Main Article

# A Study of Different Otologic Prognostic Factors Determining the Hearing Outcome in Surgical Management of Chronic Otitis Media Squamous Disease

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**ABSTRACT**

***Introduction***

*The diagnosis of chronic otitis media (COM) implies a permanent abnormality of the pars tensa or flaccida. The definitive treatment of it is surgery. Restoration of hearing is by necessity a secondary consideration.*

***Materials and Methods***

*A prospective study was done from December 2017 to August 2019 in Department of ENT in a tertiary health care centre of eastern India. Total 50 patients were included in this study.*

***Results***

*Most of the patients (62%) are females and are within 30 years of age. Commonest ossicular defects are defects with incus. 82% patients gained hearing improvement >15 dB*

***Conclusion***

*Our study shows that hearing improvement is greatest for type I tympanoplasty followed by cortical mastoidectomy, ossiculoplasty. Hearing improvement is inversely proportional to the incidence of post operative infection and complications.*

***Keywords***

*Otitis Media; Cholesteatoma; Audiometry; Tympanoplasty; Ossiculoplasty; Mastoidectomy.*

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.[1] COM is classified as healed COM, inactive mucosal com, inactive squamosal COM, active mucosal COM, active squamosal COM. Chronic otitis media is clinically characterized as an inflammatory condition of middle ear cleft associated with persistent or intermittent otorrhea. The characteristic feature of squamosal variety of COM is presence of cholesteatoma. Cholesteatoma is a three dimensional epidermal and connective tissue structure, usually in the form of a sac and frequently conforming to the architecture of the various spaces of the middle ear, attic, and mastoid. This structure has the capacity for progressive and independent growth at the expense of underlying bone, displacing or replacing the middle ear mucosa, and has a tendency to recur after

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removal.[2] According to presumed etiology cholesteatoma may be classified into two general categories: congenital cholesteatoma and acquired cholesteatoma. Congenital and acquired cholesteatoma can be eradicated from the temporal bone only by surgical resection. The primary goal of surgery for COM is to eradicate disease and obtain a dry, safe ear. Restoration of hearing is by necessity a secondary consideration. The aim of this study is to study the various otologic factors affecting the final hearing outcome in patient treated surgically for squamosal type of chronic otitis media like pre-operative complications, hearing status, factor affecting Intra-operative decision making and findings that may affect hearing outcome and postoperative complications.

## Materials and methods

The study was done in the outpatient department (OPD), indoor and operation theatre of department of Otorhinolaryngology and head and neck surgery (ENT) of a tertiary health care center of eastern India from December 2017 to August 2019. 50 patients attending in the OPD of department of ENT were included in the study.

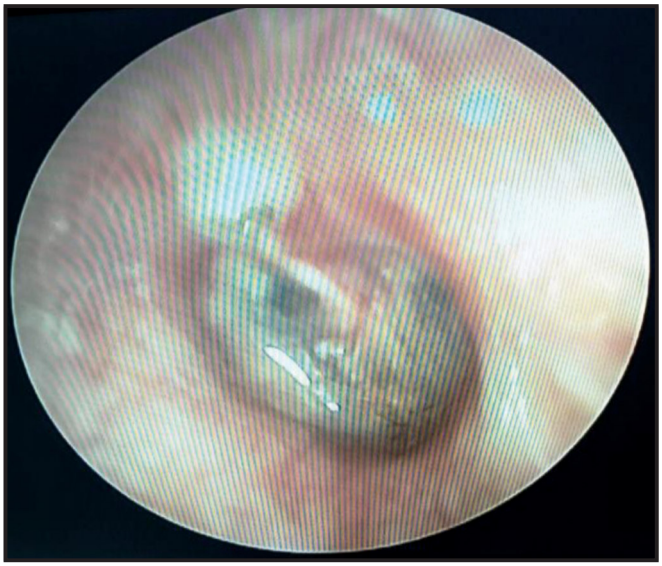

**Fig. 1. Otoendoscopic picture of attic cholesteatoma**

Patients of COM with squamosal variety with or without complication in the age group 10 years to 60 years with conductive type of hearing loss were included in the study. But those aged less than 10 years and more than 60 years with sensory neural and conductive type hearing loss and tubotympanic variety with central perforation and hearing loss less than 45 db were excluded. All the patients were undergone standard preoperative investigation including complete hemograms, serum urea, creatinine, glucose, serological tests, chest X-ray PA view, ECG 12 leads, otoendoscopic finding (Fig. 1), high resolution computed tomogram (HRCT) of temporal bone (Fig. 2), pure tone audiometry (PTA) and tympanogram.

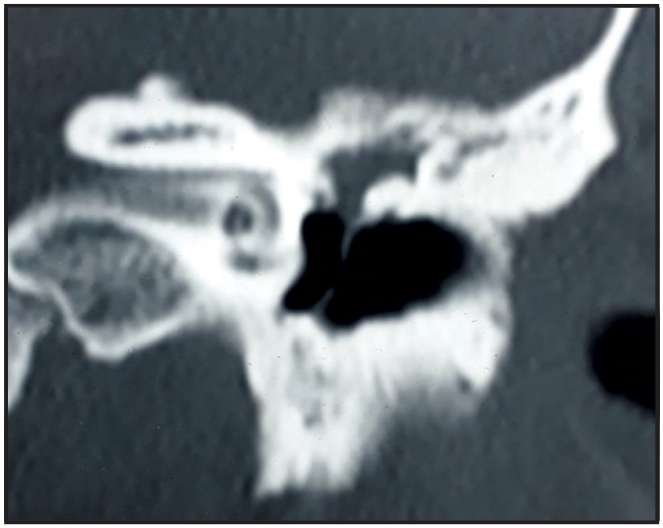

**Fig. 2. HRCT temporal bone showing soft tissue shadow in middle ear cavity**

Type I and type III tympanoplasty, atticoantrostomy, cortical mastoidectomy (Fig. 3, 4), ossiculoplasty with total ossicular replacement prosthesis (TORP) or partial ossicular replacement prosthesis (PORP) (Fig. 5) placement and canal wall down (CWD) mastoidectomy with cartilage ossiculoplasty were done according to the situation. For all above procedures post aural approach was used. All the patients underwent tympanoplasty.

Mastoid dressing was done kept up to seven days, intravenous antibiotic was given for seven days, sutures were removed on the seventh day, patients were reviewed once a week, aural pack was removed on the tenth day, graft visualized, topical ear drops were advised.

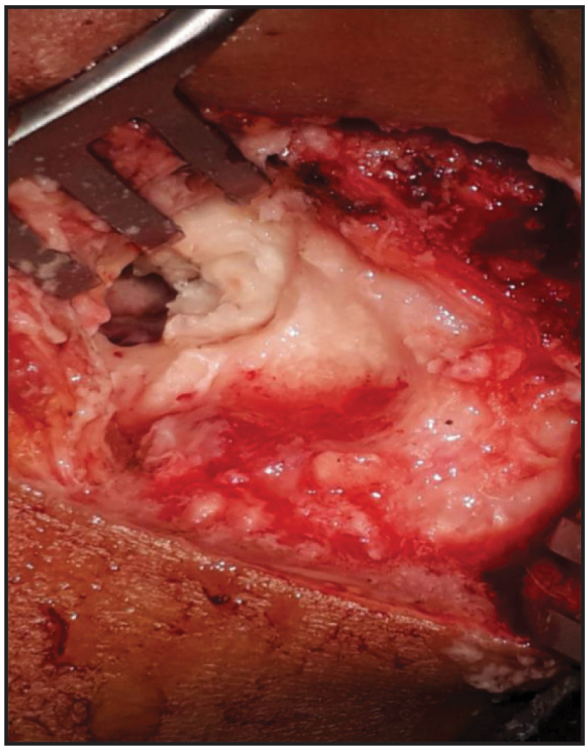

**Fig. 3. Intra-operative picture of cholesteatoma**

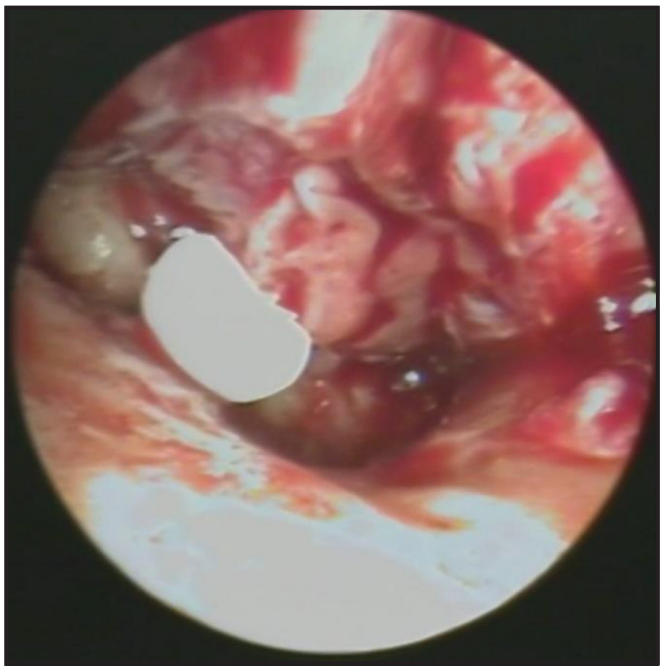

**Fig. 5. Intra-operative picture of placement of PORP**

**Fig. 4. Cholesteatoma sac**

Patients were followed up thereafter on day 7 (1st visit), day 15 (2nd visit), day 30 (3rd visit), day 60 (4th visit) and day 90 (5th visit) by clinical examination, otoscopy, examination under microscope (EUM) and audiometry (on day 90/5th visit).

## Results

The collected data was analysed with SPSS 16.0 version. To describe about the data descriptive statistics frequency analysis, percentage analysis, mean, S.D were used. For the paired samples (pre-operative and post-operative) paired t-test was used.

Out of a total of 50 patients, our study had 31 female and 19 male patients. Thus, females are commonly affected (60%) (Table I).

**Table I: Patient distribution**

| SEX | NUMBER |
|---|---|
| Male | 19 |
| Female | 31 |

According to this study, the mean age of our patients 21.96 years, ranging from 11 years to 48 the most common age group affected is 10 to 19 years followed by 20 - 29 years (Table II).

**Table II: Age distribution**

| AGE (IN YEARS) | NUMBER | PERCENTAGE |
|---|---|---|
| 10 -19 | 23 | 46 |
| 20 -29 | 20 | 40 |
| 30 -39 | 6 | 12 |
| 40 -40 | 1 | 2 |

Distribution of patients according to otorrhea; ossicular and middle ear status; procedure performed; hearing improvement gained are shown in Table III, IV, V, and VI respectively. Graft was rejected in one case, extrusion of PORP and TORP was noted in two cases each. Hearing improvement was around 80%.

**Table III: Bellucci's classification of otorrhea**

| CATEGORY OF OTORRHEA | FREQUENCY |
|---|---|
| Dry | 4 |
| Occasionally wet | 36 |
| Persistently wet | 10 |
| Persistently wet with cleft palate | 0 |

**Table IV: Distribution of patients according to ossicular and middle ear status**

| OSSICULAR STATUS | FREQUENCY |
|---|---|
| All ossicles intact | 22 |
| Defects of incus | 13 |
| Defects of incus and stapes | 5 |
| Defects of incus and malleus | 8 |
| Defects of incus, malleus and stapes | 2 |

**Table V: Procedure performed**

| | |
|---|---|
| Type I tympanoplasty | 6 |
| Attico antrostomy with type I tympanoplasty | 5 |
| Cortical mastoidectomy with type I tympanoplasty | 4 |
| Type III tympanoplasty | 6 |
| Cortical mastoidectomy with types III tympanoplasty | 1 |
| Cortical mastoidectomy and ossiculoplasty with TORP placement | 10 |
| Cortical mastoidectomy and ossiculoplasty with PORP placement | 10 |
| CWD mastoidectomy with cartilage ossiculoplasty | 8 |

**Table VI: Hearing improvement gained**

| IMPROVEMENT (DB) | GRADE | NO OF CASES |
|---|---|---|
| <5 | None | 1 |
| 5-10 | Minimal | 4 |
| 11-15 | Satisfactory | 4 |
| >15 | Good | 41 |

## Discussion

Chronic otitis media is a very common Otorhinolaryngeal problem worldwide, especially in developing countries. Around 7.8% of the Indians suffer from this infection according to WHO report, 2004.[3]

In our study, 62% females were affected while 38% males were affected. According to the study conducted by Bijan Basak et al there is female predominance.[4]

According to Glasscock, though otitis media is a disease which occurs commonly in pediatric age group, the mean age at which the disease manifests is 20-29 years. The infection is most commonly acquired in childhood as acute suppurative otitis media is common in children. This condition persists in early and middle adulthood, unless treated. Hence the incidence is more common in young population.[5]

According to Bellucci's classification of otorrhea, in this study, maximum number of patients 72% had occasionally wet ears and 20% had persistently wet ears.8 of them had dry ear, 28 of them had more than three months discharge free period before the surgery, 5 of them had active discharge at the time of surgery. These findings were comparable to the studies of Pinar et al and Sarker et al.[6,7]

The success of hearing reconstruction of the hearing mechanism depends on the pre-operative ossicular status. An intact ossicular system with only a perforation in the tympanic membrane gives the best results. The most common ossicle to be eroded is the long process of incus due to the nature of blood supply to the incudostapedial joint. In our study, there is erosion of incus in 13 patients. There was erosion of incus and stapes in 5 patients and incus and malleus in 8 patients. An intact ossicular chain was seen in 22 patients (44%). This was in accordance with the observations of Mohammadi et al and Ahmed et al.[8,9]

Ossicular fixation is less common in COM compared to ossicular necrosis[10]. In our study, there was no case of ossicular fixation.

In our study, success rate has been explained with reference to hearing benefit. Grafts which are rejected taken as failures, similar PORP, TORP extruded. There was one graft failure, 2 PORP and 2 TORP extruded. Manpreet Kaur et al did studies on comparison of graft uptake between tympanoplasty alone and tympanoplasty combined with cortical mastoidectomy in noncholesteatomatous chronic suppurative otitis media in patients with sclerotic bone. They concluded that graft uptake was 76% in patients who underwent tympanoplasty and 88% in tympanoplasty combined with cortical mastoidectomy.[11]

The most common ossicle to be eroded is the long process of incus due to the nature of blood supply to the incudostapedial joint. In our study, there is erosion of incus in 28 patients (56%). According to the studies conducted by Ghodrat Mohammadi, incus is the most commonly eroded ossicle. In his study, total erosion of the incus is more common than partial erosion.[12]

In our study PORP extrusion occurred in 2 cases and TORP extrusion occurred in 2 case.

Jha et al. in their comparative study on ossiculoplasty described that the failure and extrusion in case of cartilage were 11.5%, in bone 5.9% and in plastic PORP it was 20%.[13]

Gary Jackson et al also described higher rate of extrusion and failure when prosthesis was used. But to reduce the extrusion rate, the tragal cartilage is interposed between prosthesis and eardrum.[14]

## Conclusion

Tympanoplasty is the definitive surgical management for COM with our success rate of 82%. The success of surgery is determined in terms of hearing improvement (Air-Bone gap closure). Our study shows that mean A-B gap closure is greatest for type I Tympanoplasty followed by cortical mastoidectomy, ossiculoplasty with PORP / TORP placement. Hearing improvement is inversely proportional to the incidence of post operative infection and complications.

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