. Paranasal sinus CT on coronal plan is one of the main methods used to demonstrate

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the stages of benign inflammatory diseases preoperatively. The advantage of this approach for endoscopic sinus surgery is that; it can provide anatomical and pathological image with the same perspective to the surgeon. Sinonasal region that possess frequently anatomic variations, plays an important role in the pathogenesis of paranasal sinus diseases.^[5]

Many authors believe that anatomical variations of paranasal sinus structures may predispose patients to recurrent sinusitis.^[6,7] 120 patients were included in the study. Following observations were made:

Nasal septum is fundamental in the development of the nose and paranasal sinuses. Out of 120 patients, 96(80%) patients had atleast one anatomical variation. In our study, 80 patients had DNS. Out of these 80 patients 34(42.5%) patients had DNS to left, 30(37.5%) patients had DNS towards right and 16(20%) patients had S shaped DNS. Similar findings were noted by Perez et al., Anita Armani et al., and Mamtha et al. who in their studies found out prevalence of DNS to be 80%, 74% and 60% respectively.^[8,9,10]

Concha bullosa has been implicated as a possible etiological factor in the pathogenesis of CRS. In our study concha bullosa was seen in 44(36.67%) patients, which is almost comparable to the results obtained by Suri et al., and Kumar et al. in whose study prevalence of concha bullosa was 41.6% and 43% respectively.^[11,12]

Ethmoidal bulla is the largest and most constant cells of anterior ethmoid sinus. It can be excessively pneumatised causing obstruction of middle meatus completely.In our study,large ethmoid bulla was seen in 32.50% patients. Similar findings were given by Patel et al., and Fadda et al. where it was 32.66 % and 32.8%.^[13,14]

Paradoxical middle turbinate was observed in 23.3% patients in our study, similar to findings by Bolger et al. Found it in 26% cases and Lloyd et al. Found it in 17% of patients of sinusitis.^[15,16]

Hypertrophied uncinate process was seen in 20% patients in our study which was similar to study by Gouripur et al. ^{[17].} In their study the prevalence was 16%.

The effect of A cells on the drainage way of frontal sinus has been widely discussed in many papers. Brunner et al. reported that a cell narrows way out of the frontal sinus that had an effect on the chronic frontal sinusitis, sinus pain. Also similar results reported in a study by Bradley and Kountakis. ^[18, 19] Agar nasi cells (16.67%), were seen in 16.67% patients in our study. Yanagisawa and Joe reported the rate of AN air cells as 17 %. ^[20]

Out of 86 patients with bilateral CRS, 38(44.18%) patients had bilateral involvement, followed by left sided involvement seen in 21(24.44%) patients, right sided in 17 (19.76%) patients and no variation in 10(11.62%) patients. Figure 3 shows distribution of laterality of anatomic variations of patients with bilateral CRS.

CONCLUSION

On the basis of present study, it can be concluded that CT Scan are important investigation tool to detect anatomical variations of nose and paranasal sinuses since the rate of anatomical variations is very high in patients suffering from CRS.

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