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Clinical profile of ossicles in chronic suppurative otitis media: a study of 100 cases

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ABSTRACT

Background: To assess the status of ossicular chain intraoperatively in patients with chronic suppurative otitis media.
Methods: This was an observational study carried out in the department of ENT for a period of two years. About 100 patients of CSOM both safe and unsafe type was included in the study. They were then posted for appropriate surgery and their intraoperative ossicular findings were recorded.
Results: Out of 100 cases, malleus was found intact in 80 cases, eroded in 17 cases and absent in 3 cases. Incus was the ossicle most commonly found eroded in the study. It was intact in 65 cases, eroded in 29 cases and absent in 6 cases. The most commonly necrosed part was the long process of incus found in 25 cases. Stapes was found to be intact in 77 cases and suprastructure of stapes was eroded in 23 cases.
Conclusions: We found malleus to be the most resistant ossicle to erosion in CSOM, whereas incus was found to be the most susceptible. The incidence of ossicular erosion was much greater in unsafe CSOM than in safe CSOM.

Keywords: CSOM, Ossicle

INTRODUCTION

Chronic suppurative otitis media is a common condition in otorhinolaryngology which is characterized by chronic intermittent or persistent discharge. Poor socio economic condition, overcrowding, poor hygiene and nutrition have been suggested as the basis for the widespread prevalence of chronic suppurative otitis media in developing countries.[1]

Chronic suppurative otitis media is characterized by recurrent events of otorrhoea and mucosal changes with associated erosions of temporal bone and ossicles.[2] Both cholesteatamatous and non cholesteatamatous types of chronic suppurative otitis media are associated with ossicular damage.[3]

The proposed mechanism for erosion is chronic middle ear inflammation as a result of overproduction of cytokines – TNF alpha, interleukin -2, fibroblast growth factor, and platelet derived growth factor, which promote hypervascularisation, osteoclast activation and bone resorption causing ossicular damage. TNF alpha also produces neovascularization and hence granulation tissue formation. CSOM is thus an inflammatory process with a defective wound healing mechanism.[4] This inflammatory process in the middle ear is more harmful the longer it stays and the nearer it is to the ossicular chain.[5] The status of ossicular chain is important when selecting the type of intervention, but also in order to establish the prognosis.[6]

METHODS

This was a observational study carried out in the department of ENT at Dr. Vasantrao Pawar Medical College and tertiary health care centre, from August 2013 to December 2015. A total of 100 patients of CSOM were included in the study.

Eligibility criteria

Patients irrespective of age and sex presenting with both safe and unsafe type of chronic suppurative otitis media were included. Patients with history of previous ear surgery in the same ear and diagnosed case of middle ear malignancy were excluded.

The selected patient's ear was examined by otoscope and subsequently by a microscope to establish a preoperative diagnosis of safe and unsafe CSOM. All patients was subjected to a preoperative puretone audiometric evaluation and x ray mastoid (bilateral Schuller's view) to assess the pathology and anatomy of the mastoid. The patients were then posted for surgery after taking consent and their intraoperative ossicular findings were noted.

The ossicular chain status in safe and unsafe ear was compared statistically. Chi square test was used to evaluate the level of significance and the P value <0.05 was considered as significant.

RESULTS

Age wise distribution of cases

The present study included 100 patients of CSOM. In our study patients of all age group are included. Maximum patients were in the age group between 21 to 30. Out of which 21 cases were safe CSOM and 11 cases were unsafe. The next common group was between 31 to 40.

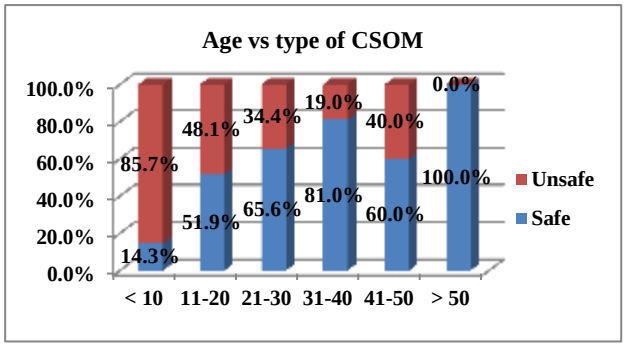

Figure 1: Age distribution.

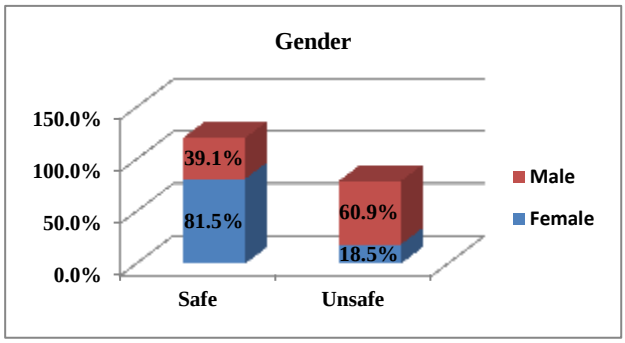

Figure 2: Gender distribution.

Table 1: Malleus status.

Malleus	CSOM		Total
	Safe	Unsafe	
Absent	0	3	3
	0.0%	7.9%	3.0%
Head erosion	0	11	11
	0.0%	28.9%	11.0%
HOM erosion	3	3	6
	4.8%	7.9%	6.0%
Intact	59	21	80
	95.2%	55.3%	80.0%
Total	62	38	100

Table 2: P value of malleus status.

Malleus status	Safe CSOM	Unsafe CSOM	Total	P value
Absent/ Erosion	3	17	20	0.000001289
Intact	59	21	80	
Total	62	38	100	

Table 3: Incus status.

Incus	CSOM		Total
	Safe	Unsafe	
Absent	0	6	6
	0.0%	15.8%	6.0%
Body erosion	0	1	1
	0.0%	2.6%	1.0%
LEN erosion	2	1	3
	3.2%	2.6%	3.0%
LP erosion	5	20	25
	8.1%	52.6%	25.0%
Intact	55	10	65
	88.7%	26.3%	65.0%
Total	62	38	100

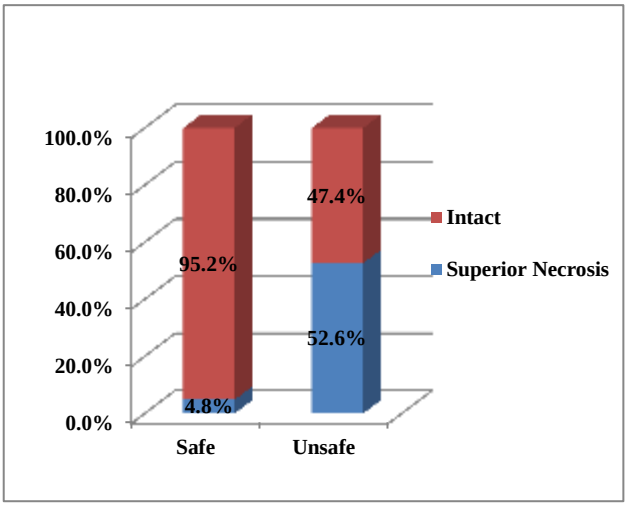

Figure 3: Stapes status.

Table 4: P value of incus status.

Incus status	Safe CSOM	Unsafe CSOM	Total	P value
Absent/ erosion	7	28	35	
Intact	55	10	65	<0.0000001
Total	62	38	100	

Table 5: P value of stapes status.

Stapes status	Safe CSOM	Unsafe CSOM	Total	P value
Erosion	3	20	23	
Intact	59	18	77	<0.0000001
Total	62	38	100	

Gender distribution of cases

Out of 100 patients 54 were females and 46 were males. In safe CSOM 44 were females and 18 were males. In unsafe CSOM 10 were females and 28 were males.

Malleus status

Out of 100 cases, malleus was found to be intact in 80 cases, eroded in 17 cases and absent in 3 cases. In safe CSOM, 59 cases had intact malleus and 3 had erosion of handle of malleus. In unsafe CSOM, 21 cases had intact malleus, 3 had handle of malleus erosion and 11 cases had head erosion and was absent in 3 cases.

P values are obtained using Chi-square test. P value <0.05 is considered to be statistically significant. P<0.0001 shows highly significant association. This shows malleus erosion differ significantly between safe CSOM and unsafe CSOM.

Incus status

Incus was the ossicle most commonly found eroded in our study. It was intact in 65 cases, eroded in 29 cases and absent in 6 cases. The most commonly necrosed part was long process found in 25 cases. In safe CSOM, was intact in 55 cases, long process was eroded in 5 cases and lenticular process was eroded in 2 cases. In unsafe CSOM, was intact in 10 cases, long process was eroded in 20 cases, lenticular process was eroded in 1 case and was absent in 6 cases.

P values are obtained using Chi-Square test. P<0.05 is considered to be statistically significant. P<0.0001 shows highly significant association. This shows incus erosion differ significantly between safe CSOM and unsafe CSOM

Stapes status

Stapes was found to be intact in 77 cases and suprastructure was eroded in 23 cases. In safe CSOM, 59 had intact stapes, suprastructure was necrosed in 3 cases. In unsafe CSOM, 18 had intact stapes, suprastructure was necrosed in 20 cases.

P values are obtained using Chi-Square test. P<0.05 is considered to be statistically significant. P<0.0001 shows highly significant association. This shows stapes erosion differ significantly between safe CSOM and unsafe CSOM.

DISCUSSION

The present study was conducted from August 2013 to December 2015 during which 100 cases of chronic suppurative otitis media of tubotympanic type (safe type) and attico-antral type (unsafe type) were included. Among 100 patients, 62 cases were safe CSOM and 38 were unsafe CSOM.

Maximum patients were in the age group between 21 to 30. Out of which 21 cases were safe CSOM and 11 cases were unsafe. Out of 100 patients 54 were females and 46 were males.

As in Table 3-5 out of 100 cases, malleus was found to be intact in 80 cases, eroded in 17 cases and absent in 3 cases. In safe CSOM, 59 cases had intact malleus and 3 had erosion of handle of malleus. In unsafe CSOM, 21 cases had intact malleus, 3 had handle of malleus erosion and 11 cases had head erosion and was absent in 3 cases.

Incus was the ossicle most commonly found eroded in our study. It was intact in 65 cases, eroded in 29 cases and absent in 6 cases. The most commonly necrosed part was long process found in 25 cases. In safe CSOM, was intact in 55 cases, long process was eroded in 5 cases and lenticular process was eroded in 2 cases. In unsafe CSOM, was intact in 10 cases, long process was eroded in 20 cases, lenticular process was eroded in 1 case and was absent in 6 cases.

Stapes was found to be intact in 77 cases and suprastructure was eroded in 23 cases. In safe CSOM, 59 had intact stapes, suprastructure was necrosed in 3 cases. In unsafe CSOM, 18 had intact stapes, suprastructure was necrosed in 20 cases.

In Varshey et al out of 150 patients, malleus was eroded in 23 cases, incus was eroded in 32 cases and stapes was eroded in 32 cases. Malleus was found to be the most resistant ossicle, found intact in 121 cases. In incus most frequently involved part were lenticular process followed by long process. Suprastructure of stapes was involved in 21.33%.[1]

In Udaipurwala et al, long process of incus was most commonly necrosed part of incus. Incidence of sapedial necrosis in our study was found to be similar to the study by Udaipurwala et al. they found the suprastructure to be necrosed in 21.00% which matches with our findings.[7]

Kartush found erosion of long process of incus with an intact malleus and stapes suprastructure as the most common ossicular defect.[8]

Gurumani et al found incus as the most commonly involved ossicle. The most commonly involved part of incus was long process which correlates with our study.[2]

In Anglitoiu et al study again long process of incus was most commonly necrosed ossicle which matches with our study.[8]

In Sathyaki et al incus was most commonly eroded ossicle (43.3%), followed by malleus (16.7%) and the stapes (13.3%).[9]

Rout et al found long process of incus as most commonly eroded ossicle which correlates with our study.[10]

In Sinha et al study incus was the most common ossicle involved followed by stapes and malleus which correlates with our study.[11]

In a study done by Jahnke and Falk ossicular destruction was found in 77% cases of cholesteatoma.[12]

Both type of CSOM have potential to incite resorption of bone.[13] The mechanism of the ossicular lesions varies with the pathology. In the normal ear the mucosa that covers the ossicle is constituted by a respiratory epithelium that rests on a basal membrane which separates it from the connective tissue. The connective tissue is constituted by collagen fibres, cell like fibrocytes, fibroblast, histiocytes, mast cells and blood vessels. When inflammation occurs in safe CSOM, this tissue is replaced by granulation tissue. The bone loses its cortical, it becomes irregular and is invaded by inflammatory tissue. The presence of the granulations, rich in lysosomes is associated with enzymatic destruction. The matrix of the collagen is degraded either by specific collagenase, either by nonspecific agents like the lysosomes or the acid hydrolase.[14]

In unsafe CSOM, the lesions are caused by the presence of keratinized squamous epithelium in the middle ear. It is perceived like a foreign body and determines the formation of the inflammatory granuloma, which is twice more destructive for the ossicles than the inflammation in the safe CSOM. The evolutive and invasive character of the cholesteatoma causes lesions that can extend to all the middle ear and even beyond that.[15]

CONCLUSION

Chronic suppurative otitis media is characterized by recurrent events of otorrhoea and mucosal changes with associated erosions of temporal bone and ossicles. Both safe and unsafe types of chronic suppurative otitis media are associated with ossicular damage. We found malleus to be the most resistant ossicle to erosion in chronic suppurative otitis media whereas incus was found to be the most suscepitible. Long process of incus was commonly necrosed part of incus. Unsafe CSOM has more tendency for ossicular erosion. So as an ENT surgeon, we should have enough competencies to do all type of ossicular chain reconstructions during surgery to give the best possible hearing result to our patients and providing a better productive life.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Varshney S, Nangia A, Bist S, Singh R, Gupta N, Bhagat S. Ossicular chain status in chronic suppurative otitis media in adults. Indian J Otolaryngol Head Neck Surg. 2010;62(4):421-6.
2. Gurumani S. A study on ossicular defects in patients with tubotympanic type of csom. J Evol Med Dent Sci. 2013;2(30):5521-5.
3. Marfani MS, Magsi PB, Thaheem K. Ossicular damage in chronic suppurative otitis media – study of 100 cases. Pak J Otolaryngology. 2005;21(1):9-11.
4. Deka RC. Newer concepts of pathogenesis of middle ear cholesteatoma. Indian J Otol. 1998;4(2):55-7.
5. Sade J, Berco E, Buyanover D, Brown M. Ossicular damage in chronic middle ear damage. Acta Otolaryngol. 1981;92:273-83.
6. Anglitotiu A, Balica N, Lupescu S, Vintila R, Cotulbea S. Ossicular chain status in the ontological pathology of the ENT clinic TIMISOARA. Medicine in Evolution. 2011;17(4):344-51.
7. Udaipurwala IH, Iqbal K, Saqulain G, Jalisi M. Pathlogical profile in chronic suppurative otitis media—the regional experience. J Pak Med Assoc. 1994;44(10):235–7.
8. Kartush JM. Ossicular chain reconstruction. Capitulum to malleus. Otolaryngol Clin North Am. 1995;27:689–715.
9. Sathyaki DC, Jyothi Swarup R, Mohan M, Rout MR, Anu PK, Manjunath K. Ossicular defects and

audiological profile of chronic otitis media. J Evol Med Dent Sci. 2014;3(7):1763-8.
10. Rout MR, Das P, Mohanty D, Rao V, Susritha K, Jyothi BE. Ossicular chain defects in safe type of chronic suppurative otitis media. Indian J Otol. 2014;20(3):102-5.
11. Sinha AK, Sharma AK, Raushan EA, Kumar G. Bone resorption in chronic otitis media: an observational study. Int J Sci Stud. 2014;2(6):82-5.
12. Jahke V, Falk W. Clinical, pathological and therapeutic aspects of cholesteatoma in children. Laryngol Rhinol Otol Stuttg. 1976;55:556-60.
13. Proctor B. The development of the middle ear spaces and their surgical significance. J Laryngol Otol. 1964;78:631-48.
14. Thomsen J, Tos M, Nielsen M, Jorgensen MB. Bone destruction in inflammatory diseases of the ear. Cholesteatoma and Mastoid Surgery, Proceedings 2nd International Conference, Tel Aviv, Israel, 22-27 March 1981. Amsterdam: Kugler Publications; 1982.
15. Yuasa R, Kneko Y, Takasaka T. The significance of kearatinization in the mechanism of bone destruction in cholesteatoma. Cholesteatoma and Mastoid surgery, Proceedings 2nd International Conference, Tel Aviv, Israel, 22-27 March 1981. Amsterdam: Kugler Publications; 1982.

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