

Intraoperative status of ossicles in patients of chronic suppurative otitis media: a study of 150 cases

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Abstract

Background: To assess the intraoperative status of ossicles in patients with chronic suppurative otitis media.

Methods : This was an observational study carried out in the department of ENT for a period of three years i.e. from 2016 to 2019. About 150 patients of CSOM both mucosal and squamousal was included in the study. They were then posted for appropriate surgery & their intraoperative ossicular findings were recorded.

Results : Out of 150 cases studied, incus was found involved in 50 patients (18- mucosal, 32 - squamosal) , stapes was found involved in 36 patients (8 -mucosal, 28- squamosal) , malleus was found involved in 32 patients(8 -mucosal, 24- squamosal). Incus was involved most frequently in 33.3%, followed by stapes ; involved in total 24% . Malleus was most resistant ossicle involved in 21.33% patients.

Conclusion: Incus was found to be the most frequently impaired ossicle to erode in chronic otitis media. Malleus was found to be the most resistant ossicle. So, as an ENT surgeon, we should have enough competencies to do all type of ossicular chain reconstruction during surgery to give the best possible hearing result to the patients and providing a better productive life.

Key word: Cholesteatoma

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I. Introduction

Chronic otitis media is characterized by recurrent events of otorrhoea and mucosal changes with associated erosions of temporal bone and ossicles¹. Ossicular chain involvement is more common in cholesteatoma, but its prevalence in chronic suppurative otitis media without cholesteatoma can also be estimated even upto 33%². Both cholesteatomatous and non cholesteatomatous types of chronic suppurative otitis media are associated with ossicular damage³. Ossicular erosion may be a feature of atticofacial (or squamousal disease) which is considered unsafe as well as tubotympanic (or mucosal disease) which is considered safe^{4,5}. 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. CSOM is thus an inflammatory process with a defective wound healing mechanism⁶. The incus is the most frequently affected ossicle; however , the stapes and the malleus can be involved solely or in combination as well. The usual sequel of inflammation is necrosis, especially at the incudostapedial joint, on the lenticular process and the distal part of the long process of the incus, but destruction of the stapes superstructure or, rarely, of the malleus handle can also occur.

II. Materials & Methods

This was a observational study carried out in the department of ENT at Maharaja Agrasen medical college, Agroha , Hisar over a period of three years i.e. from 2016 to 2019 . A total of 150 patients of CSOM were included in the study.

INCLUSION CRITERIA :

- Patients irrespective of age and sex, who underwent tympanoplasty for CSOM during this period recruited for our study.
- Patent Eustachian tube
- Healthy middle ear mucosa
- Good cochlear reserve

- Ear should be dry for atleast 3 months.

EXCLUSION CRITERIA:

- Patients who had malignancy of middle ear, otitis externa or previous history of ear surgery.
- Revision surgery

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 pure tone 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.

III. Results

150 patients with CSOM recruited for this study. The average age was(33.4 ± 8.9). 100 out of 150 patients were younger than 40. There were 96 males and 54 females. Examination findings showed that most of the ears had safe CSOM (114 ears; 76%) . while only 36 ears (24%) had cholesteatomous or unsafe ear.

INTRA-OPERATIVE FINDINGS:

Intra-operative middle ear exploration matched completely our pre- operative diagnosis; none of the patient who presumed to have safer ear turned to have cholesteatoma and vice versa.

Ossicular erosion

Malleus (Table 1)

It was found intact in 118 (78.66%) , eroded in 32(21.33%) ears. In safe CSOM (total of 114) , 106 of the ears had intact malleus. Only 8 ears (7.01%) had erosion of the malleal handle. In cholesteatomous ears (total of 36), the malleus was found intact in 12 (33.3%) , eroded in 24(66.6%).

Malleus status	CSOM		Total
	Safe	Unsafe	
Destruction	8	24	32
	7.01%	66.6%	21.33%
Intact	106	12	118
	92.98%	33.3%	78.66%
Total	114	36	150
	76%	36%	100%

Table no 1 – Malleus status in chronic suppurative otitis media (CSOM).

INCUS (Table 2)

We found incus intact in 100(66.67%) , eroded in 50(33.33%) ears. In safe CSOM (total of 114) , 96 of the ears had intact incus. Only 18 ears (15.78%) had erosion of the incus localized to the lenticular process & to the long process. In cholesteatomous ears (total of 36), the incus was found intact in 4 (11.11%) , eroded in 32(88.8%). Lenticular process was the most frequently involved portion followed by the long process of incus.

Incus status	CSOM		Total
	Safe	Unsafe	
Destruction	18	32	50
	15.78%	88.8%	33.33%
Intact	96	4	100
	84.21%	11.11%	66.67
Total	114	36	150
	76%	24%	100%

Table no. 2 - Incus status in chronic suppurative otitis media (CSOM)

STAPES(Table 3)

We found stapes intact in 114(76%) , eroded in (33.33%) ears. In safe CSOM (total of 114) , 104 of the ears had intact stapes. Only 8 ears (7.01%) had erosion of stapes. In cholesteatomous ears (total of 36), the stapes was found intact in 8 (22.2%) , eroded in 28(77.7%).

Stapes status	CSOM		Total
	Safe	Unsafe	
Destruction	8	28	36
	7.01%	77.7%	24%
Intact	106	8	114
	92.98%	22.2%	76%

Total	114	36	150
	76%	24%	100%

Table no. 3: Stapes status in chronic suppurative otitis media (CSOM)

IV. Discussion

It is hypothesized that middle ear ossicles damage in CSOM is induced by an active phenomena of osteoclastic osseous resorption rather than by a passive avascular necrosis. The suggested mechanism for bony erosion is excessive formation of inflammatory mediators in the tympanic cavity which induces osteoclast activation & bony resorption resulting in ossicular destruction. The factors that may explain that the incus lenticular and long processes being more vulnerable are possibly their tenuous blood supply, noticeable bone marrow and their exposure to the external milieu especially in posterior perforations.

The presence of cholesteatoma is associated with a higher prevalence of ossicular erosion. It is also associated with two or more ossicles being affected simultaneously. In our study, ossicular erosion in cholesteatomatous ears was as follows: incus 33.3%, malleus 21.33%, and stapes 24%.

In a study by Kurien et al. these figures were: incus 100%, malleus 67%, and stapes 67%⁷.

In another study by Garap and Dubey, the figures were: incus 89%, malleus 32%, and stapes 41%⁸.

Incus was the ossicle most commonly found eroded in our study. In safe CSOM, was intact in 96 cases. In unsafe CSOM, was intact in 4 cases.

In safe CSOM, 106 had intact stapes. In unsafe CSOM, 8 had intact stapes.

Jareen et al reported it to be 16% in their study⁹.

Thomson et al also quoted long process of incus to be most commonly eroded¹⁰. In patients with active active squamosal disease, incus was involved in 94.12% (long process -47.06%,absent -29.41% and eroded body -17.65%, in that order. Overall, incus was followed by stapes; involved in total 16.66% patients. In active squamosal disease, 64.70 % patients had stapes involvement. Malleus was most resistant ossicle, involved in 12.22% patients, all of active squamosal disease (64.71% patients). Head of malleus was most frequently eroded part of malleus in active squamosal disease(41.18%).

Varshney et al also found malleus to be most resistant and incus to be most susceptible ossicle¹¹.

Albera et al and Mohammadi et al reported most frequent involvement of incus followed by stapes^{12,13}.

Binti et al reported incus being most involved ossicle in active squamosal disease. Our results showed that ossicular chain destruction is much more prevalent in cholesteatomous ears than in non cholesteatomous ears¹⁴.

V. Conclusion:

In this study we found that the incidence of ossicular erosion was much greater in squamosal CSOM than in CSOM with mucosal disease. Incus was found to be the most susceptible among three ossicles. Overall, the order of ossicular involvement was incus>stapes>malleus. Early detection of disease with minimal ossicular damage is best for good ossiculoplasty procedure and thereby utmost hearing outcome with disease control. Preoperative consent regarding hearing and ossiculoplasty should be taken and surgery should be planned accordingly.

References

- [1]. Gurumani S. A study on ossicular defects in patients with tubotympanic type of csom. J Evol Med Dent Sci. 2013 ; 2(30) : 5521-5.
- [2]. Carrillo RJ, Yang NW, Abes GT. Probabilities of ossicular discontinuity in chronic suppurative otitis media using pure tone audiometry. Otol Neurotol. 2007;28: 1034-7
- [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]. Chole RA, Sudhoff HH. Chronic otitis media, mastoiditis and petrositis. In: Naparko JK, editor. Cummings head and neck surgery. Philadelphia : Mosby ;2010.pp. 1963-1978.
- [5]. Jeng FC, Tsai MH, Brown CJ. Relationship of pre-operative findings and ossicular discontinuity in chronic otitis media. Otol Neurotol.2003;24:29-32.
- [6]. Deka RC. Newer concepts of pathogenesis of middle ear cholesteatoma. Indian J Otol.1998;4(2):55-7.
- [7]. Kurien M, Job A, Mathew J, Chandy M (1998) Otogenic intracranial abscess: concurrent craniotomy and mastoidectomy--changing trends in a developing country. Arch Otolaryngol Head Neck Surg 124: 1353-1356.
- [8]. Garap JP, Dubey SP (2001) Canal-down mastoidectomy: experience in 81 cases. OtolNeurotol 22: 451-456.
- [9]. Jareen E, Vedantam R. Preoperative predictors of incudal necrosis in chronic suppurative otitis media. Otolaryngol Head Neck Surg. 2010;142:415-420.
- [10]. Thomson J,et al. Bone resorption in chronic otitis media. A histological and ultrastructural study. Ossicular necrosis. J Laryngol Otol. 1974;88:975-992.
- [11]. Varshney S, Nangia A, Bist SS, Singh RK, Gupta N, Bhagat S. Ossicular chain status in chronic suppurative otitis media in adults. Indian J Otolaryngol Head Neck Surg. 2010 Oct;62(4):421-6.
- [12]. R.Albera, A. Canale, E. Piumetto , M.Lacilla, and F. Dagna. Ossicular chain lesions in cholesteatoma. Acta Otorhinolaryngol Ital. 2012 Oct ; 32(5) : 309-313.
- [13]. Mohammadi G, Naderpour M, Mousaviagdas M. Ossicular erosion in patients requiring surgery for cholesteatoma. Iran J Otorhinolaryngol . 2012 Summer; 24(68) :125-8.

- [14]. Binti Abdullah A, Hashim SM, et al. Outcome of canal wall down mastoidectomy : experience in sixty three cases. *Med J Malays.* 2013;68(3):217-221.

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