

Study of clinical profile and effect of surgical treatment in patients suffering from adhesive otitis media: A descriptive study at a tertiary care center in Uttarakhand

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Introduction: This study was carried out in ENT department of Government medical college Haldwani and Govt Doon medical college, Dehradun over a period of 2 years from January 2018 to December 2019. **Study design:** Prospective, cross sectional, descriptive study. **Aim and objectives:** To make clinical profile of patients of adhesive otitis media, study the middle ear anatomical factors leading to adhesive otitis media and observe the effects of surgery in these patients. **Material and methods:** All patients were subjected to detailed clinical evaluation and selected for the study based upon inclusion and exclusion criteria. All surgeries were done under general anaesthesia using transcanal endoscopic route. Intraoperative findings were recorded and patients were followed upto six months. Audiogram was repeated at 1 month. **Results:** Based upon the inclusion criteria, 50 patients were included in the study. Most of them belonged to 2nd or 3rd decade of life having mild conductive hearing loss and ear discharge. Blockage of ventilation pathways was seen in maximum patients followed by ossicular erosion. Most of them underwent insideout mastoidectomy with tympanoplasty. Majority had improvement following surgery in terms of hearing and ear discharge. **Conclusion:** The endoscopic ear surgery provides a useful means to study various anatomical factors associated with adhesive otitis media as well as opening up and maintaining middle ear ventilation pathways thus providing relief to symptoms like ear discharge and hearing loss. Proper selection of cases and counselling regarding prognosis of disease is important factor.

KEY WORDS: Adhesive otitis media, endoscopic tympanoplasty, transcanal endoscopic route, insideout mastoidectomy

INTRODUCTION

Adhesive otitis media (AOM) results from chronic middle ear infection or disturbances in ventilatory pathways of middle ear and mastoid. Once adhesion occurs, the area of adhesion spreads

to all areas of the middle ear bony wall and the ossicular chain, accompanied by progressive conductive hearing loss. Severe AOM is often accompanied with sensorineural hearing loss.^[1] As a result, patients often have mixed hearing loss. Usually, patients come late as they remain asymptomatic in the beginning due to lack of ear discharge or hearing loss. They may occasionally have ear ache. Pathological mechanism behind the disappearance of the middle ear mucosa and the resulting adhesions remains unclear. The rate of readhesion after surgery is also higher and is accompanied by poor hearing improvement.^[2] AOM in adult patients is generally more severe as compared to pediatric subjects and a pars tensa cholesteatoma is frequently observed.^[3] Usually, the retraction and adhesion of the tympanic membrane

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invade the sinus tympani, creating a “retraction pocket” within the sinus. The accumulated debris creates a cholesteatoma. The sinus tympani are a difficult region to observe by a microscope, as it is a blind region located behind the facial recess. Therefore, otoendoscopy is necessary to visualize all areas of the tympanic membrane in an AOM patient. Although the indications for endoscopic ear surgery in patients of AOM are same as that for other types of chronic otitis media, the hearing outcome after surgery for AOM is worse than that for other types of otitis media.^[4] In severe AOM, adhesions of the tympanic membrane and erosion of the ossicles are present, conductive hearing loss is frequently relatively mild because the retracted tympanic membrane is attached to the stapes, creating a Wullstein Type 3 reconstruction so decreased hearing may occur after surgery. CT alone is not sufficient to exclude cholesteatoma in these patients preoperatively, so there is a role of diffusion-weighted non-EPI imaging as it is more sensitive and detects cholesteatoma as small as 2 mm.^[5]

This is a prospective cross-sectional descriptive study where we discuss the clinical profile of 50 cases of AOM, intraoperative middle ear findings, and results of surgical treatment.

Aims and Objectives

The aims of the study were as follows:

1. To make clinical profile of patients of AOM.
2. To study the middle ear anatomical factors leading to AOM.
3. To observe the effects of surgery in these patients in terms of hearing benefit and ear discharge if any.

Inclusion Criteria

A total of 50 adult patients were selected from OPD. They were either suffering from ear discharge or hearing loss having Sade Type IV retraction in pars tensa and clinically labeled as chronic suppurative otitis media (CSOM) mucosal type of disease having features of AOM.

Exclusion Criteria

The following criteria were excluded from the study:

- CSOM with squamous type of pathology or any other complications.
- Patients belonging to pediatric age group.
- Patients with underlying comorbid conditions.
- Patients unfit for surgery or who refused to participate in the study.

This study was carried out in the ENT Department of Government Medical College, Haldwani and Government Doon Medical College over a period of 2 years from January 2018 to December 2019.

MATERIALS AND METHODS

All patients were subjected to complete clinical examination followed by hearing evaluation. Detailed examination of ear was done by otoendoscope in OPD and repeated on

operation table. Detailed hearing evaluation included pure tone audiometry, otoacoustic emission, or brain response evoked audiometry if required. Diagnostic nasal endoscopy, X-ray both mastoids – lateral and oblique view, and routine blood investigations were done in each case. Patients suffering from sinonasal disease were treated by medical management comprising oral antihistaminics, steroid nasal spray, and avoidance of allergen. The assessments of Eustachian tube (ET) function were done clinically by Valsalva or Toynbee test and documented by impedance audiometry. Most of the patients had moderate-to-severe conductive hearing loss while some had mixed variety of hearing loss. They were further evaluated with special tests. These patients were first counseled and if they agreed and gave consent for surgery then only were included in the study. All surgeries were done under general anesthesia by a single surgeon using transcanal endoscopic route. Intraoperative findings were recorded and the patient was followed up minimal for 6 months for resolution of symptoms or any fresh complaints and hearing status. Audiogram was repeated at 1 month.

Surgical Technique

Endoscope-assisted transcanal approaches were used. Detailed examination of ear drum was done preoperatively and findings noted. The atelectatic eardrum was carefully elevated off the



Figure 1: Type IV retraction in the left tympanic membrane

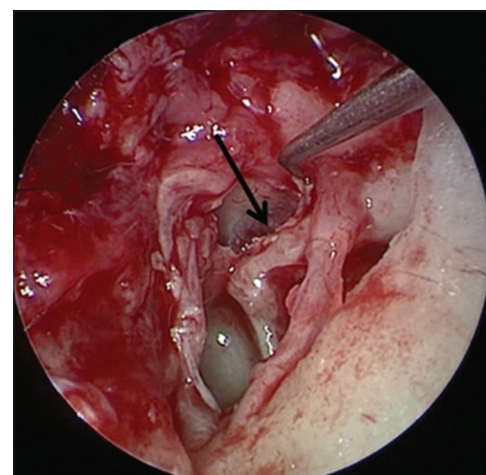


Figure 2: Isolated retraction pocket intraoperatively

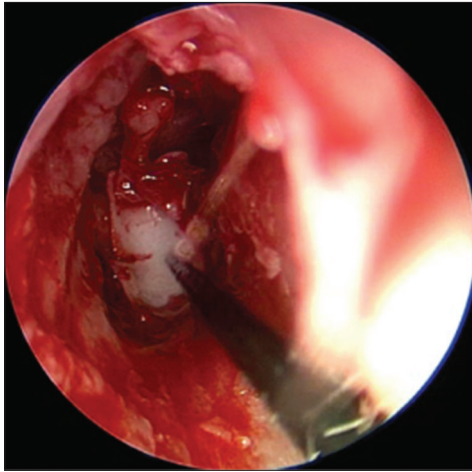


Figure 3: Tragal cartilage being used for reconstruction as well as reinforcement

promontory and middle ear structures as well as around ET opening areas in cases of sharp retraction pockets [Figures 1 and 2]. Redundant tympanic membrane was removed, and the ossicular chain was inspected. Detailed examination of anterior isthmus and posterior isthmus was done. If the ossicles were mobile, they were preserved provided, ventilatory pathways were made disease free followed by placement of graft. Examination of posterior and anterior epitympanum, sinus tympani, facial recess, etc., was done after minimal bone removal by carefully drilling the outer attic wall. Evaluation of epitympanic diaphragm was done using angled endoscope like 30° or 45°. In maximum patients, where diaphragm was complete opening, made to connect anterior epitympanic space with mesotympanum. Any granulation tissue, edematous mucosa, or any other tissue found during exploration of middle ear cavity were sent for histopathology. ET opening was visualized using 45° scope and patency was checked to exclude blockage which is very commonly seen in patients with allergic rhinosinusitis. The junction of cartilage and bony part was involved in most of the cases. In cases of ossicular discontinuity malleus and incus removed, epitympanum and other relevant areas explored and made disease free followed by reconstruction using tragal cartilage and temporalis fascia [Figure 3]. Attic was not repaired in any case as defect was small and most of the patients had sclerosed mastoid. Fascia graft was reinforced by tragal perichondrium in which ossicles were intact and type one tympanoplasty done. Most of the patients discharged either after 3 days or 7 days depending on the type of surgery. Routine medications were advised along with control of predisposing factors. Initial evaluation done after 1 week followed by fortnightly checkup. Any fresh complaints regarding ear discharge and hearing loss and associated symptom like fullness or ringing sensation were noted down and managed accordingly.

RESULTS

This study took over a period of 24 months. The detailed information regarding age, sex, clinical findings, pre-operative nature and severity of hearing loss, status of mastoid

pneumatization, types of surgery, intraoperative middle ear findings, ossicular pathology, type of reconstruction and post-operative hearing status, and improvement in symptoms were noted.

Most common symptom was discharge followed by hearing loss and ear ache. In most of the patients, discharge was not the profuse kind but even with medical management, the patients did not have significant discharge free period. This is seen in patients with AOM as most of the patients had obliteration of middle ear space as well as poor ET function. The retraction pockets in these ears also do allow accumulation of pus and debris. Proper application of ear drops either by wick method or putting Gelfoam and then applying drop or ointment helps. Five patients were suffering from rhinosinusitis who were given medical management after complete evaluation. It is utmost important for these patients to keep their nose and sinuses healthy as it would affect the results of ear surgery and patient may have recurrence of disease. In three patients, septal surgery was done before ear surgery as they had gross symptomatic DNS Table 1. Regarding vertigo and tinnitus, pre-operative counseling was done as well as medical management was started and continued even after surgery.

Maximum number of patients belonged to 18–30 years of age group followed by patients in 30–40 years of age Table 2. This also gives an indication that this disease usually starts in adulthood and then progresses to later decades of life. Control of underlying factors as well as results of surgery are better in younger age groups while in later decades of life, various systemic diseases also contribute to symptoms, especially the kind of hearing loss and associated tinnitus.

Type of Hearing Loss

Most of the patients had conductive hearing loss, that is, 45 (90%) while remaining 5 (10%) had mixed hearing loss.

Degree of Hearing Loss

As we can see in the pie chart below, majority (60%) of the subjects suffered from mild category of conductive hearing loss, whereas 30% had moderate type of hearing loss and 10% were suffering from mixed hearing loss. Since the hearing status changed in some patients after surgery, it was explained well in advance about nature of disease and possibility of changing the plan of study according to the intraoperative ear findings. Some patients did not agree and opted out of surgery so they were excluded from the study.

Pneumatization of mastoid air cells was seen in majority of patients (20) in which Type I tympanoplasty was done while in three patients there was diploic type of mastoid. In rest of the patients, mastoid was either hazy or sclerosed and very well correlated with intraoperative findings. Various kinds of findings were noted during surgery, which are shown in Table 3. About 60% of patients had unhealthy epitympanum out of which 40% had blockage of anterior and posterior isthmus, and in rest of cases, adhesions were formed between promontory

Table 1: Various symptoms of patients

Symptoms	Number of patients (%)
Ear discharge	35 (70)
Hearing loss	20 (40)
Ear ache	10 (20)
Vertigo	5 (10)
Tinnitus	3 (6)
Symptoms suggestive of rhinosinusitis	5 (10)
Miscellaneous	2 (4)

Table 2: Age-wise distribution of patients

Age group	Patients	Percentage
18–30 years	30	60
31–45 years	15	30
45–60 years	5	10

Table 3: Various intraoperative findings of patients

Intraoperative findings	Number of patients	Percentage
Intact ossicles	35	70
Erosion of ossicles	15	30
Blockage of anterior and posterior isthmus	20	40
Unhealthy epitympanum	30	60
Eustachian tube opening blockage	5	10
Involvement of mesotympanum and retrotympanum by disease	10	20
Tympanosclerosis	3	6
Dehiscence of fallopian canal	1	2
Complete tensor fold	50	100

Table 4: Post-operative status of patients

	Number of patients	Percentage
Improvement	42	84
No improvement	6	12
Became worse	2	4

Table 5: Types of middle ear surgeries done on patients

Types of surgeries	Number of patients	Percentage
Tympanoplasty alone	23	46
Mastoidectomy plus tympanoplasty (inside out)	25	50
Only inside-out mastoidectomy	2	4

or middle ear ossicles. ET opening was blocked in only 10% of cases while unhealthy epitympanum was seen in much more number of patients. This again shows the relevance of patent ventilatory pathways, that is, anterior and posterior isthmus in maintaining healthy status of epitympanum. Tensor fold or

epitympanic diaphragm was complete in all patients. Maximum patients required removal of tensor fold anteriorly connecting anterior epitympanic space with mesotympanum. This was done to prevent further formation of retraction pockets which is commonly seen in AOM. Very few patients had supratubal recess. Ossicular erosion was noted in 30% of subjects, the most common being I-S joint. In two patients, there was erosion of handle of malleus. In majority of patients, ossicles were intact while in others, ossicular reconstruction was done using tragal cartilage. Since these subjects tend to have recurrence, a single piece of tragal cartilage was used to perform Type III tympanoplasty as well as reinforcing the fascia graft. This arrangement worked well except in few cases where step deformity between graft and cartilage occurred in follow-up period. These patients were carefully followed up regularly so that early retraction pockets could be visualized and managed accordingly. In one patient, horizontal part of fallopian canal was dehiscence although there was no cholesteatoma. The patient had mild facial weakness in post-operative period which recovered spontaneously with vitamin supplements.

Follow-up of patients showed that out of 50 patients, 42 had improvement in symptoms especially in terms of hearing while it became worse in 2 patients Table 4. These two also developed tinnitus postoperatively although there was no documented sensorineural hearing loss. This may be related to unresolved disturbed middle ear physiology which was not corrected by medicines nor by surgery. Six (12%) patients had no improvement in symptoms although there was no discharge and graft uptake was there in post-operative period.

Follow-up of Patients

Different types of surgical procedures were done according to intraoperative findings like Type I tympanoplasty which was done in 46% of cases after ensuring that ventilation pathways were functioning properly. About 50% of cases required one or the other procedure like transcanal endoscopic inside-out mastoidectomy along with tympanoplasty while in some only mastoidectomy was done Table 5. All these patients had less morbidity as well as rare post-operative complications as endoscopic transcanal procedure produces minimal or no damage to soft tissues in post-aural area. If the patient takes proper care to avoid water entry in ear and any other predisposing factor such as sniffing, recurrent URTI, or food allergy are controlled, the results of surgery are encouraging.

DISCUSSION

The management of AOM continues to be one of the most controversial issues for the otolaryngologist. It is itself difficult process to counsel patient about the course and prognosis of disease. The patients initially remain asymptomatic with minimal hearing loss although there may be ossicular erosion in the middle ear. It is a known fact that the ventilation of the middle ear is controlled by (a) ET function, (b) the pressure buffer mechanism produced by the middle ear and mastoid bone, and (c) transmucosal gas exchange in the tympanic

cavity.^[6] It is not uncommon to find an isolated retraction pocket of the pars flaccida and/or a cholesteatoma limited to the posterior epitympanum, with an otherwise normal pars tensa and mesotympanum. In these cases, it is difficult to explain how dysfunction of ET results in involvement of a selective part of tympanic membrane. If these isolated pockets are unattended for a longer period of time, they may be common sites for collection of squamous debris resulting in cholesteatoma. Visualization of ventilation pathways such as anterior and posterior isthmus during endoscopic middle ear surgery helps us better to find the cause, in spite of good Eustachian function leading to the theory of selective dysventilation. When retracted tympanic membrane reaches promontory and remains there for a long period of time, the mucosa between the retracted membrane and promontory disappears leading to the formation of adhesions which then involves whole of middle ear. Sometimes, structure like sinus tympani is also involved leading to a retraction pocket inside it which in due course of time collects squamous debris, leading to the formation of cholesteatoma. Even after surgery, there can be recurrence of adhesions in middle ear, if proper steps are not undertaken to maintain middle ear space.^[7] It is not rare to see the failure of surgical procedure in spite of best efforts and technique so it is important to evaluate these patients extensively and explain the prognosis in advance.

Some patients have strong sniffing habit to relieve the ear fullness which causes a continual retraction of the tympanic membrane. This retraction then progresses to AOM with attachment between the tympanic membrane and the middle ear structures. This is often seen in patients suffering from patulous ETs. The characteristic finding of these patients on CT is a good pneumatized mastoid.^[8] If the sniffing habit is not corrected, it will again retract the tympanic membrane after surgery.^[9,10] Therefore, this sniffing habit must be confirmed and corrected before surgery.

CONCLUSION

Adhesive otitis media is a multifactorial disease which may start in any age group and may progress to severe form of illness presenting with hearing loss which may be mild-to-moderate initially but may progress to severe sensorineural hearing loss. Medical management may play a role to some extent but timely surgical management can also be beneficial provided,

the patient is well explained about the prognosis and course of disease. Endoscopic ear surgery is the treatment of choice as it is minimally invasive and is useful to understand the ventilation defects in these patients and accordingly correct them. In our study, we also concluded that ventilation in middle ear does not mean just patent ET. The isthmus blockage, complete or incomplete tensor fold, and mastoid pneumatization also play an important part. Flexible otoendoscopes may be utilized in these patients to know the depth of retraction pockets in pre- and intraoperative period. In spite of all advancement, management of AOM is still challenging for an otorhinolaryngologist.

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