

# A Clinical Study on the Influence of Sinusitis in Chronic Suppurative Otitis Media

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## ABSTRACT

### Introduction

Diseases of the nose and paranasal sinuses are known to influence the middle ear conditions. In the evaluation of the patients with chronic otitis media, radiological, endoscopic, and other auxiliary diagnostic tools may have their roles in the objective assessment of the patients, and to rule out lesions of the nasal cavity and the nasopharynx as potential aetiological factors.

### Materials and Methods

This cross sectional observational study was conducted for a period of two years to establish the role of sinusitis as focus of sepsis in patients with tubotympanic type of CSOM. All patients in the age group of 20-40 years with more than 2 months of ear discharge and with a hearing loss of 25- 40 db and diagnosed as tubotympanic type of CSOM were included in our study. Patients who had features of mastoiditis on X-ray and also with persistent ear discharge even after treatment with oral and topical antibiotics were subjected (n=70) to diagnostic nasal endoscopy and computed tomography of paranasal sinuses.

### Result

Among the 100 patients of CSOM, 70% had features suggestive of sinusitis. Deviated nasal septum (40%) was the most common pathology among the study population. Majority (54%) of them had mucopurulent type of ear discharge. The CT findings of the paranasal sinuses revealed that 48.5% of the study population had grade I type of involvement of the PNS. 54.2% of the patients had a large central perforation and the middle ear mucosa was found to be edematous for 65.7% of the patients.

### Discussion

Coexistence of deviated nasal septum and chronic rhinosinusitis with discharging CSOM is at par with several other studies conducted in other parts of the world.

### Conclusion

Deviated nasal septum, enlarged middle turbinate, medialised uncinate associated with sinusitis are the predisposing factors in the development of CSOM. So assessment for sinusitis in the treatment of CSOM should become a routine practice.

### Keywords

Otitis Media, Suppurative; Otitis Media with Effusion; Paranasal Sinuses; Maxillary Sinusitis

Chronic Suppurative Otitis Media (CSOM) of tubotympanic type is a persistent inflammation that causes irreversible changes of the mucosa in the middle ear and mastoid cavity. It is characterized by a persistent discharge from the middle ear through a tympanic membrane perforation. It is an important cause of preventable hearing loss, particularly in the developing world (WHO, 2004).<sup>1</sup> Its pathophysiology begins with irritation and subsequent inflammation of the middle ear mucosa. The most important pathological factors in CSOM are dysfunction of the Eustachian tube and bacterial infection.<sup>2</sup> Obstruction of ET in turn leads to Otitis media (OM). Diseases of the nose and Paranasal

sinuses (PNS) thus influence the middle ear condition.

Although most of the literature refers to sinusitis and upper respiratory tract as causative factor of otitis media, only few articles refer to actual nasal pathologies

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involving anatomical factors that can lead to it. Those patients who have otitis media secondary to nasal and /or PNS pathology need to have both problems addressed.<sup>3</sup>

Sinonasal pathology frequently leads to ear disease. Improvement of otitis media pathology following septoplasty was noted by Grady (1983).<sup>4</sup> Von Cauwenberge and Derycke (1983)<sup>5</sup> and Kim et al. (1993)<sup>6</sup> also showed evidence of association of sinonasal pathologies in cases of otitis media. Bozkuset et al (2013)<sup>7</sup> demonstrated that the role of sinonasal abnormalities and allergic rhinitis in the pathogenesis of chronic otitis media is prevalent. They concluded that although medical history and physical examination are considered mandatory procedures during the initial evaluation of the patients with chronic otitis media, radiological, endoscopic, and other auxiliary diagnostic tools should be used in the objective assessment of the patients, and lesions of the nasal cavity and the nasopharynx must always be taken into consideration in the differential diagnosis. Without correcting the sinusitis, the management of ear including surgery has frequently led to failures and poor prognosis.<sup>8</sup> Therefore it is essential to establish the role of sinusitis as focal sepsis in chronic otitis media active mucosal disease.

## Materials and Methods

A cross sectional observational study was undertaken in the ENT OPD for a period of two years from January 2013 to December 2014 to establish the role of sinusitis as focus of sepsis in patients with tubotympanic type of CSOM. All patients, in the age group of 20-40 years with more than 2 months of ear discharge and with a hearing loss of 25-40 dB and were diagnosed as tubotympanic type of CSOM, were included in our study. One hundred patients who met the above criteria were included in the study. X-ray of the mastoids was taken for all the patients. Patients with evidence of chronic sinusitis were treated with antibiotics and antihistamines and decongestants were given on and off for a period of 6 weeks.

Patients who had evidence of mastoiditis on X-ray and also with persistent ear discharge even after treatment

with oral and topical antibiotics were subjected (n=70) to diagnostic nasal endoscopy and computed tomography of paranasal sinuses.

## Results

Table I shows the age and sex wise distribution of the study population. The majority of the study population were males and they were in the age group between 20-30 years. Almost 90% of the study populations were from rural areas belonging to lower socio-economic status.

The findings of the nasal endoscopy were shown in

**Table I : Distribution of Study Population as per Age and Sex**

AGE GROUP (YRS)	MALE	FEMALE	TOTAL
20-25	12	12	24
26-30	18	10	28
31-35	8	4	12
36-40	4	2	6
<b>TOTAL</b>	<b>42</b>	<b>28</b>	<b>70</b>

Table II. Deviated nasal septum (DNS) was the most common pathology (40%) among the study population followed by enlarged bulla. Medialised uncinata was seen in 17.1% of the study population and 10% of them had enlarged bulla with prominent agger.

The type of discharge in the middle meatus viewed through nasal endoscopy had shown that almost 54.2% of the discharge was mucopurulent type and the remaining was either purulent or mucoid in nature (Table III).

The grading of paranasal sinuses based on CT findings had shown that almost 48.5% of them had grade I, where the disease is limited to OMC (ostiomaxillary complex), 22.8% had grade II (incomplete opacification of one/more sinuses) 14.2% had grade III (complete opacification of one or more major sinuses) and 7.1%

had grade IV findings i.e., total opacification of all sinuses (Table IV).

**Table II : Nasal endoscopy findings among study population**

NASAL ENDOSCOPY FINDINGS	FREQUENCY	PERCENTAGE
Deviated nasal septum / turbino septal deformity	28	40%
Medialised uncinata	12	17.1%
Enlarged middle turbinate	10	14.2%
Enlarged bulla with prominent agger	7	10%
<b>TOTAL</b>	<b>70</b>	<b>100%</b>

**Table III : Type of discharge seen in middle meatus during nasal endoscopy**

NATURE OF DISCHARGE	FREQUENCY	PERCENTAGE
Mucopurulent	38	54.2%
Purulent	18	25.7%
Mucoid	14	20%
<b>TOTAL</b>	<b>70</b>	<b>100%</b>

The anatomical variations of paranasal sinuses based on CT findings had shown that 40% of them had deviated nasal septum, 20% of them had medialised uncinata with maxillary mucosal thickening and 11.4% of them had prominent agger (Table V).

The otoendoscopy findings among the study population had shown that 54.2% of them had a large

**Table IV : Grading according to findings of CT Scan of PNS**

CT SCAN PNS FINDING	FREQUENCY	PERCENTAGE
Grade 0	5	7.1%
Grade I	34	48.5%
Grade II	16	22.8%
Grade III	10	14.2%
Grade IV	5	7.1%
<b>TOTAL</b>	<b>70</b>	<b>100%</b>

**Table V : Anatomical variations as per CT Scan of PNS**

ANATOMIC VARIANTS	FREQUENCY	PERCENTAGE
Deviated Nasal septum	28	40%
Medialised uncinata with maxillary mucosal thickening	14	20%
Enlarged bulla narrowing OMC	7	10%
Concha bullosa	13	18.5%
Prominent agger / frontal cell obstructing frontal recess	8	11.4%
<b>TOTAL</b>	<b>70</b>	<b>100%</b>

central perforation of the tympanic membrane, 31.4% had a subtotal central perforation and the remaining 14.2% had only a small central perforation. The middle ear mucosa were edematous for 65.7% of the population

and 34.2% of them had a polypoidal mucosa (Table VI).

**Table VI : Otoendoscopy findings in study population**

TYPE OF PERFORATION	FREQUENCY	PERCENTAGE
Large CP	38	54.2%
Subtotal CP	22	31.4%
Small CP	10	14.2%
<b>TOTAL</b>	<b>70</b>	<b>100%</b>

## Discussion

The most important step in the diagnosis of chronic suppurative otitis media (CSOM) is to identify the underlying pathology, once it is identified, the treatment would be much simpler.

Keeping in view the importance of nasopharyngeal and sinonasal pathology of CSOM, the present study was carried out on 70 patients of CSOM presenting to our Outpatient Department of Otolaryngology. Age of patients ranged from 20 to 40 years with a mean age of  $28.7 \pm 6.4$  years. Maximum number of patients (74.2%) was aged between 21-30 years. CSOM is defined primarily as a disease of pediatric age group (Nelson, 1988).<sup>9</sup> Other workers like Shrestha et al (2010),<sup>10</sup> Karkiet al (2011),<sup>11</sup> Poorey and Iyer (2002)<sup>12</sup> had found maximum prevalence of CSOM in the younger age group, which was almost at par with our study.

Several studies have proposed nasal septum deviation as a predisposing factor in patients with CSOM. Van Cauwenberge et al demonstrated that increase in nasal resistance leads to higher static middle ear, and closing pressures of the Eustachian tube pressure with resultant formation of mucosal edema and finally Eustachian tube dysfunction.<sup>13</sup> Gutierrez-Marcos showed that obstructive septal deviation induces Eustachian tube dysfunction.<sup>14</sup> Deron et al detected that opening pressure of the Eustachian tube recovers in the early,

and late postoperative period surgical repair of the septal deviation.<sup>15</sup> Using paranasal CT procedures, Gocmen et al reported septal deviations in 52% patients with CSOM.<sup>16</sup> It is almost at par with our study where we found 40% of patients with CSOM had deviated nasal septum.

Diagnostic nasal endoscopy findings of our study revealed DNS alone or in combination with other pathologies to be the most common findings. Similar observations were made by Yeolekar et al (2011)<sup>17</sup> in their study, sinonasal pathology was seen in 90% of the patients with CSOM.. Poorey and Iyer (2002)<sup>12</sup> reported presence of pharyngeal and sinonasal pathology in 93% patients with CSOM.

In the literature, detection of sinusitis ranges between 43 and 78% in the patients with OME, supports the prevalent finding of inflammation in the upper respiratory tract as a culprit of OME.<sup>18</sup> Fireman et al. emphasized that otitis media is a multifactorial disease which was effected by many etiologies including nasal, and paranasal sinus abnormalities.<sup>19</sup> Eryilmaz et al reported the presence of chronic rhinosinusitis in patients with (57.7%) and without (25%) chronic otitis media with effusion (COME) with a significant difference between groups.<sup>20</sup> Grote and Kuijpers detected maxillary sinusitis in 47% of 1252 pediatric cases with COME.<sup>21</sup> In the present study, maxillary sinusitis was present in 48.5% of cases.

Majority of investigators have revealed the important role of upper respiratory tract abnormalities as causative factors for Eustachian tube obstruction in the aetiopathogenesis of CSOM.<sup>11</sup> Stammberger et al reported serious loss in Eustachian tube functions as a consequence of impaired function of nasal, and paranasal sinuses.<sup>22</sup> Gocmen et al. detected chronic inflammation of the osteomeatal unit in 27% of 52 patients with adhesive otitis, and revealed that nasal, and paranasal sinus abnormalities were significantly different relative to the control group.<sup>16</sup>

Takashi et al demonstrated that inflammatory processes of nasal, and paranasal sinuses ensued in obstruction, inflammation, and resultant dysfunction of Eustachian tube.<sup>23</sup> In our study maxillary sinusitis was found to be the most common type of sinusitis among

the patients with CSOM. The same study showed that among the patients with CSOM, 62% of them had mucopurulent type of ear discharge and 60% had a large central perforation of the tympanic membrane and the results were almost similar to our study where 54% of them had central large perforation with mucopurulent discharge. Grote and Kuijpers<sup>21</sup> in their study on the middle ear mucosa using otoendoscopy among the patients with CSOM revealed that 71% of them had edematous middle ear mucosa and 29% had polypoidal mucosa which was almost in par with our study.

### Conclusion

This study had demonstrated that sinusitis is one of the most important predisposing factor in the development of CSOM. Deviated nasal septum, enlarged middle turbinate, medialised uncinata are the most common anatomical variants of nose and paranasal sinuses predisposing to sinusitis. So sinusitis should be considered as one of the most important risk factor in the development of CSOM and it has to be identified and treated promptly.

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