Role of antrotomy in tympanoplasty

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Abstract
The role of antrotomy in cases of tympanoplasty has always been controversial since the beginning. Our present study was undertaken to ascertain the role of antrotomy in patients undergoing tympanoplasty. In this present study 100 patients were reviewed out of which in 50 cases tympanoplasty with antrotomy was done and in 50 cases only tympanoplasty was done. All cases were of CSOM with tubotympamic disease, irrespective of hearing loss, site and size of perforation with intact ossicular assembly. Results were concluded on the bases of hearing improvement and graft uptake. Pure tone audiometry was done before and three months after the surgery.

At the end of study the success rate of graft uptake was 90% in patient with antrotomy and 88% in patient without antrotomy. Hearing improvement was also nearly equal in both groups. But the additional benefit of opening antrum was that in 2% of cases, cholesteatoma sac was found accidently in the attic region which would have been missed if antrotomy was not performed.

So it was concluded that though antrotomy plays no significant role in success of graft uptake and hearing improvement, but still it should be done in all the cases of discharging mucosal type CSOM not responding to medical treatment so that any hidden cholesteatoma sac in attic region is not missed.

Keywords: Cholesteatoma, Tubotympanic disease, Antrum, Perforation, Tympanic memberane.

Objective
The role of antrotomy in tympanoplasty still remains a topic of controversy. We intend to assess the role of antrotomy on the outcomes of tympanoplasty performed in patients with persistent or intermitted discharging chronic suppurative otitis media without cholesteatoma.

Material and Methods
Inclusion criteria: Patients attending OPD of Department of ENT with permanent tympanic membrane perforation and continuous or intermittent non foul smelling, non purulent discharge and not responding to culture specific antibiotic given over a period of 3 month and had conductive type hearing loss were selected randomly.

Exclusion criteria:
Pediatric patient
Dry ear
Cholesteatoma sac visible on oto-microscopy
Prior-mastoidectomy
Any patient with sensorineural component

Study design: Prospective, randomized, Single-blinded study.

Setting: Teritary referral center (Government Medical College, Haldawani)

This study was conducted in Department of ENT, Government medical college Haldwani. Patients attending OPD of Department of ENT with permanent tympanic membrane perforation and continuous or intermittent non foul smelling, non purulent discharge and not responding to culture specific antibiotic given over a period of 3 month and had conductive type hearing loss were included in the study. Time duration of study was one year extending from June 2011 to June 2012.

A through history was taken followed by oto-microscopic examination, audiogram and X-ray lateral oblique view skull was performed in all patients. Proper written consent was taken for both the procedures.

Tympanoplasty was performed under general anesthesia using post aural approach by the same surgeon only. Tympanoplasty done was of underlay type and the graft was harvested from temporalis fascia. The selected patients were randomly divided in to two groups. Both surgical procedures were thoroughly explained to all the patients.

A total number of 100 patients were selected and were randomly divided into two groups. Examination of middle ear was done after raising tympanomeatal flap and if any cholesteatoma sac was seen in middle ear, the patient was removed from the study.

In Group A patient tympanoplasty with antrotomy was done along with examination of aditus and attic and free flow of saline through aditus was ensured to confirm the patency of aditus. Patient with water test negative were examined to know the cause of obstruction and aditus was widened and the patency was restored.

Patient with cholesteatoma sac in mastoid antrum or blocking aditus were included in study but surgery was converted to modified radical mastoidectomy.

Group B patient only tympanoplasty was done and if any cholesteatoma sac was seen in middle ear, the patient was removed from the study. Both group of

patient were subjected to same post operative management and were actively followed in OPD at 3, 6 and 12 month post operative duration.

The results were measured in term of graft uptake rate, hearing improvement and accidental finding of cholesteatoma sac in mastoid antrum or aditus.

Success was defined by absence of the following: persistent perforation of Tympanic Membrane, atrophy or atelecteses or otorrohea of any kind.

Postoperative audiogram was done after 3 month of surgery.

Audiometric data was compiled according to the standard of American academy of otolaryngology head and neck surgery (1) for reporting air conduction(AC) and bone conduction(BC) threshold at .5,1,2,4 khz.

Preoperative and postoperative air bone gap was calculated by subtracting Bone Conduction PTA from Air Conduction PTA. Air Bone Gap closer was calculated as preoperative Air Bone Gap minus postoperative Air Bone Gap.

Univarate statistical analysis was performed with the x^2 test for the categorical variables. Student t-test was used to detect audiometric differences between groups. Data was expressed as mean ± standard deviation(SD). P value less than 0.05 was considered significant.

Results

The patients were enlisted in department of ENT Govt. Medical College, Haldwani, Uttrakhand between June 2011 to June 2012. 100 patients who fulfilled the criteria were enlisted. In group A 2% patient had accidental finding of cholesteatoma sac blocking the aditus and 10% had granulation tissue blocking the aditus. In those 2% cases modified radical mastoidectomy with tympanoplasty was done. In 10% cases with granulation tissue aditus was cleared and water test made positive. At the end of 6 month follow 40 patient in group A and 35 in group B were available. Preoperative audiometric parameters are listed in table 1.

Table 1: Preoperative hearing status

	Group-A mean ±sd	Group-B mean(±sd)	P value student t test
PTA air(db)(mean)	39.40(±13.3)	38.24(±12.4)	0.46
PTA bone(db)(mean)	13.65(±6.4)	14.87(±7.5)	0.10
ABG(db)	25.75(±12.6)	23.37(±10.5)	0.08

At the end of the study there were 3 failures in group A and 5 failures in group B, a difference that was statistically not significant. Auditory outcome of both group are listed in table-2.

Table 2: Postoperative hearing result after 6 month

Parameters	Group-A mean(±sd)	Group-B mean(±sd)	P value
Preoperative ABG	25.75(±12.6)	23.37(±10.5)	0.08
Postoperative ABG	13.5(±6.2)	12.4(±6.4)	0.11
P value within group	<0.00001	<0.00001	

There is no significant post operative Air Bone GAP difference between the two groups. The reduction of Air Bone GAP in each group was significant (P<0.00001). No complication related to surgery were noted in both group of patient.

Although there was no significant statistical difference in audiometric finding of pre and post operatively but the benefit of opening antrum was seen in those 2% with accidental finding of cholestetoma sac and in 10% cases with blocked aditus due to granulation tissue.

Discussion

The aim of surgery is to eradicate the existing pathology, to create a sound conductive mechanism with a well aerated mucosa lined middle[3] suggested that mastoidectomy is helpful for both dry and discharging ears. Hence ae recommended performing simple cortical mastoidectomy routinely for all tympanoplasty because it's better to be safe than sorry[3]. Those who advocate mastoidectomy consider this procedure as the most effective means of repneumatizing mastoid and eradicating the mastoid source of infection.[4,5]

The primary argument in favor of opening antrum was that, an improvement in middle ear and mastoid ventilation and drainage through clearance of diseased mucosa and ventilator mechanisms of an open mastoid system.[6] The mastoid air cell system is thought to function, at least in part as a buffer to changes in pressure within the middle ear.[6,7]

According to Boyles law an increase in the volume available to the middle ear space through a surgically opened mastoid would be protective for the TM in response to middle ear pressure changes.[7]

Balyan et al.[8] have reported equivalent results of graft uptake and hearing results with or without opening mastoid in their series of 323 tympanoplasties. No statistical significant difference was found for graft

success and Air Bone GAP difference. Author offers no use of opening mastoid.

Mishiro et al.[9] attempted to detect whether opening mastoid with tympanoplasty is helpful in increasing success rates in CSOM cases. No statistical significant difference was found for graft success and Air Bone GAP difference. Author concluded that opening mastoid was not helpful even in cases of discharging ear.

Different studies have done to identify factors significant for the success of tympanoplasty.[1,10,11] The location and size of Tympanic Membrane perforation have been commonly studied.[1,11] Technically anterior perforation is more difficult to access and place graft.[11,12]

Previous studies reported that the location of perforation had no effect on the surgical and hearing results.[11,13] Conversely Pinar et al.[14] stated that success rate for central perforations were higher compared with posterior and anterior perforation often due to inadequate exposure.

Most of the studies are based on tympanoplasty with mastoidectomy but in our study we decided to open antrum instead of going for mastoidectomy. The purpose of both is to make the mastoid re-pneumatize and to check for incidental cholesteatoma sac hidden in.

Conclusion

In our study it was observed that antrotomy offers no additional benefit in tympanoplasty in reference to graft acceptance and hearing improvement but it does help in 1-2% cases were cholesteatoma sac was accidently discovered during antrotomy. So with this study we conclude that antrotomy should be routinely done in all cases of persistent ear discharge.

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