Clinicoradiological Comparative Study of Obstructive Osteomeatal Complex in Cases of Rhinosinusitis

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- Obstructive Osteomeatal
- Rhinosinusitis

**ABSTRACT**
Mosher said that intranasal ethmoidectomy is the most dangerous and terrifying. He said that in the mid-twentieth century. Endoscopy changed this view significantly. Since the commencement of medication, various endeavours have been made to light up and analyse within the different empty depressions situated inside the body. A hospital-based comparative and correlative study was undertaken with 50 patients. The research assessed the clinicoradiological comparison of obstructive osteomeatal complex in cases of rhinosinusitis. Majority (28%) patients were 31-40 years in the age group. The 34.2±12.50 years was the mean age of patients. 60% patients were males. The most common symptoms were nasal obstruction (80%) followed by headache (76%), nasal discharge (42%), postnasal discharge (40%), sneezing (28%) and epistaxis (20%). Osteomeatal complex and maxillary sinus were the most frequently affected regions seen in 88% of patients. The most common sign is purulent middle meatal discharge in 86% of patients. The next most common sign seen is deviated nasal septum in 46% of the patients. 62% of the patients in our study suffered from chronic rhinosinusitis. Out of 50 cases, 33 cases have septal deviation using DNE. Uncinate attachment to the skull base is seen in 18 (36%) cases each on the right, and 17 (34%) left side in both DNE and CT. In DNE 7 (14%) cases show middle turbinate hypertrophy on the right side. There was statistically significant correlation between Middle turbinate: concha bullosa and Maxillary sinus (r=0.621; p=0.0005), Pneumatized uncinate and Anterior ethmoid (r=0.452; p=0.0001), Agger nasi and Frontal sinus (r=0.318; p=0.024) and Middle turbinate: paradoxical and Maxillary sinus (r=0.864; p=0.0001). The significance of variations is that they impair the normal drainage pathway, hinder endoscopic access to distal areas and increase the risk of endoscopic mishaps.

**INTRODUCTION**
Mosher said that intranasal ethmoidectomy is the most dangerous and terrifying. He said that in the mid-twentieth century. Endoscopy changed this view significantly. This view changed substantially with the approach of the endoscopes. Since the commencement of medication, various endeavours have been made to light up and analyse within the different empty depressions situated inside the body. In 1907, Hirschmann utilised an altered cystoscope to look at the centre meatus and study sinus ostia (Draf, 1903). The most critical advancement...
in nasal endoscopy was seen during 1950’s when Hopkins created a strong bar focal point with proximal virus light source. In the last piece of the twentieth century, sinonasal endoscopy has been set up as a significant part in our demonstrative and remedial armamentarium (Messerklinger, 1978).

The spearheading work of Prof Walter Messerklinger of Graz, Austria on sinus mucosa and mucociliary transport has carried light into the comprehension the pathophysiology of sinus sicknesses. This can be outlined as below. Most PNS contaminations spread from nose to sinus. Recurrent sinusitis is auxiliary to deficient surge or block of the characteristic sinus Ostia into the nasal cavity. Sites of hindrance or fractional stenosis are the ethmoid infundibulum at the passage to the maxillary and frontal sinus (Stammberger, 1986a,c).

This work of Messerklinger has been valued and acknowledged. The prior idea that frontal and maxillary sinuses are the offenders for chronicity of the sickness is not, at this point, acknowledged. The presentation of CT-scan again affirmed this point. Modern endoscopic sinus medical procedure is discretionarily partitioned into Messerklinger, and Wigand approaches. The Messerklinger approach (1985) is perfect for patients with foremost ethmoid sickness with or without maxillary or frontal sinus malady. Here the methodology is from foremost to back. It tends to be reached out to the back ethmoids, sphenoid and frontal sinus, if important. The Wigand approach (1978) is conversely, perfect for patients with pansinusitis who may not react to a restricted medical procedure. This methodology is from back to front and routinely includes leeway of all the sinuses (Rice, 1994). Both strategies depend on the presumption that the sinus mucosa is reversibly infected and will come back to ordinary once satisfactory waste has been set up. FESS has picked up prominence and keeps on doing as such among the ENT specialists in the ongoing years with the better comprehension of the sidelong mass of the nose. An assortment makes the finding of ceaseless rhinosinusitis of doctors including essential consideration doctors, general doctors, paediatricians, pulmonologists and otolaryngologists. Interminable rhinosinusitis altogether impacts the personal satisfaction by meddling with the general wellbeing, essentialness and social working and cause a decline in profitability in the work power; which is equivalent with that saw in patients with coronary illness and ceaseless lung malady. Ceaseless rhinosinusitis is one of the most typical conditions for which anti-infection agents are recommended.

Most instances of interminable rhinosinusitis react to clinical treatment however if no improvement in indications is accomplished, FESS advocates an orderly way to deal with the careful treatment of the sickness of the nose and sinuses (Nghi and Mccaig, 2002; Blackwell et al., 2002). Patency of pathways through which the sinuses channel is critical for satisfactory mucociliary work and ensuing sinus drainage (Thiagarajan and Basith, 2012). Stammberger and Kennedy characterise osteomeatal unpredictable as a useful unit of the foremost ethmoid complex speaking to the last normal pathway for waste and ventilation of the frontal, maxillary and front ethmoid sinuses (de Freitas Linhares Riello and Boasquevisque, 2008). OMC is a tight anatomical area comprising of centre turbinate, uncinate process, bulla ethmoidal, frontal break, ethmoidal infundibulum, centre meatus, and first ethmoidal, maxillary and frontal sinus ostia (Zinreich et al., 1987a). The coronal plane best shows the osteomeatal unit, the relationship of the mind to the ethmoid rooftop. It connects intimately with the careful direction, in this manner is the essential imaging direction for assessment in all patients with a fiery sinus infection. Nasal endoscopy joined with CT has made the way to deal with sinonasal sickness progressively explicit, sane and precise. The ordinary OMC is imagined on 1 or 3-mm thick coronal CT section (Wani et al., 2009).

Messerklinger announced that infundibulum and centre meatus were the most widely recognised locales impacted by an anatomic variety of OMC and Stammberger found that over 90% of this ailment is brought about by an anatomic variety of OMC (Stammberger, 1986b; Zinreich et al., 1987b; Lee, 1989). The cornerstone of utilitarian endoscopic sinus medical procedure is the capacity to treat even minor changes in OMC precisely. CT sweep and nasal endoscopy give the capability to accurately get to this region for proof of restricted malady or any anatomic deformity that bargains ventilation and mucociliary leeway. Scarcely any investigations of Indian cause have inspected the putative job of anatomical varieties of osteomeatal complex, for example, concha bullosa, septal deviation, uncinate process varieties, agger-nasi cells, Haller cells and incomprehensibly bent centre turbinate in the improvement of customary CRS (Dua et al., 2005).

Hence the current study was done at our tertiary hospital to survey the clinicoradiological correlation of obstructive osteomeatal complex in instances of rhinosinusitis.

Aims And Objectives
Majority (28%) of were in the age group of 31-40 years. The mean age was 34.2 ± 12.50 years.

Table 2: Distribution of patients according to Sex

<table>
<thead>
<tr>
<th>Sex</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>30</td>
<td>60%</td>
</tr>
<tr>
<td>Female</td>
<td>20</td>
<td>40%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 3: Age and Gender Distribution of patients

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Male N</th>
<th>%</th>
<th>Female N</th>
<th>%</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 – 20</td>
<td>6</td>
<td>12%</td>
<td>2</td>
<td>4%</td>
<td>8</td>
</tr>
<tr>
<td>21 – 30</td>
<td>9</td>
<td>18%</td>
<td>4</td>
<td>8%</td>
<td>13</td>
</tr>
<tr>
<td>31 – 40</td>
<td>7</td>
<td>14%</td>
<td>7</td>
<td>14%</td>
<td>14</td>
</tr>
<tr>
<td>41 – 50</td>
<td>6</td>
<td>12%</td>
<td>3</td>
<td>6%</td>
<td>9</td>
</tr>
<tr>
<td>51 – 60</td>
<td>2</td>
<td>4%</td>
<td>2</td>
<td>4%</td>
<td>4</td>
</tr>
<tr>
<td>61 - 65</td>
<td>0</td>
<td>-</td>
<td>2</td>
<td>4%</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>60%</td>
<td>20</td>
<td>40%</td>
<td>50</td>
</tr>
</tbody>
</table>

Mean ± SD 35.4 ± 15.89 32.3 ± 13.72 34.2 ± 12.50

Clinicoradiological assessment of obstructive osteomeatal complex in cases of rhinosinusitis. To compare and correlate clinicoradiological findings in targeted cases.

MATERIALS AND METHODS

A hospital-based comparative and correlative study was undertaken with 50 patients to assess the clinical, radiological comparison of obstructive osteomeatal complex in cases of rhinosinusitis.

Study Design
A comparative correlative study.

Study Duration
Two years.

Sample Size
50 Patients

Inclusion criteria
Patient age group of 15-65 years with rhinosinusitis > 2-3 weeks

Exclusion criteria
Patients with conchomeatal sinus malformation. Previous endoscopy sinus surgery. History of injury to nose and PNS. All cases of rhinosinusitis with pregnancy.

Statistical Analysis
Appropriate statistical software, SPSS ver. 20 was used for statistical analysis.

RESULTS AND DISCUSSION

A hospital-based comparative and correlative study was undertaken with 50 patients to assess the clinical, radiological comparison of obstructive
osteomeatal complex in cases of rhinosinusitis shown in Table 1.

The above Table 2 reveals that 60% of patients were males, whereas female patients constituted 40% of the study population.

The above Table 3 found that age and gender distribution is summarised in Table 3. The average age of males was higher as compared to females. However, this difference was statistically not significant as per Student t-test (p>0.05)

**Distribution of patients according to Symptoms**

The most common symptoms were nasal obstruction (80%) followed by headache (76%), nasal discharge (42%), postnasal discharge (40%), sneezing (28%) and epistaxis (20%).

**Distribution of patients according to Signs**

The most common sign is purulent middle meatal discharge in 86% patients followed by sinus tenderness in 76% and granular posterior pharyngeal wall in 62% of patients. The next most common sign seen is deviated nasal septum in 46% of the patients. The hypertrophied middle turbinate is found in 34%, whereas non-purulent middle meatal discharge is seen in 30% of the patients. Other signs like inferior turbinate hypertrophy are seen in 42%, oedematous nasal mucosa in 18%, congested mucosa in 34% and pale mucosa in 26%. Normal mucosa is seen in 22% of the patients.

**Distribution of patients according to Diagnosis**

62% of the patients in our study suffer from chronic rhinosinusitis, whereas 12% presented with Nasal polyposis. Fungal Rhinosinusitis is seen in 12%, rhinitis in 14%, Ethmoidal polyp is seen in 12%, Antrochoanal polyp in 10%. Mucocele is seen in 2% and atrophic rhinitis seen in 6%. 40% of the patients have an asymptomatic deviated nasal septum, and 4% have other diagnoses like inverted papilloma, rhinoscleroma and atrophic rhinitis.

**Distribution of patients according to Diseased Area**

Osteomeatal complex and maxillary sinus were the most frequently affected regions seen in 86% patients each followed by anterior ethmoids (68%), posterior ethmoids (50%), frontal sinus (40%) and sphenoid sinus (20%).

**Comparison of CT and DNE findings of the nasal cavity**

Out of 50 cases, 33 cases have septal deviation using DNE while using CT, 36 cases have septal deviation. 23 (46%) cases show the attachment of uncinate process to lamina papyracea on the right and left in DNE as well as in CT. 9 (18%) cases show uncinate attachment to middle turbinate on the right side and 10 (20%) cases on left using DNE whereas 9 (18%) cases show the same on the right side and 10 (20%) cases on the left in CT. Uncinate attachment to the skull base is seen in 18 (36%) cases each on the right and 17 (34%) left side in both DNE and CT.

Secretions were visualised in 31 (62%) in right middle meatus 27 (54%) cases on the left side. Frontal recess patency is seen in 25 (50%) cases on the right side, and 28 (56%) cases on the left side in DNE while 30 (60%) cases have patency in the right and left side each in CT. Maxillary ostium patency is established in 18 (36%) cases on the right, and 19 (38%) cases on the left using DNE whereas in CT 22 (44%) cases on the right and 17 (34%) cases on the left have patency.

**Comparison of CT and DNE findings concerning anatomical variant**

A pneumatised uncinate is seen in 1 (2%) case on the left side in DNE whereas 2 (4%) cases show on the right side and 1 (2%) case on the left in CT. Agger nasi is seen pneumatised in 8 (16%) on left and 14 (28%) cases on the right side in DNE and it is seen in 15 (30%) cases on left and 18(36%) cases on the right with CT scan. Haller cells are visualised in 5 (10%) cases on the right side and left side in 4 (8%) cases in CT. Only CT showed Onodi or sphenoid ethmoidal air cells in 2 (4%) cases on the right side. Accessory maxillary ostium is seen only in DNE in 11 (22%) cases on the right side and 16 (32%) cases on the left. The paradoxical middle turbinate is seen in 3 (6%) cases on the left side in DNE whereas CT shows 1 (2%) case on the right and 5 (10%) cases on the left side. 9 (18%) cases have concha bullosa on the right side and 10 (20%) cases on left using DNE while 13 (26%) cases have concha bullosa on the right and 10 (20%) cases on left when their CT is done.

The average age of males was higher as compared to females. However, this difference was statistically not significant as per Student t-test (p>0.05)

Sachdeva P et al. (Aramani et al., 2014) study assessing the event of anatomical varieties of osteomeatal complex (OMC) and evaluating its connection in the causation of constant rhino sinusitis discovered more significant part of patients were found in 18-24 years old gathering (29%) with guys commanding the investigation (M: F = 1.7:1). Aramani An et al. (Bandyopadhyay et al., 2015) spellbinding cross-sectional examination configuration surveying the anatomical varieties of osteomeatal complex in incessant sinusitis patients discovered range 13 to 70 y. 73% of the patients
were generally more youthful as they were either equivalent to or under a multi-year old enough with the equivalent extent of the patients in the age gatherings of 21-30 y and 31-40 y. There were 32 females and 22 guys. In this way, male to female proportion was 1:1.45. The most regular manifestations in our examination were nasal deterrent (80%) trailed by cerebral pain (76%), nasal release (42%), postnasal discharge (40%), sniffing (28%) and epistaxis (20%). Osteomeatal mind-boggling and maxillary sinus were the most frequently included areas seen in 88% patients each followed by foremost ethmoids (68%), back ethmoids (half), frontal sinus (40%) and sphenoid sinus (20%). Bandyopadhyay R et al. (Sachdeva et al., 2017) illustrative, medical clinic based cross-sectional investigation evaluating the anatomical variation of osteomeatal complex and its measurements when present detailed 77.3, 59.1 and 47.7 % had wheezing, rhinorrhoea and cerebral pain individually.

Sachdeva P et al. (Takahashi, 1987) study assessing the event of anatomical varieties of osteomeatal complex (OMC) and surveying its connection in the causation of incessant rhinosinusitis announced 70% of the patients had side effects for a term of 1-5 years. Migraine was the most widely recognised manifestation (85%) trailed by a postnasal trickle (80%). The creators saw that Osteomeatal mind-boggling and maxillary sinus were the most often included districts seen in 88% patients each.

The most widely recognised sign in our investigation is purulent centre meatal release in 86% patients followed by sinus delicacy in 76% and granular back pharyngeal divider in 62% of patients. The following most regular sign seen is digressed nasal septum in 46% of the patients. Hypertrophied centre turbinate is found in 34% though the non-purulent centre meatal release is seen in 30% of the patients. Different signs like substandard turbinate hypertrophy are seen in 42%, oedematous nasal mucosa in 18%, blocked mucosa in 34% and pale mucosa in 26%. Normal mucosa is seen in 22% of the patients. 62% of the patients in our investigation experienced interminable rhino sinusitis though 12% gave Nasal polyposis. Contagious rhinosinusitis is seen in 12%, rhinitis in 14%, Ethmoidal polyp is seen in 12%, Antrochoanal polyp in 10%. Mucocele is seen in 2% and atrophic rhinitis seen in 6%. 40 % of the patients have an asymptomatic digressed nasal septum, and 4% have different conclusions like rearranged papilloma, rhinoscleroma and atrophic rhinitis. It was observed in the present study that out of 50 cases, 33 cases have septal deviation using DNE while using CT, 36 cases have septal deviation. 23 (46%) cases show the attachment of uncinate process to lamina papyracea on the right and left in DNE as well as in CT. 9 (18%) cases show uncinate attachment to middle turbinate on the right side and 10 (20%) cases on left using DNE whereas 9 (18%) cases show the same on the right side and 10 (20%) cases on the left in CT. Uncinate attachment to the skull base is seen in 18 (36%) cases each on the right and 17 (34%) left side in both DNE and CT.

In the study, secretions in the middle meatus are visualised in 31 (62%) on right and 27 (54%) cases on the left side in DNE while it is not visualised in CT. Frontal recess patency is seen in 25 (50%) cases on the right side, and 28 (56%) cases on the left side in DNE while 30 (60%) cases have patency in the right and left side each in CT. Maxillary ostium patency is established in 18 (36%) cases on the right, and 19 (38%) cases on the left using DNE whereas in CT 22 (44%) cases on the right and 17 (34%) cases on the left have patency.

TakanishiR (Takahashi, 1987) watched Nasal septum is essential in the advancement of the nose and paranasal sinuses. It is the epiphyseal stage for the improvement of the facial skeleton.

Nandita An et al. (Nandita et al., 2017) retrospective examination on CT Assessment of Anatomical Variations of Paranasal Sinus Region announced most basic anatomical variety watched was digressed nasal septum, 44 (88%), trailed by Aggernasi cells, 33 (66%), concha bullosa, 32 (64%), Haller cells, 28 (56%), and Onodi cells, 19 (38%). The septal deviation was the most widely recognised variety seen. It was observed in our study that a pneumatised uncinate is seen in 1 (2%) case on the left side in DNE whereas 2 (4%) cases show on the right side and 1 (2%) case on the left in CT. Aggernasi is seen pneumatised in 8 (16%) on left and 14 (28%) cases on the right on DNE and it is seen in 15 (30%) cases on left and 18 (36%) cases on the right with CT scan. Haller cells are visualised in 5 (10%) cases on the right side and left side in 4 (8%) cases in CT. Only CT showed Onodi or sphenoidethmoidal air cells in 2 (4%) cases on the right side. Accessory maxillary ostium is seen only in DNE in 11 (22%) cases on the right side and 16 (32%) cases on the left. The paradoxical middle turbinate is seen in 3 (6%) cases on the left side in DNE whereas CT shows 1 (2%) case on the right and 5 (10%) cases on the left side. 9 (18%) cases have concha bullosa on the right side and 10 (20%) cases on left using DNE while 13 (26%) cases have concha bullosa on the right and 10 (20%) cases on left when their CT is done.

Nandita A et al. (Nandita et al., 2017) retrospective study on CT Assessment of Anatomical Varia-
tions of Paranasal Sinus Region reported most common anatomical variation reported out of 50 scans, nasal septum accounts for 44 (88%), among which 17 (47.72%) deviated toward the left side, and 23 (52.27%) veered toward the right side. Aggernasi cells were observed in 33 (66%), out of which 14 (28%) were present unilaterally and 19 (38%) bilaterally. Also, 8 (57.1%) were found on the left side and 6 (42.9%) on the right side.

Sachdeva P et al. (Takahashi, 1987) study assessing the event of anatomical varieties of osteomeatal complex (OMC) and evaluating its connection in the causation of ceaseless rhinosinusitis announced Aggernasi cells were available in the region foremost and better than the inclusion of centre turbinate and it’s a relationship on CT is fundamental for the analysis of interminable frontal sinusitis. It was found in 73% of the patients. DNE reported it in 70% of cases. The cartilaginous septal deviation is often missed on CT scan is inferred. The uncinate process is a key bony structure of the lateral wall of the nasal cavity. Lateral deviation causes narrowing of semilunar hiatus and infundibulum, medially deviated makes contact with middle nasal meatus, threatening it “s permeability. Two hundred sides were studied and 170 could be assessed. Typically in 35% sides, medially rotated in 32%, laterally rotated in 15%, hypoplastic in 2% and pneumatized in 1% sides.

Benign nasal growth on the right is seen in 8 (16%) cases both in DNE and CT and 3 (6%) cases have benign growth on the left side in both DNE and CT. The integrity of bone such as erosions, expansion or dehiscence is only visualised using CT scan.

It was observed in our study that 23 (46%) cases have right frontal sinus haziness and 27 (54%) cases have left haziness in CT. 37 (74%) cases have right ethmoid sinus haziness, and 35 (70%) cases have haziness on the left side in CT. 28 (56%) cases showed haziness in maxillary antrum on the right, and 31 (62%) cases showed on the left. 19 (38%) cases show posterior ethmoid sinus haziness on the right side and 14 (24%) cases on the left side in CT. Sphenoidal sinus is hazy in 12 (24%) cases on the right and 8 (16%) cases on the left.

There was statistically significant correlation between Middle turbinate: concha bullosa and Maxillary sinus (r=0.621; p=0.0005), Pneumatised uncinate and Anterior ethmoids (r=0.452; p=0.0001), Aggernasi and Frontal sinus (r=0.318; p=0.024) and Middle turbinate: paradoxical and Maxillary sinus (r=0.864; p=0.0001).

**CONCLUSIONS**

The significance of variations is that they impair the normal drainage pathway, hinder endoscopic access to distal areas and increase the risk of endoscopic mishaps.

**ACKNOWLEDGEMENT**

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**Funding source**

None to report.

**Conflict of Interest**

We all the authors declare no conflict of interest.

**REFERENCES**


