

MASTOID PNEUMATIZATION PATTERN IN PATIENTS WITH MUCOSAL TYPE OF CHRONIC OTITIS MEDIA- AN EXPERIENCE IN TERTIARY CARE CENTRE.

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ABSTRACT

BACKGROUND

Chronic Otitis Media (COM) is the bacterial infection of the mucoperiosteum of the middle ear cleft that has persisted for 12 weeks and above, characterised by persistent otorrhea, tympanic membrane perforation with varying degree of hearing impairment. In mucosal COM there is permanent perforation of pars tensa with or without inflammation of middle ear and mastoid. Pneumatization refers to both the process by which the epithelium expands into developing bone and the resulting interconnected air cells within the temporal bone.

MATERIALS AND METHODS

25 patients attending ENT OPD, with profuse unilateral ear discharge lasting for more than 3 months were selected by purposive sampling method from April 2021 to March 2022 and was subjected to detailed history taking and clinical examination. All the active mucosal COM patients were treated with conservative medical management. The patients were subjected to HRCT temporal bone and results were analysed.

RESULT

The mastoid pneumatization patterns were found to be sclerotic in most cases followed by cellular then diploic. The age group most commonly involved were 21-30 years. The sex most commonly involved were females. The ear most commonly infected was left ear. The mastoid pneumatization patterns in contralateral normal ear were found to be cellular in most cases followed by diploic then sclerotic.

CONCLUSION

There is decreased pneumatization in diseased patients which is secondary to chronic inflammation and not congenital cause. Hypocellularity of mastoids is the effect of the disease not the cause for middle ear pathologies.

Keywords: Chronic Otitis media, Mucosal COM, High Resolution Computed Tomography, Pneumatization.

INTRODUCTION

The diagnosis of chronic otitis media (COM) implies a permanent abnormality of the pars tensa or flaccida, most likely a result of earlier acute otitis media, negative middle ear pressure or otitis media with effusion. COM equates with the classic term chronic 'suppurative' otitis media (CSOM) that is no longer advocated as COM is not necessarily a result of 'the gathering of pus'¹. The World Health Organization (WHO) estimated that 65-330 million people worldwide are affected by CSOM, of whom 50% suffer from hearing impairment and approximately 28000 deaths per annum are attributable to the complications of otitis media. Some of these figures have been confirmed by Monasta et al. who recorded a CSOM incidence of 31 million cases globally. They have also found that otitis media related hearing impairment has a prevalence of 30.8 per 10000 and that 21000 people died annually from complications of otitis media¹. In humans, temporal bone pneumatization (TBP) begins during prenatal development². Pneumatization refers to both the process by which the epithelium expands into developing bone and the resulting interconnected air cells within the temporal bone³. While the function of TBP remains unknown, numerous previous studies reported the correlations between the degree of TBP and various pathologies including atelectasis, otitis media and cholesteatoma⁴. Generally, poor pneumatization in temporal bone is closely associated with increased incidence and poor prognosis of these pathologic conditions.⁵ There is paucity of studies analysing mastoid pneumatization patterns in COM. Hence the present study aims to study mastoid pneumatization pattern in mucosal COM.

MATERIALS AND METHODS:

A total of 25 patients of chronic otitis media, mucosal type attending ENT OPD, Gadag Institute Of Medical Sciences, Gadag (tertiary care centre) were selected for the study. The period of study was one year from April 2021 to May 2022. Detailed history was taken and clinical examination was done. Informed consent was obtained from each patient after counselling them and their relatives regarding the nature of the disease and the investigations required. The inclusion criteria was all patients with unilateral mucosal COM. The exclusion criteria included patients who had not given consent for the study and patients with other otitis media like squamosal, syphilis and tuberculous otitis media and malignancies of middle ear. The patients were then made to undergo appropriate investigations. The patients underwent High Resolution Computed Tomographic scan of the temporal bones and the results were analyzed.

RESULTS

Table 1: Age distribution of patients with mucosal type of chronic otitis media

Age group (in years)	Number of patients	Percentage
11-20	05	20
21-30	10	40
31-40	07	28
>40	03	12

Out of 25 patients with mucosal COM, majority of the patients (40%) were aged between 21 and 30 years, 20% were aged between 11 and 20 years, 28% were aged between 31 and 40 years and 12% were aged beyond 40 years.

Table 2: Sex distribution in patients with mucosal type of chronic otitis media

Sex	Number of patients	Percentage
Male	8	32
Female	17	68

Out of 25 patients with mucosal type of chronic otitis media, 32% were males and 68% were females.

Table 3: Ear affected in patients with mucosal type of chronic otitis media

Ear affected	Number of patients	Percentage
Right	12	48
Left	13	52

Out of 25 patients with mucosal type of chronic otitis media, right ear was affected in 48% of patients and left ear was affected in 52% of patient.

Table 4. Pneumatization patterns in diseased ears of patients with mucosal type of chronic otitis media

Pneumatization	Number of	Percentage
Sclerotic (hypo pneumatization)	16	64
Diploeic (moderate	02	08
Pneumatized	07	28

Out of 25 patients with mucosal chronic otitis media, in diseased ears, HRCT temporal bones revealed 64% sclerotic mastoids, 08% diploeic mastoids and 28% well pneumatized mastoids.

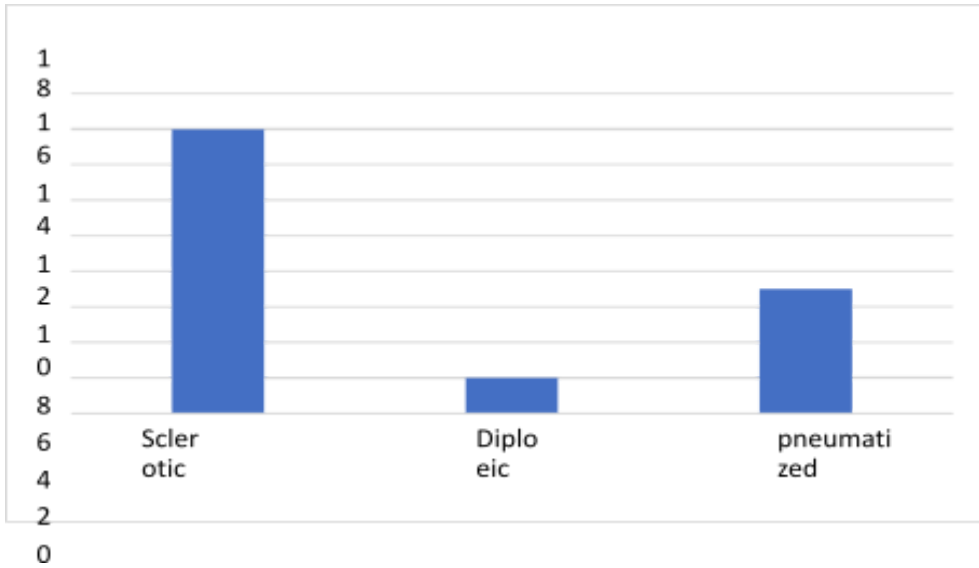


Chart 1. Pneumatization patterns in diseased ears of patients with mucosal type of chronic otitis media

Table 5: Pneumatization patterns in contralateral healthy ears of patients with mucosal type of chronic otitis media

Pneumatization	Number of patients	Percentage
Sclerotic (hypopneumatization)	04	16
Diploic (moderate pneumatization)	06	24
Pneumatized (Good pneumatization and hyperpneumatization)	15	60

Out of 25 patients with mucosal chronic otitis media, in contralateral healthy ears, HRCT temporal bones revealed 16% sclerotic mastoids, 24% diploic mastoids and 60% well pneumatized mastoids.

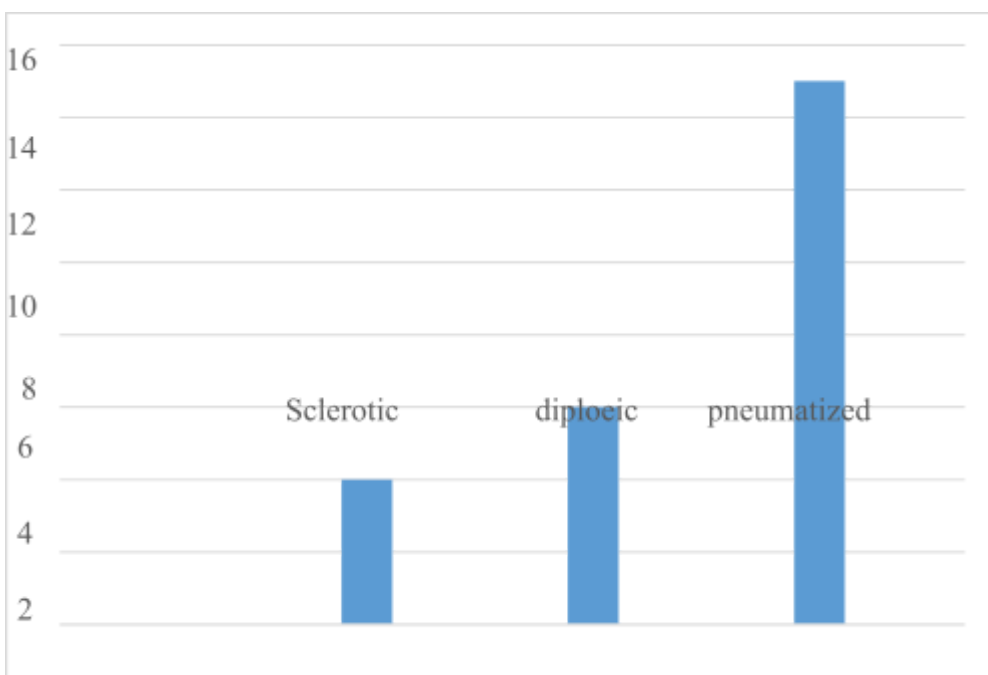


Chart 2: Pneumatization patterns in contralateral healthy ear

Table 6: Comparison of pneumatization patterns in diseased ears of mucosal COM with contralateral healthy ears (p value < .05)

Pneumatization	Diseased ears	Healthy ears
Sclerotic	16	04
Diploic	02	06
Well pneumatized	07	15

DISCUSSION

25 patients with unilateral chronic otitis media, mucosal type were included in our study over a period of 12 months from April 2021 to March 2022. Chronic otitis media is one of the most common conditions which the Otolaryngologist faces in day-to-day practice. Detailed history was taken and clinical examination was performed on all the patients. In all the patients the various mastoid pneumatization patterns were assessed by using HRCT scan of temporal bones. By doing so we tried to find out relation between the pneumatization patterns and the disease process. In this study, a total number of 25 patients with chronic otitis media, mucosal type which fit into inclusion and exclusion criteria attending the Department of Otorhinolaryngology, were selected for the study. Simple random sampling was done. The youngest patient was 13 years of age and the eldest was 65 years of age. The maximum number i.e 10 patients were in between 21 - 30 years of age i.e. in the third decade of life. We did not consider patients less than 12 years for our study as these patients are not proper candidates for mastoid pneumatization measurement because of incomplete development of mastoid bone. In our study there was a female preponderance 17 cases (68%) when compared to males 08 cases (32%) which is in agreement with other studies^{8,9}. Normally, the pneumatization is symmetrical in 72-99%¹⁰. When pneumatization is affected, the ear is suspected to be diseased with possibility of new bone formation and hence sclerosis. In our study in diseased ears, HRCT temporal bones revealed pneumatized mastoid in 28%, diploec in 8%, sclerosed mastoid in 64% of the cases. Our study was comparable with a study conducted by Sunitha M et al¹⁵ who found that out of 37 cases of tubotympanic type, HRCT temporal bones revealed pneumatized mastoid in 15 (40.5%), diploec in 1 (2.7%) and sclerosed mastoid in 21 (56.8%).¹⁵ In our study in normal ears, HRCT temporal bones revealed pneumatized mastoid in 60%, diploec in 24% and sclerosed mastoid in 16% of the cases. Our study was comparable to Ashwani sethi et al study¹¹ in the normal ears which had 84% well pneumatized mastoid air cell system and 16% had poorly pneumatized mastoid. In studying Temporal bone pneumatization, High Resolution Computed Tomography (HRCT) must be used, because his technique has the advantage that it shows the complete pneumatization with excellent resolution as observed by Chat Virapongse et al¹². The mastoid antrum may be the only air filled space in the mastoid process when the name acellular or sclerotic is applied. This occurs in 20% of the adults with Chronic Suppurative Otitis Media. In our study the percentage of sclerotic mastoids in diseased ears was found to be 64 % as compared to the contralateral healthy ears having 16% percent sclerotic mastoids. The difference was statistically significant with a p value of less than 0.05. Therefore we can say there is definite relation between the pneumatization of the mastoid air cells and chronic otitis media which is comparable with findings of Hegde Mahesh et al¹³ and Henry Gans et al¹⁴, who stated that sclerotization of mastoid process is neither hereditary nor congenital, nor sequelae of otitis media in infancy, but is a result of the suppurative process representing a defence mechanism consisting in growth of bone which displaces the pathologic process towards the antrum. Significantly more sclerosis was seen in diseased ears of mucosal COM. Kazuhiro aoki M D et al¹⁰ stated that persistent inflammatory stimulation was more severe and continuous in the sub epithelium than in the epithelium. The degree of this inflammation in the sub epithelium is thought to be related to the degree of suppression of the growth of the mastoid air cells. In suppressed pneumatization it is widely supposed that mucosa mediated gas exchange in the pneumatic space is reduced when compared with that of their pneumatic mucosa of normal persons because of mucosal hypertrophy and decreased vascular network accompanying chronic inflammatory changes in sub epithelium of the pneumatic space. Our findings are in accordance with the above statements proves that the suppressed pneumatization in chronic middle ear diseases is an acquired one and not a congenital one. It proves that the suppressed pneumatization is not due to otitis media in infancy but due to prolonged middle ear cleft subepithelial inflammation which occurs as a result of persisting middle ear pathologies. So the hypocellularity of the mastoid is the effect but not the cause of the disease.

CONCLUSION

Out of 25 cases of mucosal chronic otitis media, CT temporal bones revealed well pneumatized mastoid in %, diploic in 08% and sclerotic in 64% and in the contralateral healthy ears, CT temporal bones revealed well pneumatized mastoid in 60%, diploic in 24% and sclerotic mastoid in 16%. There is definite decreased pneumatization of affected ear in mucosal chronic otitis media, however the decreased pneumatization in patients with middle ear disease is secondary to chronic inflammation and not congenital cause. Chronic middle ear infection seems to have a definite influence on the pneumatization process as evidenced by the smaller size of the mastoid air cell system in our study. The duration of the infection seems to have a direct correlation with the degree of pneumatization. Sclerosed mastoids are seen in the ears with long standing pathologies. Our study proves suppressed pneumatization in chronic middle ear disease is an acquired one but not a congenital one and it is not due to otitis media in infancy but due to prolonged middle ear cleft subepithelial inflammation which occurs as a result of persisting middle ear pathologies. Hence hypocellularity is the effect of the disease but not the cause of middle ear pathologies.

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