Comparison of Surgical Outcomes in Chronic Otitis Media (Mucosal) following Type 1 Tympanoplasty with and without Cortical Mastoidectomy

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ABSTRACT

Introduction: Chronic suppurative otitis media is one of the most common cause of reversible conductive hearing loss in the world especially in developing countries because of poor socio-economic status, poor nutrition, poor hygiene and lack of health education. It affects both sexes and all age groups. Successful outcome of tympanoplasty depends on various factors. This study was conducted to compare surgical outcome in tubotympanic disease following Type 1 tympanoplasty with and without cortical mastoidectomy.

Material and methods: A prospective comparative study, comprising of 50 patients with chronic otitis media mucosal type who were randomly divided into two equal groups with 25 patients undergoing type 1 tympanoplasty and 25 patients undergoing type 1 tympanoplasty with cortical mastoidectomy

Results: In our study, there was no significant difference in the graft uptake rate or the hearing improvement in both these groups.

Conclusion: Cortical Mastoidectomy is recommended in patients of Chronic Otitis media (Mucosal) with subtotal perforations. The graft uptake rate is similar in both the groups of patients with central perforation (involving one or two quadrants). In successful graft take up, results of hearing improvement and graft mobility are similar with or without mastoidectomy. Possibility of finding mastoid antral pathology is more in patients having Chronic otitis media (mucosal) with sub total perforation as observed in this study

Keywords: Cortical mastoidectomy, Tympanoplasty with mastoidectomy, Tympanoplasty

INTRODUCTION

The term Tympanoplasty was first used in 1953 by Wullstein[1] to describe surgical techniques for reconstruction of middle ear hearing mechanisms that had been destroyed by chronic ear disease.[2]

A number of histopathological changes can develop in the middle ear and mastoid in chronic suppurative otitis media determining the success or failure of tympanomastoid surgery. Studies have shown that obstructed aditus and antrum can potentially lead to the development of the pathological tissue in the middle ear cavity, the prevalence of which was found to be as high as 97% in 144 temporal bones studied.[2] Tympanoplasty is defined as an procedure to eradicate the disease in the middle ear and to reconstruct the hearing mechanism with or without tympanic membrane grafting.[3]

In tubotympanic cases, tympanoplasty can be combined with a simple mastoidectomy or performed alone.

Aim of the study was to analyze and compare the surgical outcome of tympanoplasty with or without cortical mastoidectomy in central perforation (Chronic otitis media – Mucosal type) and to assess the role of cortical mastoidectomy in the management of Chronic otitis media – Mucosal type

MATERIAL AND METHODS

For this study 50 patients having Chronic otitis media with central perforation were selected, based on the following inclusion and exclusion criteria. Ethical clearance was obtained from the institutional ethical board and informed consent was obtained from the patients before the start of the study.

All patients with dry and quiescent ears were included in the study. Chronic otitis media squamous type, traumatic perforations, previous ear surgeries and patients having sensorineural hearing loss were all excluded.

The 50 patients were randomly divided into two equal groups with 25 patients under going type 1 tympanoplasty and 25 patients undergoing type 1 tympanoplasty with cortical mastoidectomy

After a proper selection and evaluation, the patients underwent the standardized procedure of type 1 tympanoplasty with or without cortical mastoidectomy

Per operatively the middle ear and mastoid cavity were inspected for the disease process such as; polypoidal mucosa, granulation tissue, fibrous tissue, glue and the peroperative findings were recorded. The disease was cleared from the middle ear and the mastoid antrum and a type 1 Tympanoplasty with or without cortical mastoidectomy was done for the subjects according to their group.

All the cases were taken up under general anesthesia and the post aural approach was used. Temporalis fascia graft placed by underlay technique for the repair of the tympanic membrane in all the patients.

Post operatively all the patients were discharged on the 2nd post-operative day. Patients were started on systemic antibiotics, analgesics and antihistamines for duration of one week. Post operatively all the patients were followed up for a total of 6 months with regular intervals at 1st, 3rd and 6th month.

Post operatively all the study patients were assessed for the status of the graft, mobility of the graft and the hearing improvement. Pure tone audiogram was done for all the patients at the end of 6 months to assess the level of hearing improvement.

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STATISTICAL ANALYSIS

SPSS version 21 was used for the statistical analysis. Student t test test and Pearson's chi-squared test were applied to compare the symptoms in both the groups. Categorical variables were analyzed using descriptive statistics.

RESULTS

The type of perforation was classified as central and sub total perforation. In the tympanoplasty group 17 out of the 25 had central perforation and 8 out of 25 had sub total perforation (figure-1). In the cortical mastoidectomy group, 15 out of the 25 patients had central perforation and 10 out of 25 patients had sub total perforation. The P value calculated was 0.77 which was statistically insignificant.

P Value for the graft uptake was calculated in each group, using the Pearson's chi-squared test with yate's continuity correction, was found to be 0.74 which was not significant as showen in table-1. The percentage of mobility of the graft (post-operatively) in Group A was 48% and in Group B was 28%

Students independent 't' test was used to calculate significance of mean values of the pure tone hearing levels between the 2 groups as shown in table-2.

The pre op mean and standard deviation of pure tone average in tympanoplasty group was higher than the mean pre op value in the cortical mastoidectomy group. However there was no significant difference in mean P value, which was 0.60 and was insignificant. The mean post op pure tone average value and standard deviation in the 2 groups were 30.4 +/- 5.8 and 29.6 +/- 8.7. The p value calculated was 0.60 and 0.71 pre and post operatively and was statistically insignificant.

Table-3 shows the comparison of the pre operative mean and the standard deviation of pure tone average values within each group

Student paired T Test was used to calculate the P value and was found to be < 0.001 which was statistically found to be significant which meant there was significant improvement in the post operative hearing levels in the 2 groups

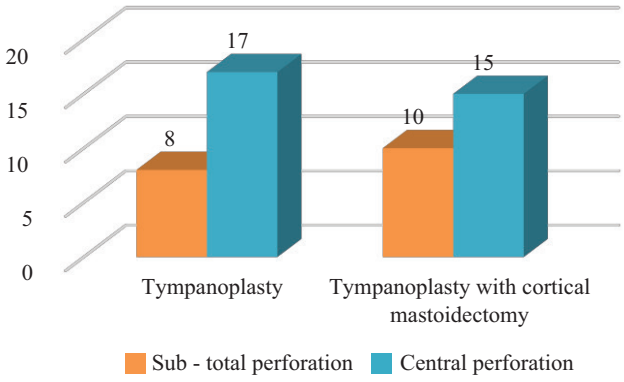

Figure-1: Type of perforation

DISCUSSION

Chronic suppurative otitis media owing to poor socio economic status and poor environmental conditions account for morbidity in about 5 % of the total population. ENT surgeons by performing a corrective surgery for chronic otitis media can change the lifestyles of the patient profoundly. The medical line of management only can lessen the severity of the symptoms.

The age and sex of the patients in both the groups were comparable and bore no statistical significance. Pearson's chi-squared test was applied to compare the symptoms in both the groups and were found to be comparable i.e. were statistically insignificant.

The type of perforation was classified into central and subtotal. 8 (32%) of the patients in the tympanoplasty group and 10 (40%) in the cortical mastoidectomy group had subtotal perforation. The presence of polypoidal tissue in the middle ear was compared between both the groups and the P value calculated was 0.05 and was found to be statistically significant. Presence of myringosclerosis was statistically insignificant when compared between both the groups.

The pre operative hearing levels were divided into 20-30db and 30-45 db hearing loss categories on the basis of pre operative pure tone audiogram. In tympanoplasty group 6 patients had pure tone average within the 20-30 db and 19 patients in 30-45 db level. In the mastoidectomy group there were16 patients with pure tone average between 20-30 db and 9 patients within 30-45 db.

In tympanoplasty group 10 patients per operatively had polypoidal mucosa in the middle ear, 7 had adhesion in the

Group	Graft taken up	Graft rejected	Mobility
Tympanoplasty	20 (80%)	5 (20%)	12 (48%)
Tympanoplasty with cortical mastoidectomy	18 (72%)	7 (28%)	7 (28%)

Table-1: Graft rejection rate

Group	Tympanoplasty	Tympanoplasty with cortical mastoidectomy	P – Value
	Mean +/- standard deviation	Mean +/- standard deviation	
Pre op	34.3 +/- 5.8	33.3 +/- 7.0	0.60
Post op	30.4 +/- 5.8	29.6 +/- 8.7	0.71
Change	3.9 +/- 3.4	3.8 +/- 4.7	0.88

Table-2: Pure tone average of both groups

Group	Pre op Mean +/- std	Post op Mean +/- std	Change Mean +/- std	P Value
Tympanoplasty	34.3 +/- 5.8	30.4 +/- 5.8	3.9 +/- 3.4	<0.001
Tympanoplasty with cortical mastoidectomy	33.3 +/- 7.0	29.6 +/- 8.7	3.8 +/- 4.7	<0.001

Table-3: Pure tone average of both groups

region of the oval window, round window and in the ossicular chain thus reducing the overall mobility of the chain (figure-2). In the cortical mastoidectomy group 16 patients had polypoidal tissue per operatively in the middle ear, 12 patients had antral disease blocking the patency of the aditus ad antrum, 5 patients had adhesions and 3 patients had glue in the antrum.

The percentage of graft uptake in tympanoplasty group at first follow up was 68 % and in the mastoidectomy group was 72 %. Of the 5 patients who had graft failure in the tympanoplasty group, 4 of them had polypoidal tissue in the middle ear with subtotal perforations and one patient had central perforation with normal middle ear mucosa. Of the 7 patients who had graft failure in the mastoidectomy group, 4 of the patients had subtotal perforation and 3 of them had central peroration. Out of them, 6 of these patients had antral disease and polypoidal tissue in the middle ear (figure-3).

Pearson's chi-squared with Yate's continuity correction was used to calculate the p value, which was 0.74 and statistically significant. The graft failure in the tympanoplasty group can be attributed to the presence of the polypoidal tissue and the subtotal perforation in which the presence of the antral disease was more likely.

A post-operative hearing improvement of 10 db after 6 months was considered to be a significant improvement in hearing levels. In our study 6 patients from the tympanoplasty group and 8 patients from the mastoidectomy group showed more than 10 db improvement.

The mean post op pure tone average value and standard deviation in the 2 groups was 30.4 +/- 5.8 and 29.6+/-8.7. The P value calculated was 0.60 and 0.71, pre and post operatively and were statistically insignificant. Hence the hearing improvement in both the groups post operatively is similar irrespective of the procedure done.

In a study conducted by Mutoh t et al comparing the results efficacy of mastoidectomy in methicillin resistant staph aureus and methicillin susceptible staph aureus infected otitis media, mastoidectomy had significantly better results concerning post operative complications in discharging ears with MRSA infected chronic otitis media.[4]

In a separate study by Rickers J, Petersen CG comparing the long term follow up evaluation of mastoidectomy in children with non cholesteatoma chronic otitis media they concluded that mastoidectomy in these patients should be kept as a last resort when intensive conservative treatment and myringoplasty.[5]

In another similar study Balyan FR et al compared the graft success rate and the final functional hearing outcome and found tympanoplasty without mastoidectomy as preferable treatment modality in non cholesteatoma ears ($p > 0.05$).[6] Vijayendra et al advocated the opening of the antrum to prevent the graft failure in 2-3 % of patients.[7]

In their retrospective analysis of 251 cases of non cholesteatoma cases of chronic otitis media by Y. Mishiro et al who underwent tympanoplasty with and without mastoidectomy, graft success rates were 90.5 % in group A and 93.3% in group B. The rates of the post-operative air bone gap within 20db were 81.6% in Group A and 90.4% in Group B, without a statistically significant difference.[8]

Glasscock had reported a 96% success rate with underlay technique. 86% graft uptake by underlay technique was found

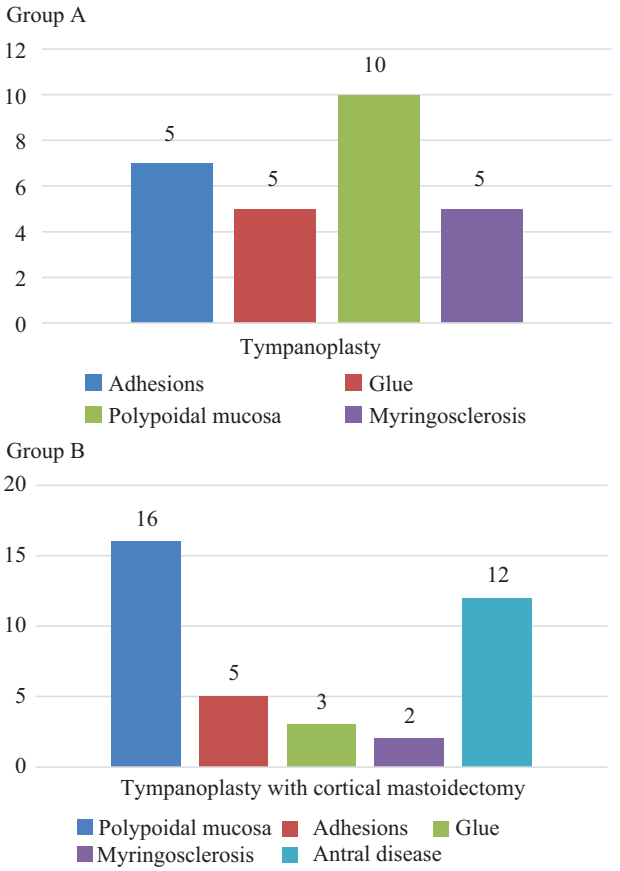

Figure-2: Per operative findings

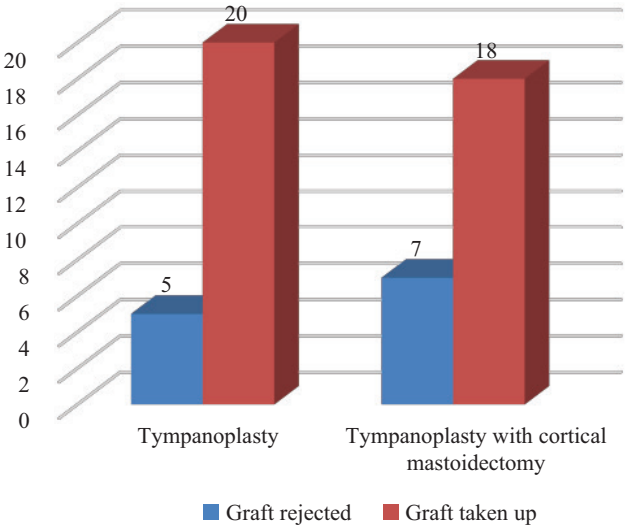

Figure-3: Graft take up

by Rizer.[10] Smyth and Patterson in their report of 153 patients showed it to be 78 % with a longer follow up.[11] In our study graft take up rate in patients who underwent only tympanoplasty was 80% and those with tympanomastoidectomy was 72%.

CONCLUSION

Cortical Mastoidectomy is recommended in patients of Chronic Otitis media (Mucosal) with subtotal perforations. The graft uptake rate is similar in both the groups in patients with central perforation involving one or two quadrants.

In successful graft take up, results of hearing improvement and graft mobility are similar with or without mastoidectomy.

Possibility of finding mastoid antral pathology is more in patients having Chronic otitis media (mucosal) with sub total perforation as observed in this study.

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