A Study on the Involvement of Sinuses on CT among Chronic Rhinosinusitis Patients

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ABSTRACT

Introduction: Chronic rhinosinusitis (CRS) is one of the most common health care problems, with significant direct medical costs and severe impact on lower airway disease and general health outcomes. The aim of this study was to study the involvement of Sinuses on CT among Chronic Rhinosinusitis patients.

Material and methods: The study was a cross sectional observational study. All the patients having clinical findings of CRS referred from ENT Department for CT PNS constituted the study population. All the patients were submitted to detailed clinical examination, routine investigation and subsequently submitted for CT scan of PNS.

Results: Maxillary sinus was found to be most common sinus (68.5%) followed by Ethmoidal Sinus (60.9%), Sphenoidal Sinus (38%), Sphenoidal Sinus (26.1%), Isolated Maxillary (23.9%) and Pansinusitis (14.1%). The percentage of other sinuses was less than 10%. Single number of sinus was observed in 48.9% patients followed by multiple (40.2%) and none (10.9%).

Conclusion: There are a multitude of anatomic variants of the sinonasal cavities. Some of which are such common that they are most likely found in the majority of individuals.

Keywords: Chronic Rhinosinusitis, Sinuses, Anatomic variants

INTRODUCTION

Different sinonasal anatomic variants exist. These are frequently seen on sinus CT scans. The most common are: Agger nasi cells, infraorbital ethmoidal (Haller) cells, sphenoethmoidal (Onodi) cells, nasal septal deviation and concha bullosa. The Agger nasi cells have been reported to be most anterior ethmoidal air cells. Their location is anterior, lateral and inferior to frontal recess.[1,2] Infraorbital ethmoidal (Haller) cells are ethmoidal cells. These extend downward under the medial floor of orbit adjacent to/above the maxillary sinus ostium lateral to the infundibulum. Sphenoethmoidal (Onodi) cells are posterior ethmoidal cells. These extend laterally, superiorly and posteriorly to the sphenoid sinus. These are intimately correlated with optic nerve.[3]

Few of anatomic variants are associated with chronic rhinosinusitis. This may possibly lead to inflammation by obstructing drainage pathways from the sinuses and nasal cavity. Large ethmoidal bullae are correlated with maxillary sinusitis in one study. However, another study showed an association between paradoxically bent middle turbinates, infraorbital ethmoidal cells and chronic rhinosinusitis.[4,5] A statistically significant correlation has been reported between the presence of sinus mucosal disease and nasal septal deviation, bilateral concha bullosa, infraorbital ethmoidal (Haller) cells, hypertrophic ethmoidal bullae and Agger nasi cells.[6]

The present study was aimed to study the involvement of sinuses on CT scan among patients of chronic rhinosinusitis patients.

MATERIAL AND METHODS

This was a cross sectional observational study conducted in a tertiary care hospital. All the patients having clinical findings of CRS referred from ENT Department for CT PNS constituted the study population. All the patients having clinical findings of CRS referred from ENT department for CT PNS were included in the study. Patients with malignancy/ history of trauma and not giving consent/Pregnancy were excluded from the study.

All CT scan was performed on spiral scanner 64 slice Somatom Definition AS of Siemens definition AS62 slice MD CT scanner. Patient age, sex and symptoms were recorded in pre defined proforma. Various anatomical variation were evaluated by CT scan like Deviated nasal septum, Aggernasi cell, Conchabullosa, Haller cells, Onodi cell Pneumatization of Vomer septum and Septate maxillary sinus. All CT scan were be obtained on Siemendefination AS63 Slice MD CT scanner. After obtaining the scout projection, the area of scanning were defined to include the region from roof of frontal sinus up to hard palate. Axial sections were taken with the patient in supine position and plane of data acquisition was be parallel to hard palate. All the scans were evaluated on dedicated Siemens work station in the all three orthogonal planes i.e. axial, sagittal and coronal plane.

All the patients were submitted to detailed clinical examination, routine investigation and subsequently submitted for CT scan of PNS. As per the protocol, chronic

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Involvement of Sinuses*	No. (n=92)	%
Maxillary sinus	63	68.5
Ethmoidal Sinus	56	60.9
Sphenoidal Sinus	35	38.0
Frontal Sinus	24	26.1
Isolated Maxillary	22	23.9
Isolated Ethmoidal	3	3.3
Isolated Sphenoidal	6	6.5
Isolated Frontal	7	7.6
Pansinusitis	13	14.1
*Multiple response		

Table-1: Distribution of patients according to involvement of Sinuses on CT

Number of sinuses involved	No. (n=92)	%
None	10	10.9
Single	45	48.9
Multiple	37	40.2

Table-2: Distribution of patients according to number of sinuses involved

sinusitis was defined as nasal blockade anterior nasal discharge, post nasal drip, headache or facial pain, these patient were refractory to medical treatment for more than 3 month duration.

Descriptive statistics are presented.

RESULTS

Maxillary sinus was found to be most common sinus (68.5%) followed by Ethmoidal Sinus (60.9%), Sphenoidal Sinus (38%), Sphenoidal Sinus (26.1%), Isolated Maxillary (23.9%) and Pansinusitis (14.1%). The percentage of other sinuses was less than 10%. Isolated Frontal and Isolated Sphenoidal was in 7.6% and 6.5% patients respectively. Isolated Ethmoidal was in 3.3% patients. (Table-1).

Single number of sinus was observed in 48.9% patients followed by multiple (40.2%) and none (10.9%) (Table-2).

DISCUSSION

Chronic rhinosinusitis remains one of the most common diseases with negative impact on quality of life. It has a high prevalence rate of about 10.9% as found out in an European study; the GA2LEN study.[7] CT scan is considered as the gold standard in diagnosing rhinosinusitis while nasal endoscopy is performed to look for anatomic variations and mucosal changes. It has been advocated that either a CT scan or endoscopic evaluation of nose must be a part of any clinical trial. Because, it provides the majority of objective data used to diagnose CRS.[8-10]

The surgical management of sinonasal disease has been advocated for many years. Extensive external approaches as well as prolonged hospital stays are being replaced by a minimally invasive procedure which is called endoscopic sinus surgery (ESS). This procedure includes opening the obstructed ostia to provide normal ventilation with preservation of adjacent mucosa and removal of disease.[5]

In the literatures, excellent results have been reported with ESS.[11,12] However, because of close proximity of PNS to important structures like orbit and the skull base, if complications occur in surgery, they are usually dangerous and harmful.

Sinonasal regions have many types of anatomical variations. Their role in the development of sinusitis remains unclear. But complete knowledge of these variations are important before the surgical procedure to avoid dreadful complications.[13]

In the present study, maxillary sinus was found to be most common sinus (68.5%) followed by Ethmoidal Sinus (60.9%), Sphenoidal Sinus (38%), Sphenoidal Sinus (26.1%), Isolated Maxillary (23.9%) and Pansinusitis (14.1%). The percentage of other sinuses was less than 10%. Chakraborty and Jain[14] reported that Pansinusitis was found in 12.19%. Isolated sinus involvement is not much common. Maxillary sinus was involved alone in 21.9%, isolated etmoidal in 1.21%, isolated sphenoidal in 6.09% and isolated frontal in 2.43%. 7.3% patients had no sinus involvement. Deosthale et al[15] found that 83(68.03%) cases had maxillary sinusitis, 74 (60.66%) anterior ethmoid sinusitis and 39(31.97%) frontal sinusitis. Posterior ethmoid sinusitis (31.15%) or sphenoid sinusitis (18.03%) was not seen individually but was seen in association. Kate and Mandke[16] found that 85% patients suffered from maxillary sinusitis. Seyyed et al[17] also found that maxillary sinus was the most common site of involvement (67 patients).

In this study, single number of sinus was observed in 48.9% patients followed by multiple (40.2%) and none (10.9%). Chakraborty and Jain[14] found that the most patients had multiple sinus involvement (48.78%).

CONCLUSION

There are a multitude of anatomic variants of the sinonasal cavities. Some of which are such common that they are most likely found in the majority of individuals.

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