

A STUDY ON THE INFLUENCE OF SINUSITIS IN A CASE OF PERSISTENT CHRONIC SUPPURATIVE OTITIS MEDIA OF TUBOTYMPANIC TYPE

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ABSTRACT

BACKGROUND

Chronic Suppurative Otitis Media (CSOM) is the chronic inflammation of the middle ear cleft mucosa, which is characterised by irreversible changes in it with a history of ear discharge for more than 3 months through a permanent tympanic membrane defect. Chronic suppurative otitis media is of two types tubotympanic (mucosal) and atticoantral (squamous). Tubotympanic type (mucosal) is mainly due to infection from the oropharynx and the nasopharynx, which travels into the middle ear via the eustachian tube, whereas atticoantral type (squamous type) is due to cholesteatomatous lesions. The prevalence of CSOM was 4.1 percent (3.1%- unilateral and 1.0% bilateral disease). Both otitis media and sinusitis are the most common pediatric diagnoses and they share many common characteristics.

The aim of the study is to prove focal sepsis of chronic otitis media, tubotympanic type sinusitis and there is an improvement in middle ear mucosal disease status after functional endoscopic sinus surgery.

MATERIALS AND METHODS

50 patients in the age groups of 20-40 years chronic otitis media tubotympanic type attending outpatient department were identified and screened for evidence of focal sepsis in paranasal sinus by diagnostic nasal endoscopy and computed tomography. Then, nasal surgery was done to clear sinusitis and middle ear mucosal disease status assessed for improvement and statistically assessed.

RESULTS

Deviated nasal septum (33%) was the most common pathology among the study population. Majority (48%) of them had mucopurulent type of ear discharge. The CT findings of the paranasal sinuses revealed that 56% of the study population had grade I type of involvement of the PNS. 44% of the patients had a large central perforation. About 84% of patients had improved mucosal status after treating sinusitis.

CONCLUSION

There is a strong correlation between tubotympanic types of chronic otitis media with sinusitis. Treating sinusitis gives best results to CSOM patients. DNE and CT scan of paranasal sinuses plays vital role in diagnosis of sinusitis.

KEYWORDS

Diagnostic Nasal Endoscopy, Functional Endoscopic Sinus Surgery, Otitis Media Septoplasty.

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Chronic Suppurative Otitis Media (CSOM) is the chronic inflammation of the middle ear cleft mucosa, which is characterised by irreversible changes in it with a history of ear discharge for more than 3 months through a permanent tympanic membrane defect.¹ Chronic suppurative otitis media is of two types tubotympanic (mucosal) and

atticoantral (squamous). Tubotympanic type (mucosal) is mainly due to infection from the oropharynx and the nasopharynx, which travels into the middle ear via the eustachian tube, whereas atticoantral type (squamous type) is due to cholesteatomatous lesions.² The prevalence of CSOM was 4.1 percent (3.1%- unilateral and 1.0% bilateral disease).¹ Both otitis media and sinusitis are the most common paediatric diagnoses and they share many common characteristics.³

Most common pathogens inhabiting the nasopharynx are *Streptococcus pneumoniae*, *Haemophilus influenzae* and *Moraxella catarrhalis*. They can cause upper respiratory tract infections including otitis media and sinusitis.⁴ The middle ear secretions drain into the nasopharynx through the eustachian tube. The pathogenesis of otitis media depends upon interactions among host characteristics, virulence factors of bacterial and viral pathogens and the

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environmental factors. Obstruction of the eustachian tube can play important role in the development of otitis media. Bacterial pathogens can infect the middle ear secretions leading to otitis media.⁵ The most important pathological factors in CSOM are bacterial infection and dysfunction of the eustachian tube. Obstruction of ET can lead to otitis media. Diseases of the nose and paranasal sinuses, thus influence the middle ear condition.^{6,7}

Aim of the Study- Focal sepsis of chronic otitis media tubotympanic type is sinusitis, improvement in middle ear mucosal disease status after functional endoscopic sinus surgery.

MATERIALS AND METHODS

The study includes patients with tubotympanic type of CSOM were randomly selected from Outpatient Department of UIORL at Government General Hospital, Chennai. Period of study from June 2011 to May 2013. Ear discharge of these patients was sent for culture and sensitivity. The patients were treated with culture directed topical and systemic antibiotics and mucolytic agents and were followed up for a period of 1 month. X-ray of the mastoids was also taken. Patients who had cellular type of mastoids on x-ray and also with persistent ear discharge after 1 month were selected for the study. The patients selected were subjected to diagnostic nasal endoscopy and computed tomography of paranasal sinuses. Patients with evidence of chronic sinusitis were treated with antibiotics, antihistamines and decongestions for a period of at least 6 weeks. Though, they had temporary symptomatic improvement, they showed frequent relapse of symptoms. So, they underwent endoscopic sinus surgery and were followed up postoperatively every 2 weeks for a period of 3 months. The patients were assessed every 2 weeks by otoendoscopy for decrease in ear discharge and improvement of middle ear mucosal status.

Inclusion Criteria

Both sexes are included with age from 20 to 40 years. Tubotympanic types of CSOM patients with mild conductive (25-40 dB) hearing loss are included.

Exclusion Criteria

Atticoantral type of CSOM patients. Hearing loss more than 40 dB. About 50 patients who met the above criteria were selected for the study and results are statistically analysed.

RESULTS

Age of patients included in this study ranged from 20-40 yrs. Out of 50 patients, 25 (50%) were males and 25 (50%) were females. Maximum number of patients belonged to age group 21-30 yrs. Anatomical variations noted in diagnostic nasal endoscopy are shown in Figure 1.

Accessory ostium, which can influence the chronic sinusitis was found in 13 patients. It was present in the anterior fontanelle in 4 patients (8%) and in the posterior fontanelle in 9 patients (18%). Discharge in middle turbinate

were mucopurulent in 24 patients (48%), purulent in 14 patients (28%) and mucoïd in 12 patients (24%). Paranasal findings of the CT scan showed most common was grade 1 (Figure 2).

Anatomical variations noted in CT scan are shown in Figure 3. On otoendoscopy, 22 patients (44%) had a large central perforation, 16 patients (32%) had a subtotal central perforation and 12 patients (24%) had small central perforation. Middle ear mucosal status assessed by otoendoscopy, 32 patients (64%) had oedematous wet mucosa, while 18 patients (36%) had polypoidal (boggy) mucosa. This indicates poor eustachian tube function. The disease pathology is tabulated in Table 1.

Surgical procedure done for clearance of sinusitis are FESS in 17 patients (34%) and FESS with septoplasty in 33 patients (66%). Improvement of middle ear mucosal status with clearance of sinusitis are tabulated in Table 2.

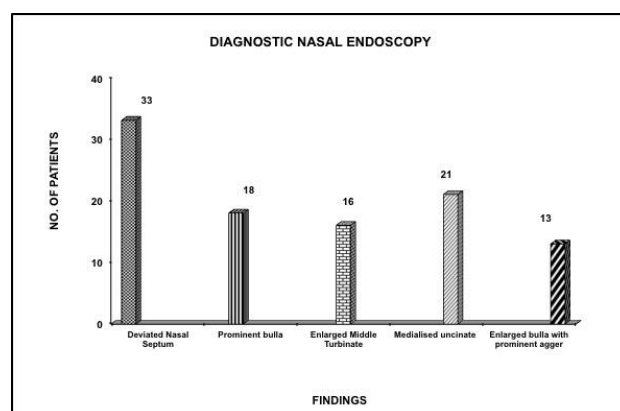


Figure 1. Anatomical Variations Noted in Diagnostic Nasal Endoscopy

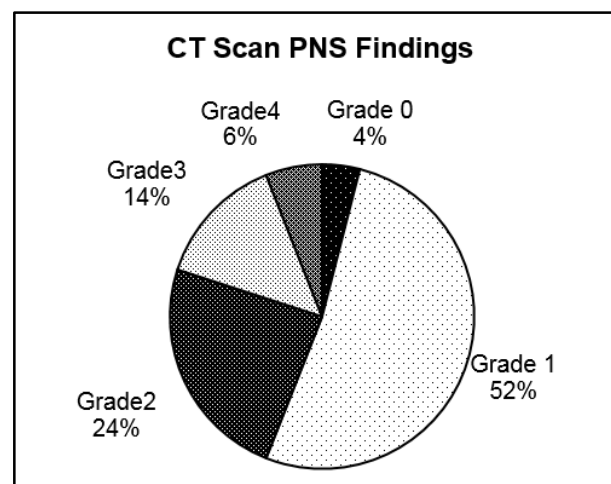


Figure 2. Paranasal Findings Noted in CT Scan

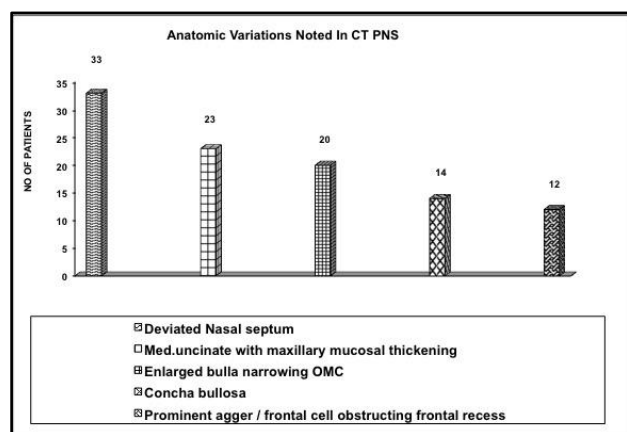


Figure 3. Anatomical Variations Noted in CT Scan

Pathology	Patients with Persistent CSOM	Patients with Sinusitis	Percentage
Unilateral	18	18	36
Bilateral	32	32	64

Table 1. Disease Pathology

Nature of Mucosa Prior to Treatment	Nature of Mucosa after Treatment	With Endoscopic Sinus Surgery + Mucolytic + Antibiotics	Surgery + Regular Suction Cleaning + Topical Antibiotics (Culture Directed)
Moist	Improved	24	27
	No improvement	8	5
Boggy	Improved	12	15
	No improvement	6	3

Table 2. Improvement of Middle Ear Mucosal Status with Clearance of Sinusitis

DISCUSSION

In our study, we analyse cases of tubotympanic type only. Chronic sinusitis acts as a focus of sepsis in the development of chronic suppurative otitis media of tubotympanic type. That, such an interrelationship exists is supported by clinical experience. Tubotympanic type of CSOM patients with concurrent active sinusitis has chronically discharging ears. Surgery on the ear without correction of sinusitis has frequently led to failures and poor prognosis.

This study correlates that sinusitis is the main aetiological factor for middle ear disease of tubotympanic type and that clearance of sinusitis in these patients results in good outcome of tubotympanic disease clearance. The nose, paranasal sinuses and eustachian tube lined by respiratory epithelium that is essentially a pseudostratified ciliated columnar epithelium with interspersed goblet cells. Due to its own mucociliary clearance, a previously normal eustachian tube can remain resistant to abnormal secretion. Due to the virulence and duration of such condition, congestion and obstruction of the orifice can occur due to inflammation of its lymphoreticular tissue with slowing down of the mucociliary clearance may result in impeded ventilation leading to changes in the middle ear cleft.

Our study of 50 patients include 25 males and 25 females, thereby no much sex difference. Maximum number of patients belonged to age group 21-30 yrs. 38 cases (76%) belonged to the lower socioeconomic group, 10 cases (20%) belonged to middle economic group and 2 cases (4%) belonged to the higher socioeconomic group and so the disease is more frequent in lower socioeconomic group. Of the 50 cases, 32 cases were from the rural population and 18 cases from the urban population. The poor living conditions in rural population were the predisposing factor for the high prevalence in the population.

In our study, diagnostic nasal endoscopy was done for all patients. 33 patients (66%) had septal deviation, which was the most common anatomical variant, 36% had enlarged bulla, 42% had medialised uncinate, 32% had enlarged middle turbinate and 26% had paradoxical middle turbinate. This shows septal deviation is strongly associated with otitis media.⁸ Accessory ostium, which is one of the signs of chronic sinusitis was found in 13 patients. It was present in the anterior fontanelle in 4 patients (8%) and in the posterior fontanelle in 9 patients (18%). Mostly, all patients had discharge in middle meatus. While the discharge was mucopurulent in 24 patients (48%), it was purulent in 14 patients (28%) and mucoid in 12 patients (24%).

On computerised tomography scan of paranasal sinuses, majority of cases had grade I disease (56%), i.e. minimal disease limited to OMC followed by grade II (24%), i.e. moderate incomplete opacification of one or more sinuses, 14% had grade III- complete opacification of one or more major sinuses, not all and 6% of patients had grade IV disease- total opacification of all sinuses. In 4% of patients, CT scan PNS was normal. The most common anatomic variant on CT scan was deviated nasal septum in 33 patients. Medialised uncinate with maxillary mucosal thickening was found in 23 patients while enlarged bulla narrowing OMC was seen in 20 patients. Concha bullosa was found in 14 patients. Prominent agger or a type of frontal cell obstructing the frontal recess was found in 12 patients.

Ostiomeatal Complex (OMC) can cause obstruction and stagnation of secretions, which may then become infected or perpetuate infection. Recently, diagnostic nasal endoscopic evaluation of the nose and paranasal sinuses is a routine component for evaluating patients with evidence of suspected chronic sinusitis and the patients with significant findings are evaluated with Computed Tomography (CT) of the paranasal sinuses.⁹ Diagnostic Nasal Endoscopy (DNE) and computerised tomography plays a role in diagnosis and to identify the variations in paranasal sinuses. Precise descriptions of anatomical variations are very important in achieving perfect diagnosis and successful endoscopic sinus surgeries.¹⁰

On otoendoscopy, 12 patients (24%) were found to have a small central perforation involving the anterior quadrant. 22 patients (44%) had a large central perforation involving anterior and posterior quadrants while 16 patients had a subtotal central perforation. Middle ear mucosal status assessed by otoendoscopy is a reflection of eustachian tube

function. 32 patients had oedematous (moist) middle ear mucosa while 18 patients had polypoidal (boggy) mucosa reflecting poor eustachian tube function.

The mucosal swelling of the eustachian tube and sinus ostia lead to- (1) Impairment of drainage of the secretions; (2) A disorder of the pressure relationships between the cavities of the middle ear, paranasal sinuses and the nose; and (3) The development of negative pressure within the middle ear or paranasal sinuses, which favours aspiration of mucus and bacteria from the nasopharynx into the middle ear space or paranasal sinuses.¹¹

On comparing the incidence of unilateral and bilateral ear discharge in the selected patients, it was found to be 18 (36%) and 32 (64%), respectively. The patients with unilateral ear discharge had signs of chronic sinusitis and discharge over the eustachian tube orifice only on the side of the discharge. These findings are in concurrence with our study. The anatomical variations of OMC are not the pathology for chronic sinusitis. But, they predispose the individual to chronic sinusitis.⁹

The patients underwent functional endoscopy sinus surgery by Messerklinger technique for the treatment of chronic sinusitis. Patients with unilateral sinusitis underwent surgery only on the diseased side. 33 (64%) patients also underwent septal correction. Several studies show septal correction and with or without sinus surgery improves the pathology of otitis media. It is commonly believed that turbulent airstreams are created through deformities of the nasal septum. This in turn causes oedema in the nasal and postnasal cavities resulting in stagnation of nasal secretion. Thus, the principle of septoplasty has its objective the restoration of the normal pattern of airflow by restoring a normally aerodynamic nasal cavity. Thus, septoplasty restores normal patterns of ventilation of the nasal cavity.¹²⁻

¹⁴ Nasal and paranasal surgery has dual purposes. They are- (1) Restoration of the normal functioning of the nose and paranasal sinuses; and (2) Prevention of recurrent attacks of otitis media and infection of the respiratory tract.¹³

Following clearance of sinusitis, improvement in middle ear mucosal status was assessed. Out of 32 patients with moist mucosa, 24 patients showed improved mucosal status, while 8 patients had no improvement in mucosal status. Further treatment like suction cleaning and culture directed topical antibiotics improved the mucosal status of 3 more patients. Out of 18 patients with boggy mucosa, 12 patients showed improved mucosal status after surgery alone, while 3 more patients had improved mucosal status with antibiotic and regular suction cleaning. This shows evidence of association of sinonasal pathologies in cases of otitis media.¹⁵

Overall, out of 50 patients, 42 patients (84%) had improved mucosal status after clearance of sinusitis, while 8 patients (16%) showed no improvement at all in the mucosal status and nature of ear discharge. These patients are treated by mastoidectomy with tympanoplasty. Hence, there is a strong association between ETF and graft uptake. This proves that eustachian tube plays a major role in the graft uptake.¹⁶ Without correcting the sinusitis, the management

of ear including surgery has commonly led to failures and poor prognosis. Therefore, it is essential to establish the role of sinusitis as focal sepsis in chronic otitis media and active mucosal disease.¹⁷

CONCLUSION

It may be summarised that obstruction of the nasal and PNS passages may result in tubotympanic disease. This in turn may cause otitis media through the obstruction of the ET. For the successful treatment and prevention of recurrent OM, sinusitis has to be treated first by septoplasty and sinus surgeries. This is particularly true when surgery on the ear is contemplated for the repair of damage inflicted by otitis media.

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