

INFLUENCE OF CHRONIC RHINOSINUSITIS IN MIDDLE EAR FUNCTION.

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Abstract: Diseases of the nose and the paranasal sinuses can affect the middle ear by causing congestion and obstruction of the eustachian tube. Infected discharge from the sinuses can lead to inflammation of the mucosa of the eustachian tube and thereby alter the mucociliary clearance. It can also lead to changes in the middle ear pressure thereby elevating the sound conduction threshold of the middle ear. This study was conducted in our institute to compare the effect of chronic rhinosinusitis in middle ear function over the past two years.

Keywords: Chronic Rhinosinusitis Middle Ear Function

I. Introduction

A wide variety of disease of nose and paranasal sinuses like common cold, allergic rhinitis, acute and chronic rhinosinusitis may affect the function of the Eustachian tube and consequently Middle ear (1) Pathological changes which occur in the nasal and sinus mucosa alter the nature of the nasal secretions and also the mucosa of the nasal secretory routes. These infected secretions can cause congestion and obstruction of the eustachian tube orifice by inflammation of the lymphoreticular tissue thereby slowing down the mucociliary clearance and may lead to impeded ventilation and/or ascending infection of the middle ear (2) The aim of this study is to compare the effect of chronic rhinosinusitis in middle ear pressures, hearing thresholds and also the correlation of location of sinusitis on middle ear functions.

II. Materials and methods

The study was conducted in our hospital for a period of 2 years. Study population: 40 patients with chronic rhinosinusitis in and around Salem.

Inclusion criteria

1. Age- 10-60 years
2. Duration of sinusitis- a period greater than 3 months
3. Diagnostic modality- Chronic rhinosinusitis proven by a combination of clinical history, nasal endoscopy and CT paranasal sinuses.

Exclusion criteria

1. Patients with CSOM or ASOM or a previous history
2. Cases of acute allergic rhinitis or nasal masses
3. Cases with adenoidal hypertrophy or other nasopharyngeal masses
4. Patients with history of irradiation of head and neck
5. Patients with history of surgeries like adenoidectomy, cleft palate repair, maxillectomy, palatal resection, nasal surgeries and ear surgeries including tympanostomy tube placement
6. Patients with sensory neural hearing loss

Diagnostic nasal endoscopy (DNE)

A diagnostic nasal endoscopy was done on an outpatient basis to emphasize on

1. Abnormal or structural variants in the nasal wall that predispose to sinusitis.
2. Presence of frank mucopus.
3. Closing and opening of eustachian tube when the patient is asked to swallow.
4. Structural changes in the eustachian tubal orifice.
5. Post nasal discharge from the sinuses and its relation to the eustachian tube orifice.

CT Paranasal sinuses

A CT paranasal sinuses was taken with both axial and coronal views after 3 weeks of antibiotics to document the presence of sinusitis

X ray both mastoids lateral oblique view

To look for the pneumatisation of mastoids

Pure tone audiometry

Taken to note and assess the hearing and if there is any elevation in the air conduction and bone conduction thresholds

Impedance audiometry

Taken to assess the type of curve , the mastoid volumes and the stapedial reflexes

III. Results

Male patients	Female patients
20	20

Number of subjects with regard to duration

Less than 3 years	22
More than 3 years	18

Incidence of eustachian tube dysfunction symptoms

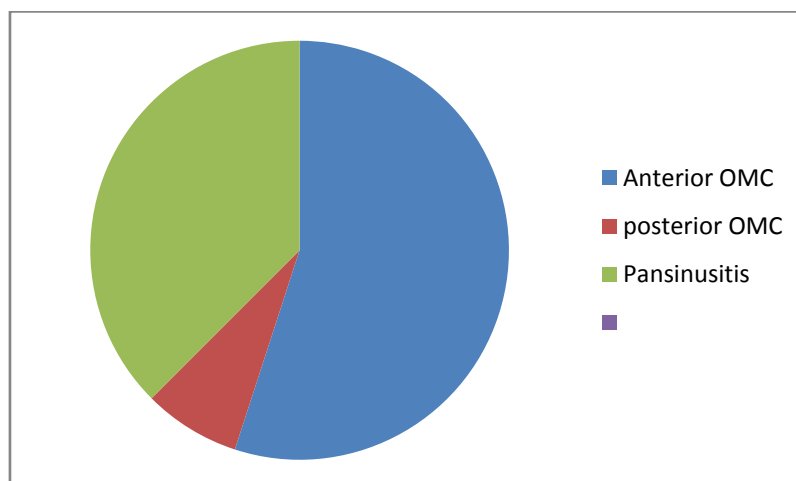
Blocked sensation	14 cases	35%
Popping sensation	4 cases	10%
Hearing loss	1 cases	2.5%
Autophony	1 cases	2.5%
Dizziness	0 cases	0%

Incidence of retracted tympanic membrane

Grade 1	20 cases	50%
Grade 2	16 cases	40%
Grade 3/4	4 cases	10%

Distribution of sinusitis

Anterior OMC	22 cases	55%
Posterior OMC	3 cases	7.5%
Pansinusitis	15 cases	37.5%

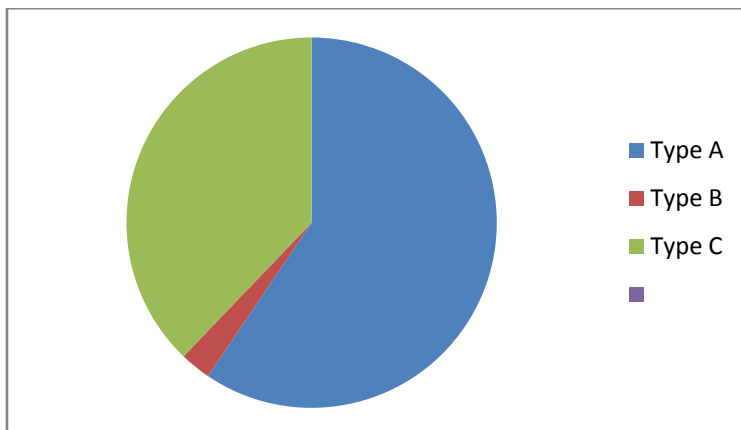


Cellularity of mastoids

Cellular mastoids	22 cases	55%
Scleroitic mastoids	10 cases	25%

Tympanometry curves

Type A	23 cases	62.5%
Type B	1 case	2.5%
Type C	14	35%



Stapedial reflexes

Reflex present	39 cases	97.5%
Reflex absent	1 case	2.5%

Middle ear volumes

Normal	37 cases	92.5%
High	0 case	0%
Low	3 cases	7.5%

Pure Tone Audiometry

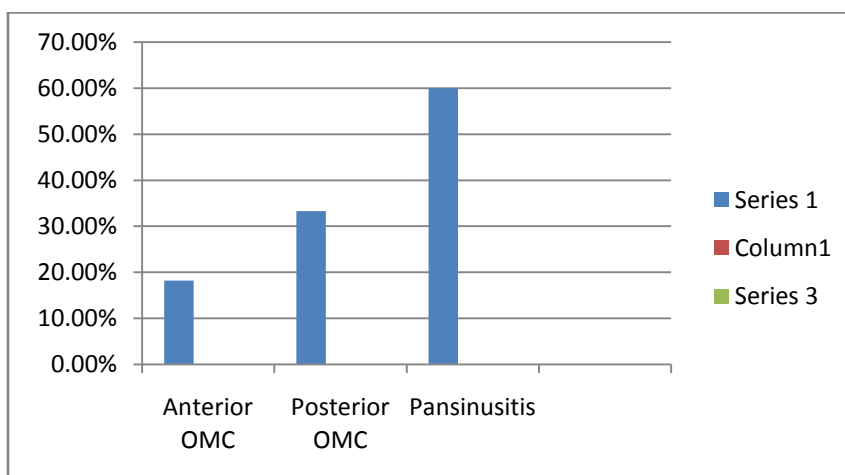
Normal hearing	38 cases	95%
Conductive loss	2 cases	5%
Sensoryneural loss	0 case	0%

Threshold elevation in patients with normal hearing

Air conduction	25 cases	65%
Bone conduction	0 case	0%

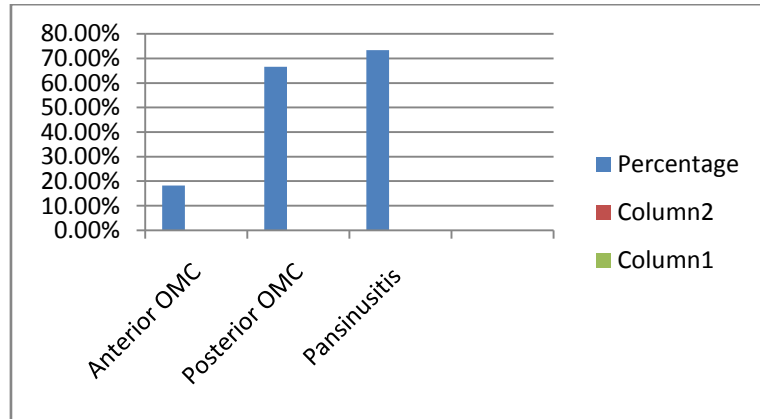
Location of sinuses in relation to type C curve

Location	Number	Threshold elevation	Percentage
Anterior OMC	22 cases	4	18.18%
Posterior OMC	3 cases	2	33.3%
Pan sinusitis	15 cases	11	60%



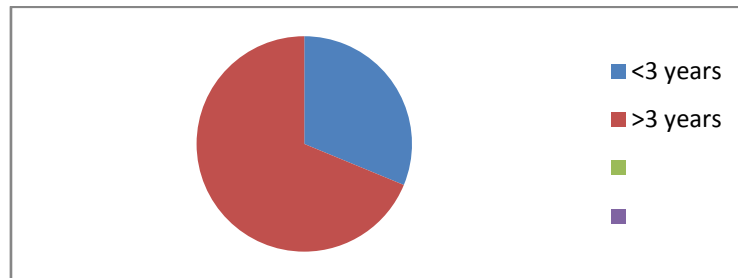
Location of sinuses in relation to threshold elevation

Location	Number	Threshold elevation	Percentage
Anterior OMC	22 cases	4	18.18%
Posterior OMC	3 cases	2	66.6%
Pansinusitis	15 cases	11	73.3%



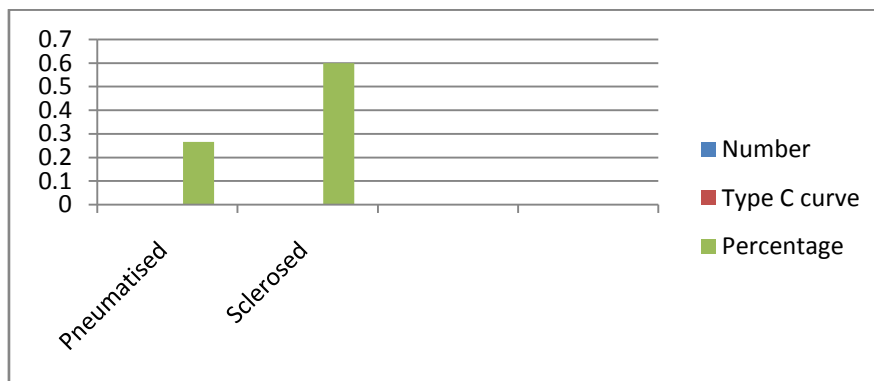
Period of sinusitis in relation to Type C curves

Less than 3 years	22 cases	5 Type C curves	22.7 %
More than 3 years	18 cases	9 Type C curves	50%



Mastoid cellularity in relation to Type C curves

Cellularity	Number	Type C curve	Percentage
Pneumatized	30 cases	8 cases	26.6%
Sclerosed	10 cases	6 cases	60%



IV. Discussion

Of the 40 patients screened for sinusitis a majority(55%) had disease confined to the anterior osteomeatal complex which includes maxillary,frontal,and anterior ethmoid followed closely by pansinusitis(3) The least incidence involved sinusitis changes of only posterior osteomeatal complex comprising the sphenoid and posterior ethmoidal complex.

The major complaint relating to eustachian tube pathology was fullness of ears (35%) followed by popping sound(10%). About 50% patients had grade 1 retraction , followed by 37.5% with grade 2 and only about 10% with grade3/4 retraction.

In tympanometry 62.5% showed Type A curve,while 35% displayed a Type C curve indicative of high negative middle ear pressure,probably eustachian tube dysfunction. Mastoid ear volumes were found to be within normal limits in 92.5% cases and low volumes were found in 7.5% of the cases probably reflecting the fact that mastoid ear volumes are predetermined in the first few years of life when the middle ear cleft is developing and sinusitis in adult life may not have an impact on the mastoid volume. Stapedial reflexes both

ipsilateral and contralateral were found normal in 97.5% cases showing that hearing loss in pure sinusitis case is not severe enough to cause any changes in stapedial reflex patterns.

Pure tone audiometry showed normal hearing in 95% cases, but 65% cases had a elevated air conduction threshold implying a silent middle ear dysfunction. The location of the sinusitis from the study appears to play a vital role in tympanometric and pure tone audiometric findings. Pansinusitis and posterior sinusitis consume a majority of the proportion of Type C curves and a majority of hearing threshold elevations reflecting the fact that mucopus from the infected sinuses especially posterior group transverse the eustachian tube ostia there by causing long standing inflammation , mucosal swelling,patency disturbance and there by dysfunction(4) Period of sinusitis also play a significant role with a long course of the disease in the paranasal sinuses contributing to deterioration of middle ear function(5). 60% of the sclerosed mastoids had Type C curves on impedance audiometry while 26.6% of pneumatized mastoids had Type C curve implying that poorly pneumatized mastoids cope poorly with the negative pressure generated in eustachian tube dysfunction.(6)

V. Conclusion

From this study we are able to conclude that damage to the middle ear becomes more serious with the extend of disease and longer course of the disease in the paranasal sinuses. Though hearing was unaffected, a significantly high (65%) number had elevated air conduction thresholds. Sinusitis involving the posterior group of sinuses were more likely to cause middle ear dysfunction. Also sclerotic mastoids are more likely to adjust poorly to negative pressures.

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