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A Study On Endo-Microscopic Surgical Approach To Cholesteatoma

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ABSTRACT

Introduction The surgical intervention of cholesteatoma is to eradicate the disease and to prevent the recurrence. Microscope has limited view of hidden areas of middle ear like anterior epitympanic recess and sinus tympani. Endoscope has benefits of better visualization and wide -field view of middle ear. Through microscopic approach disease in the mastoid is cleared and with the endoscope hidden areas are examined and disease is cleared without removing the posterior meatal wall. so, this combined Endoscopic and microscopic approach helps in reducing the post operative cavity complications like cavity infection, prolonged ear discharge, excessive granulations and vertigo.

Objective: The objectives are to describe the steps of combined microscopic and endoscopic approach to cholesteatoma surgery, to assess the graft uptake and the hearing after surgery and to describe the reduction of post operative cavity complications with the combined approach.

Results: In our study out of 30 patients 16 patients are males (53.3%) and 14 patients are females (46.6%) who underwent mastoidectomy and reconstruction with graft. Out of 30 patients, 28 patients (93.33%) graft uptake is good and in 2 patients (6.66%) graft uptake is failed and in 27 patients (90%) hearing improvement is observed and in 3 patients (10%) no hearing improvement is seen.

Conclusion: Endo - microscopic approach for cholesteatoma is effective procedure in clearing the disease with reduce recurrence rate and residual disease along with no post operative cavity complications.

KEYWORDS: *Endoscopic , Microscopic, Chlolesteatoma, Hearing, Graft*

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1. INTRODUCTION

Cholesteatoma is a collection of keratinizing squamous epithelium [1]. Expansion of a cholesteatoma can erode surrounding bony structures, causing complications such as otorrhea, hearing loss, dizziness, as well as facial paralysis and intracranial complications [2]. The surgical intervention for cholesteatoma aims to eradicate the lesion with the best procedures to prevent recurrence. Traditionally, the microscopic approach has been used to treat this disease. Microscopic ear surgery (MES) provides surgeons with binocular vision and the ability to perform two-handed surgery, which could be beneficial for surgical management. However, the microscope provides a limited view of hidden areas, such as the anterior epitympanic recess or the tympanic sinus. The endoscope provides a wider and clearer view with optimal magnification, which could reduce the residual lesions. Moreover, the endoscopic trans-canal approach follows the rational route of cholesteatoma growth, increasing the possibility of completely removing cholesteatoma. Through microscopic approach disease in the mastoid is cleared and with the endoscope hidden areas are examined and disease is cleared without removing the posterior meatal wall. so, this combined Endoscopic and microscopic approach helps in reducing the post operative cavity complications like cavity infection, prolonged ear discharge, excessive granulations and vertigo.
Not many studies are available in view of combined Endoscopic and microscopic approach which needs further investigation.

2. MATERIALS AND METHODS:

This is a prospective study conducted in 30 patients diagnosed with cholesteatoma who underwent mastoidectomy , for a period of 2years (2022 -2024) in the department of otorhinolaryngology and head and neck surgery at teaching headquarters' hospital. Our study includes both adult and paediatric population.

For this combined approach along with the Micro ear instruments, microscope, Micromotor drill, Endoscopy set which include camera, light source, monitor and 0^0 & 45^0 4mm telescopes are required which are arranged conveniently. In our institute we have used Leica 4k microscope with monitor, Marathon micromotor, Stortz HD endoscopy set and telescopes and Kalelkar Cartilage slicer.

SURGICAL TECHNIQUE:

Endo-Microscopic Combined Approach

The procedure is carried out under general or local anaesthesia. After local infiltration of post auricular region and External auditory canal with 1 in 1,00,000 Xylocaine with adrenaline the combined approach begins with the Microscopic approach which includes graft harvesting (Tragal cartilage), elevation of Korner's flap, followed by postauricular approach with freshening of margins, TM Flap elevation and cortical mastoidectomy and disease clearance from mastoid upto the auditus. With the help of the 0^0 and 45^0 telescope disease from the auditus and the middle ear are cleared with an en bloc resection of cholesteatoma is performed with systematic control of the cavity (by checking the retrotympanum, protympanum, and epitympanum using 0° and 45° optics). Finally Ossicular reconstruction and graft placement are done with the help of Endoscope or Microscopic approach.

Microscopic surgical steps

Under microscopic vision tragal cartilage of adequate size with perichondrium on both the sides is harvested. After proper irrigation of external auditory canal an horizontal incision and two radial incisions are given to elevate the Korner's flap. William Wilde's incision given in the post auricular region. A T-shaped incision is made through the periosteum with the top of T at the linear temporalis and periosteum is elevated to expose the spine of henle and the ear canal.

Incisions are made in the external auditory canal from the 3 o'clock to the 9 o'clock positions up to about 2.5 cm lateral to the anulus. The tympanomeatal flap is lifted gently with the help of epinephrine-soaked cottonoids. The flap is pulled from lateral to medial and the annulus is identified and the dissection of the tympanomeatal flap is performed underlay by lifting the anulus. The dissection continues with the dissection superiorly of the pars flaccida, which is carefully detached from the short process of the malleus and pulled inferiorly. The tympanomeatal flap adherent to the umbus is pulled inferiorly to obtain a good exposure of the protympanum

The boundaries of the MacEwen'S triangle are identified and marked with the drill and cutting burr and drilling is carried out from superficial to deep until antrum is identified and opened. All the cells of the mastoid are opened without any bony

overhangs leaving behind the posterior canal wall intact. Cholesteatoma sac from the mastoid and other air is dissected and cleared upto the auditus

Endoscopic Surgical Steps
The surgeon holds the endoscope with the left hand and the surgical instrument with the right hand; keep the endoscope stable during the operation.

With the help of 0^0 or 45^0 telescope identify the morphology of the tensor fold and tympanic isthmus. It is also possible to obtain a real-time assessment of the extent of the disease, evaluating the Auditus, retrotympanic, protympanic, epitympanic, and hypotympanic regions. A further evaluation is made regarding the status of ossicular chain (for example, distinguishing the presence of an interruption or disjuncture of the chain) and of the anatomical relationships between the chain and the cholesteatoma. It will be possible to preserve a normally articulated chain if the cholesteatoma extends to the anterior epitympanum and lateral attic without affecting the medial attic and the medial aspect of the incudo-malleolar joint otherwise it will be necessary to sacrifice the Incus before the dissection of the cholesteatoma if the disease is extending beyond the auditus. Drilling of the scutum is carried out to regularize the area usually eroded by the disease and the posterior malleolar ligament is detached these steps allow further exploration of the chain and medial attic with 45° optics.

Now the cholesteatoma dissected upto auditus with the help of microscope and the part of cholesteatoma dissected from the all the areas of middle ear cavity with the help of endoscope are resected en bloc with the help of cottonoid pushing the cholesteatoma sac to one side into the middle ear sacrificing the incus if present.

Finally all the areas (Mastoid, Auditus, Middle ear cavity and the hidden areas like attic, facial recess, sinus tympani, Foot plate) occupied by cholesteatoma are clearly examined for any reminants with help of endoscope.

Finally Ossicular reconstruction (TORP or cartilage) and graft (sliced tragal cartilage) placement are done with the help of Endoscopic or Microscopic approach.

3. RESULTS:

TABLE:1 Sex detrmination

MALES	16	53.3%
FEMALES	14	46.6%
TOTAL	30	

In our study out of 30 patients 16 patients are males (53.3%) and 14 patients are females (46.6%) who underwent cortical mastoidectomy with reconstruction with cartilage graft for cholesteatoma.

TABLE 2 : Post Operative results of graft uptake

GRAFT UPTAKE	NO. OF PATIENTS	PERCENTAGE
GOOD	28	94%
FAILURE	2	6%

Out of 30 patients with cholesteatoma who underwent surgery, graft uptake is good in 28 patients (93.33%) out of 30 and graft uptake is failed in 2 patients (6.66%) out of 30.

TABLE-3: Post Operative results based on hearing improvement

HEARING IMPROVEMENT	NO. OF PATIENTS	PERCENTAGE
PRESENT	27	90%
ABSENT	3	10%

Out of 30 patients with cholesteatoma who underwent surgery, hearing improvement is seen in 27 (90%) patients out of 30 and no improvement in hearing is seen in 3 patients (10%) out of 30.

4. DISCUSSION:

The principle of cholesteatoma treatment is extensive disease removal with reconstruction of hearing, Preservation of normal mucociliary function, clearance of ventilation pathway of middle ear and mastoid and improved hearing outcome

are the essential factors that aid in improved surgical as well as patient related outcomes.

The main drawback with only microscopic approach is unable to visualize the hidden areas such as epitympanic recess, retro and hypotympanum.so, with the endoscope we can visualize these hidden areas and can clear the disease in these hidden areas. Residual disease is equal to disease left due to poor visualisation and poor access to the hidden areas. The use of endoscope as adjunct to microscope has reduced the chance of residual disease and recurrence.

The most common area of residual disease is tympanic cavity and not the mastoid . So the visualization and removal of disease from the tympanic cavity is more important than excessive removal of mastoid cells.

Extensive and aggressive mastoid dissection results in large mastoid cavity and cavity related complications like discharging cavity, cavity infections due to loss of mucociliary clearance mechanism due to cavity mucosal removal and giddiness. To prevent this complications mastoid cavity reconstruction and cavity obliteration techniques to be done. To reduce these complication mastoid disease is cleared with microscope and middle ear cavity disease is cleared with endoscopic approach.

Many studies and some reviews have reported the effectiveness of EES for the treatment of cholesteatoma [3,4]. They demonstrated that EES could reduce the recurrence rate and shorten the operation time, with no significant difference in postoperative hearing outcomes compared with MES [5–8]. Although EES has limitations in mastoid dissection compared to MES [9,10], recent advancements in instruments and techniques have improved access within mastoid cells [11].

In the study by Hunter et al. [12], patients who underwent endoscopic and microscopic examinations experienced residual illness at rates of 20% and 40%, respectively. Another study found that the rate of residual cholesteatoma at second sight was 24% in patients in whom the endoscope was used only for inspection or not at all during initial resection, compared to 23% in patients in whom the endoscopic dissection was carried out [13].

Te study by Ohki et al. [14], who used endoscopic inspection of common areas of cholesteatoma recurrence after microscopic ear surgery, demonstrated the benefits of the endoscopic over microscopic technique.

5. CONCLUSION:

Using both endoscopic and microscopic surgical approach for removal of cholesteatoma shows better disease clearance, good graft uptake and improvement of hearing is seen without any post operative cavity complications irrespective of age, gender, or the duration of disease.

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