



## “RADIOLOGICAL ASSESSMENT OF OSTEOMEATAL UNIT VARIATIONS IN CHRONIC RHINOSINUSITIS AND NASAL POLYPOSIS– A STUDY IN A TERTIARY CARE HOSPITAL”.

### Otorhinolaryngology

<b>Dr. Carol Jacob*</b>	Post Graduate Resident, Department Of Otorhinolaryngology, Father Medical College And Hospital. *Corresponding Author
<b>Dr. Savita Lasrado</b>	Associate Professor, Department Of Otorhinolaryngology, Father Muller Medical College And Hospital, Mangalore
<b>Dr. Basavaraj N Birader</b>	Assistant Professor, Department Of Radio Diagnosis, Father Muller Medical College And Hospital
<b>Dr. Sadia M Shaikh</b>	Fellow in Head and Neck Surgical Oncology, Department of Head and Neck Oncology, Narayana Hrudayalaya Bangalore.

### ABSTRACT

The osteomeatal unit plays an important role in the development of chronic rhinosinusitis with nasal polyposis. **MATERIALS AND METHODS** Observational Descriptive Study Design. Medical Records Department and CT Archives of Radiology Department, Father Muller Medical College Hospital(FMMCH), Mangalore. Three months after approval from ethics committee, data extraction period was from 29-09-2018 to 20-05-2020. **INCLUSION CRITERIA:** All age group patients with chronic rhinosinusitis and nasal polyposis who underwent FESS in FMMCH, Mangalore from 29-09-2018 to 20-05-2020. **EXCLUSION CRITERIA:** Patients with Malignancy of nose and PNS, road traffic accident cases and Revision nasal surgery cases. **RESULT AND DISCUSSION:** In our study, 16(10.4%) patients were  $\leq 20$  years old, 32(20.8%) patients were 21-30 years old, 34(22.1%) patients were 31-40 years old, 28(18.2%) patients were 41-50 years old, 22(14.3%) patients were 51-60 years old, 14(9.1%) patients were 61-70 years old, 7(4.5%) patients were 71-80 years old and 1(0.6%) patient was 81-90 years old. There were 70(45.5%) female patients and 84(54.5%) male patients. For complete disease clearance and safe performance of endoscopic sinus surgery a thorough knowledge of the CT scan of the paranasal sinuses is a necessary requirement in modern the modern endoscopic sinus surgery era. Hence a better understanding of the anatomy of the osteomeatal complex plays a vital role in the outcome of endoscopic sinus surgery performed for chronic rhinosinusitis. **CONCLUSION:** We concluded in our study that deviated nasal septum was seen in 83% of our patients which was the most common anatomical variant followed by concha bullosa, aggermasi, haller cell and paradoxical middle turbinate. The most common attachment of the uncinate process was to the lamina papyracea.

### KEYWORDS

Radiological Assessment, Chronic Rhinosinusitis, Nasal Polyposis

#### INTRODUCTION:

The osteomeatal unit plays an important role in the development of chronic rhinosinusitis with nasal polyposis. This is a small compartment located in the region between the middle turbinate and the lateral nasal wall in the middle meatus, it represents the region of drainage of the anterior ethmoids, maxillary and frontal sinuses.(1)

With every episode of rhinosinusitis the ciliary movement is hampered and hence resulting in stasis of mucous inside the sinuses. Thus the sinonasal mucosa becomes engorged closing the ostia. This process is reversible and once the osteomeatal unit is reopened, the disease within the maxillary and frontal sinuses usually resolves spontaneously. But if there is an anatomical variation narrowing this key area, then even a minimal amount of mucosal oedema may predispose the patient to recurrent infection, resulting in chronic inflammatory changes in the mucosa.(2)

Over the past few decades, both CT scan and nasal endoscopy are being used as diagnostic modalities for sinonasal diseases. The aim of these is to determine the mucosal abnormalities and bony anatomic variations of osteomeatal unit and assess the possible pathogenicity of chronic rhinosinusitis with nasal polyposis in these patients.(3)

CT examination of the paranasal sinuses provides an anatomic road map of the paranasal sinuses during endoscopic sinus surgeries to identify the presence of anatomic variations, their location, severity of the disease and the exact location of the obstruction. The coronal plane in CT scan is optimal for the assessment of osteomeatal unit, skull base, ethmoid roof and the relationship of orbits to the paranasal sinuses.(2)

Since the approach to patients with chronic rhinosinusitis is endoscopic sinus surgery, which aims at removing the obstruction of the main drainage pathway, which in turn requires the surgeons to have detailed knowledge of the anatomy of the lateral nasal wall, paranasal sinuses and surrounding vital structures and of the anatomic variations in this region.(3)

#### MATERIALS AND METHODS:

**Study Design:** Observational Descriptive Study Design

**Study Settings:** Medical Records Department and CT Archives of Radiology Department, Father Muller Medical College Hospital(FMMCH), Mangalore

**Study Duration:** Three months after approval from ethics committee, data extraction period was from 29-09-2018 to 20-05-2020.

**Data Collection Tool:** Predesigned validated observation checklist to extract the information from the CT scan Records

All CT Scans were obtained with GE bright speed 16 slice. After obtaining the scout projection, the area of scanning was defined to include the region from anterior wall of frontal sinus till the sphenoid sinus for coronal sections. Axial sections were performed with the patient in supine position. The plane of data acquisition was parallel to hard palate. The sections were taken with slice thickness of 2.5 mm and the images were reconstructed 1.25mm. Scanning parameters included 150 mas, 120 kvp. Coronal sections were performed with the patients in prone position with extended neck and the plane perpendicular to axial plane. The scan parameters were same as in axial plane.

**Sample Size:** It is a **time bound study** wherein the clinical case records of all the patients with chronic rhinosinusitis and nasal polyposis who have undergone CT imaging of Para Nasal Sinuses (PNS) before undergoing functional endoscopic sinus surgery from 29-09-2018 to 20-05-2020 were taken. The sample size was 154.

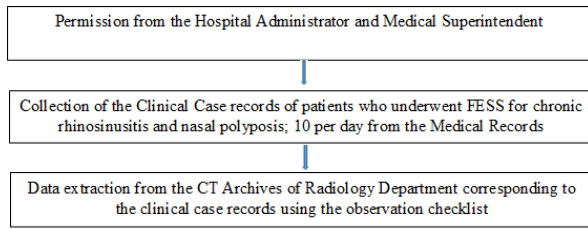
#### INCLUSION CRITERIA:

All age group patients with chronic rhinosinusitis and nasal polyposis who underwent FESS in FMMCH, Mangalore from 29-09-2018 to 20-05-2020.

#### EXCLUSION CRITERIA:

Patients with Malignancy of nose and PNS, road traffic accident cases and Revision nasal surgery cases.

**Study plan:**

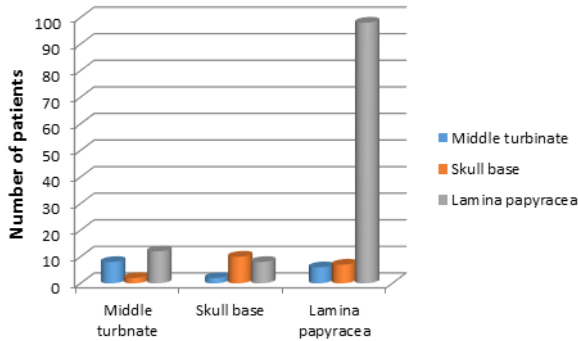


**Statistical Analysis:**

The results are expressed in percentages and proportions. Appropriate tests of association like Chi square test were used to find out the association of variations of osteomeatal unit with sociodemographic and clinical variables of patients who underwent FESS. The data was analyzed using SPSS 23 and p-value < 0.05 was considered as statistically significant.

**Ethical Considerations:**

- Ethics clearance was obtained from the Institution ethics committee of Father Muller Medical College, Mangalore.
- The patients' data was kept completely confidential and the personal identifiers were never revealed in any form while reporting of results.



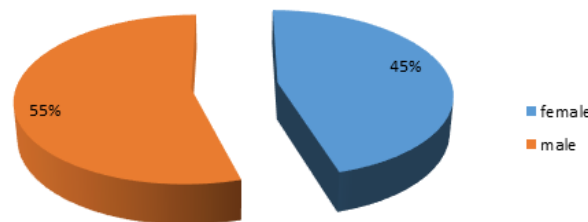
**Figure 1 - Variations in attachment of uncinete process (between right and left side)**

**Table 1- anatomic variations in the nasal septum**

DNS	Frequency	Percent
midline	26	16.9%
right	62	40.3%
left	66	42.9%
Total	154	100.0%

**Table 2 – age distribution in years**

Age in Years	Frequency	Percent
≤20	16	10.4%
21-30	32	20.8%
31-40	34	22.1%
41-50	28	18.2%
51-60	22	14.3%
61-70	14	9.1%
71-80	7	4.5%
81-90	1	0.6%
Total	154	100.0%



**Figure 2 – Sex distribution**

**RESULT AND DISCUSSION:**

Computed tomography is the gold standard diagnostic tool in cases of chronic rhinosinusitis in modern rhinology. It's an invaluable tool in the

pre-operative work up of a FESS candidate.

In our study, 16(10.4%) patients were ≤20 years old, 32(20.8%) patients were 21-30 years old, 34(22.1%) patients were 31-40 years old, 28(18.2%) patients were 41-50 years old, 22(14.3%) patients were 51-60 years old, 14(9.1%) patients were 61-70 years old, 7(4.5%) patients were 71-80 years old and 1(0.6%) patient was 81-90 years old. There were 70(45.5%) female patients and 84(54.5%) male patients.

Srivastava M et al. (1) in their study on anatomic variations of uncinete process in frontal sinusitis found that uncinete process insertion into lamina papyracea was seen in 74 (57.8 %) cases, uncinete process attachment to skull base was seen in 26 (20.3 %) cases and uncinete process attachment to middle turbinate was seen in 8 (6.2 %) cases. In our study, uncinete process attachment on the right side was to the middle turbinate in 22 (14.3%) patients, to the skull base in 20 (13.0%) patients and to lamina papyracea in 112 (72.7%) patients. While uncinete process attachment on the left side was to middle turbinate in 16 (10.5%) patients, to skull base in 19 (12.4%) patients and to lamina papyracea in 118 (77.1%) patients.

A study by Aramani A et al. (3) showed that 74.1% of the chronic sinusitis cases had deviated nasal septum, which was found to be the commonest among the anatomical variations followed by unilateral concha bullosa (33.3%) and paradoxically bent middle turbinate (14.8%). In our study, 26(16.9%) patients had a midline septum, 62(40.3%) patients had deviated nasal septum to right and 66(42.9%) patients had deviated nasal septum to left.

In their article on CT scan variations in chronic sinusitis, Dua K et al. (5), the CT Scans were classified according to the Lund & Mackay radiological system of scoring and they found that sinonasal polyposis were seen in 62% patients, among the anatomic variations deviated nasal septum was the most common variation, seen in 44%, followed by agger nasi seen in 40% patients. Other variations were concha bullosa (16%), paradoxical middle turbinate (10%), over pneumatized ethmoidal bulla or giant bulla (14%), haller cells (16%), onodi cells (6%), lamina papyracea pushed laterally (4%), maxillary sinus septae (6%) and pneumatization of vomerine bone seen in 2% patients. In our study, 12(7.8%) patients had paradoxical middle turbinate on the right side, while 16(10.4%) patients had paradoxical middle turbinate on the left side.

Wani AA et al (6) in their study found that concha bullosa was the commonest anatomic variation and was seen in 30% of the patients. The other anatomic variations seen included -paradoxical middle turbinate in 9.33% patients, uncinete process variations in 25% patients, agger nasi cells in 9.33%, haller cells in 8.66% and posterior septal deviations in 25.33% patients. The mucosal changes were most commonly seen in anterior ethmoids (87.33%), followed by maxillary sinus ostial area (70%), maxillary sinus disease (65.33%), posterior ethmoidal disease (38%), frontal sinus disease (15%) and sphenoid sinus mucosal disease (8.66%) patients. In our study, 105(68.2%) patients had normal and 49(31.8%) patients had prominent agger nasi on the right side. While, 118(76.6%) patients had normal and 36(23.4%) patients had prominent agger nasi on the left side.

Liu X et al (7) in their study on the anatomic variations of osteomeatal complex in chronic sinusitis patients found that 3.3% of the patients had haller cells. In our study, 31(20.1%) patients had haller cell.

In their study on the frequency and appearance of concha bullosa on CT scan, Maru YK et al (8) found that 62(41.3%) patients had concha bullosa. Among these 10 (16.1%) patients had bilateral concha bullosa and while 52 (83.5%) patients had unilateral concha bullosa. In our study, 37 (24.0%) patients had concha bullosa on the right side while 41 (26.6%) patients had concha bullosa on the left side.

**CONCLUSION:**

For complete disease clearance and safe performance of endoscopic sinus surgery a thorough knowledge of the CT scan of the paranasal sinuses is a necessary requirement in modern endoscopic sinus surgery era. Hence a better understanding of the anatomy of the osteomeatal complex plays a vital role in the outcome of endoscopic sinus surgery performed for chronic rhinosinusitis. We concluded in our study that deviated nasal septum was seen in 83% of our patients which was the most common anatomical variant followed by concha bullosa, agger nasi, haller cell and paradoxical middle turbinate. The

most common attachment of the uncinate process was to the lamina papyracea.

#### REFERENCES:

1. Srivastava M, Tyagi S. Role of Anatomic variations of Uncinate Process in Frontal Sinusitis. *Indian J Otolaryngol Head Neck Surg.* 2016;68(4):441-4.
2. Mendiratta V, Baisakhiya N, Singh D, Datta G, Mittal A, Mendiratta P. Sinonasal Anatomical Variants: CT and Endoscopy Study and Its Correlation with Extent of Disease. *Indian J Otolaryngol Head Neck Surg.* 2016;68(3):352-8.
3. Aramani A, Karadi RN, Kumar S. A study of anatomical variations of osteomeatal complex in chronic rhinosinusitis patients-CT findings. *J Clin Diagnostic Res.* 2014;8(10):KC01-4.
4. Arslan IB, Uluyol S, Demirhan E, Kozcu SH, Pekcevik Y, Cukurova I. Paranasal Sinus Anatomic Variations Accompanying Maxillary Sinus Retention Cysts: A Radiological Analysis. *Turk Otolarengoloji Arsivi/Turkish Arch Otolaryngol.* 2017;55(4):162-5.
5. Dua K, Chopra H, Khurana AS, Munjal M. CT scan variations on chronic sinusitis. *Indian J Radiol Imaging.* 2005;15(3):315-20.
6. Wani AA, Kanotra S, Lateef M, Ahmad R, Qazi SM, Ahmad S. CT scan evaluation of the anatomical variations of the ostiomeatal complex. *Indian J Otolaryngol Head Neck Surg.* 2009;61(3):163-8.
7. Liu X, Zhang G, Xu G. Anatomic variations of the ostiomeatal complex and their correlation with chronic sinusitis: CT evaluation. *Zhonghuaer bi yanhoukezazhi.* 1999 Jun;34(3):143.
8. Maru YK, Gupta Y. Concha bullosa: frequency and appearances on sinonasal CT. *Indian J Otolaryngol.* 1999-2000;52:40-45.