

Original Research Article

Clinical study on type 1 tympanoplasty: anatomical and functional outcomes

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ABSTRACT

Background: Tympanoplasty is operation to eradicate disease in middle ear and to reconstruct the hearing mechanism. Present study aims at assessment of success rate and hearing improvement following type I tympanoplasty.

Methods: 50 patients with chronic suppurative otitis media, tubotympanic type attending department of ENT are taken up for study screened with clinical history and examination. Type I tympanoplasty performed in all patients. Simple mastoidectomy with type I tympanoplasty performed in 8 patients. Patients are followed after surgery on 7th, 14th days and end of 3 months. Anatomical outcome is assessed in terms of graft uptake. Pure tone audiometry was performed at 3 months and air bone gap is considered to assess outcome.

Results: Out of 50 cases, 43 cases (86%) showed good success rate by means of graft uptake. Remaining 5 cases showed residual perforation and 3 cases medialization of graft. In 42 patients type I tympanoplasty is performed, success rate was 80.95% and in cases with where type I tympanoplasty with cortical Mastoidectomy was done and the success rate was 100%. In the present study mean pre op AB gap was 27.65 dB and mean post op AB gap was 19.07 dB. The difference between the two, i.e., AB gap closure was 8.52 dB which is statistically significant.

Conclusions: Type-I tympanoplasty using temporalis fascia with underlay technique have good surgical success rate with excellent improvement of hearing. Cortical mastoidectomy can be planned depending on the status of the middle ear mucosa.

Keywords: Otitis media, Audiometry, Tympanoplasty, Mastoidectomy

INTRODUCTION

Tympanoplasty is meant for repair of the tympanic membrane which also involves clearance of the disease in the middle ear and also aids in reconstruction of the hearing mechanism. This surgical technique can usually be combined with mastoidectomy either an intact canal wall or a canal wall down procedure to remove disease from the mastoid area.¹ Zollner and Wullstein provided a classification of Tympanoplasty based on the type of ossicular chain reconstruction required.² Type-I tympanoplasty is performed when there is perforation in

the tympanic membrane without any ossicular damage. This study deals with anatomical and functional outcome in a series of patients who underwent type-I tympanoplasty by underlay technique using temporalis fascia graft.

Tympanoplasty provides dry ear with improvement of hearing in majority of patients. Tympanoplasty can also be done in moist or discharging ears but with addition of cortical mastoidectomy.³ Though many techniques have evolved for the closure of tympanic membrane perforation, closure with temporalis fascia is the gold standard of all.^{4,9}

The present study aims at assessment of hearing improvement following type I tympanoplasty with or without cortical mastoidectomy.

METHODS

A total of 50 patients who underwent type I tympanoplasty in department of ENT, Mamata Hospital, are taken for prospective study during period of Jan 2009 to August 2010. Patients presenting with tubo-tympanic type of CSOM, having small, medium, large or subtotal central perforation and not having evidence of active infection of nose, throat and paranasal sinuses were included in the study. Patients having hearing loss of sensorineural type or mixed type, with ossicular abnormality in pre-op or during surgery, with clinical and radiological evidence of attico-antral disease and with history of previous surgery for chronic otitis media were excluded.

All the patients presenting with clinical features of tubotympanic type CSOM were screened with clinical history where the patients were questioned about disease onset, duration, number of episodes and other associated medical and surgical history. Examination of the ear was performed using otoscopy in all these patients and the findings were documented.

Pure tone audiometry was performed preoperatively in all the selected patients of the study and the findings were documented. Average hearing loss prior to surgery was calculated by using 500 Hz, 1000Hz and 2000Hz. Airbone gap calculated by subtracting average bone conduction threshold from average air conduction threshold.

The operations are performed under local or general anesthesia using a microscope with a lens of 250 mm. In all the cases as a standard protocol post auricular approach was used for adequate exposure of the perforation. In all cases temporalis fascia graft was harvested and underlay grafting done. In 2 cases canaloplasty was done when the tortuous external auditory canal is obscuring the margins of the perforation.

Type I tympanoplasty was done in 42 patients with dry perforation. Simple mastoidectomy with type I tympanoplasty was performed in 8 patients with moist or discharging ears. All the patients are followed after surgery on the 7th and 14th days and at the end of 3 months. Anatomical outcome is assessed in terms of graft uptake. Pure tone Audiometry was performed at the completion of 3 months. Air conduction threshold and airborne gap were considered to assess the outcome i.e. the improvement of hearing objectively and the results were compared with their preoperative results. Statistical analysis was done based on paired t test. The p value less than 0.05 are taken as significant.

RESULTS

A total of 50 patients with chronic suppurative otitis media tubotympanic type requiring surgical treatment were treated. A period of 20 months was taken into study. All these patients were in the age group of 11-60 yrs, the majority being in the age group 21-30 yrs. Females (28; 55.00%) are more compared to males (22; 45.00%), patients in the present study. Of the 50 patients, 16 (32%) patients had disease in the right ear, 24 (48%) had disease only in Lt. ear and 11 patients (25%) had disease in both ears. Out of the 11 patients with bilateral disease, the ear with more hearing loss was operated on first.

Commonest presenting complaints are ear discharge and hearing loss present in all the patients of the present study. Tinnitus is found in 26%, while pain in the ear found in 18% of the patients. Out of 50 cases small sized perforation was seen in 21 cases, medium in 17, large in 7 and subtotal in 5 cases.

Out of 50 cases, 43 cases (86%) showed good success rate by means of graft uptake. Remaining 5 cases showed residual perforation of the tympanic membrane and 3 cases showed medialization of the graft. In 42 patients with dry ear where type 1 tympanoplasty was done, the success rate was 80.95% and in cases with polypoidal or congested middle ear mucosa, and in presence of glue, where type 1 tympanoplasty with cortical mastoidectomy was done and the success rate was 100% (Table 1).

Table 1: Comparison of results by the type of procedure and overall success rate.

	No. of cases	Success rate (%)	AB gap closure
Procedure			
Tympanoplasty alone	42	80.95	8.52 dB
Tympanoplasty with cortical mastoidectomy	8	100	3.2 dB
Overall success rate			
Graft uptake	43 (86%)		
failure	7 (14%)		

In the present study the mean preoperative AB gap was 27.65 dB and mean post op AB gap was 19.07 dB. The difference between the two, i.e., AB gap closure was 8.52

dB which is statistically significant. Statistical analysis was done based on paired t test. The p valve less than 0.05 are taken as significant. But the mean gain in

hearing in cases with cortical mastoidectomy was 3.20 dB which were not statistically significant.

DISCUSSION

The fundamental principles of tympanoplasty were described by Wullstein in 1952 using a free skin graft, and Zoellner in 1955, using a pedicle graft since then, several types of homologous and autologous graft materials has been described for closure of tympanic membrane perforation.^{5,6} In 1958, Heerman began to use autologous Temporalis fascia.⁷ In 1961, Storrs reported a series of patients in which temporalis fascia was used as an outer surface graft.⁸ Over the next three years, this technique became wide spread and resulted in over 90% graft take.

Initially tympanoplasty was developed essentially to improve the hearing where the cochlear function was adequate. Ideas have changed, and tympanoplasty is now an adjunct to excessive surgery for chronic disease of the mastoid, aimed at healing the ear and at the same time attempting to improve the hearing.⁴

Many studies have been carried out in the past regarding structural and functional outcome following type-I tympanoplasty utilizing temporalis fascia with underlay technique. The quoted success rate in various studies ranges from 75% to 95%. The present study was fall in this range.

In our study we used postaural approach, underlay technique with temporalis fascia graft for all cases. In 42 patients with dry ear where type 1 tympanoplasty was done, the success rate was 80.95%. Most of the studies showed the success rate of tympanoplasty using temporalis fascia is above 80% which correlated with our study. Since the study is conducted in a teaching hospital success of type 1 tympanoplasty with temporalis fascia depends on the skill and the experience of the surgeon which is not taken into account in our study.

In the remaining 8 cases we had observed polypoidal or congested middle ear mucosa, or glue, during the surgery for which cortical mastoidectomy was done along with type 1 tympanoplasty, in which the success rate was 100%. Many studies prove that wet or dry ears do not affect the success rate, but it should be mucoid and scanty.^{10,11} Rashmi in his study on role of cortical mastoidectomy in type 1 tympanoplasty in 80 patients concluded that cortical mastoidectomy is not routinely necessary in all cases of CSOM but it is of definite help in sclerosed contracted mastoid with edematous polypoidal middle ear mucosa to remove aditus block, as performing mastoidectomy adds time, cost, and increased risk of postoperative complications.¹²

In the present study we found out that the success rate in terms of graft uptake is 100% in cases where cortical

mastoidectomy is done along with type 1 tympanoplasty, while it is 83.33% when tympanoplasty alone is done. So whenever necessary cortical mastoidectomy is to be performed though it takes extra time. The success rate of tympanoplasty with mastoidectomy showed 100% results in terms of graft uptake. But the mean gain in hearing in cases with cortical mastoidectomy was 3.20 dB which were not statistically significant. This is similar to the studies done by Rashmi and Saha et al.^{4,12}

In 2 cases where there is narrow ear canal canaloplasty is done along with tympanoplasty. In cases of narrow ear canal, mostly due to anterior wall bulge, poor visualization of anterior sulcus may result in improper graft placement and hence failure. Vijayendra et al had even shown canaloplasty offers better graft placement and 9 dB gain in hearing when compared to tympanoplasty without canaloplasty.¹³ In our study, the importance if canaloplasty can not be justified as the sample size is very low, but canaloplasty is preferred whenever there is anterior canal bulge or a narrow canal for proper visualization and placement of graft.

CONCLUSION

In conclusion, study shows that type-1 tympanoplasty using temporalis fascia with underlay technique have good surgical success rate with excellent improvement of hearing. Cortical mastoidectomy can be planned depending on the status of the middle ear mucosa

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