

## Assessment of the Outcome of Type 1 Tympanoplasty with and without Anterior Tucking: Comparative Study

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### Abstract

**Aim:** Comparative study of outcomes of type 1 tympanoplasty with and without anterior tucking

**Methods:** This prospective comparative study was carried out in the Department of ENT, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India, for 12 months. Patients with only tympanic membrane perforation due to COM were included. Patients with cholesteatoma with atticofurrow disease, hearing impairment more than 50 dB which indicates ossicular chain discontinuity, already undergone tympanoplasty or any other otologic surgery, sensorineural hearing loss were excluded. For all patients; age, sex, presence of contralateral perforation or otitis media with effusion, type and location of perforation, preoperative and postoperative hearing levels were recorded. 100 Patients were divided into 2 groups and group 1 underwent type 1 tympanoplasty with anterior tucking and group 2 underwent type-1 tympanoplasty without anterior tucking.

**Results:** In this study 100 patients were included, 50 patients under type 1 tympanoplasty with tucking and 50 patients underwent without tucking. The age group of this study patients ranged from 10 to 50 years, more patients was noted in 20 to 30 years 45%, followed by 30 to 40 years 30%. Out of 100 patients, 54% were male and 46% were female patients. In our study when we compare pre and post-operative audiometry in type-1 tympanoplasty with and without anterior tucking, the p-value was 0.57 in both the groups which were statistically not significant. The hearing improvement was almost the same in both the groups. Graft uptake was good in type 1 tympanoplasty with tucking (94%) when compared to without tucking tympanoplasty (90%). Complications like residual perforation were seen in both groups equally, anterior marginal blunting was noted (10%) in type 1 tympanoplasty with tucking.

**Conclusion:** The hearing improvement following type-1 tympanoplasty with anterior tucking and without anterior tucking was comparable. No statistical difference was found in either of the groups. Type-1 tympanoplasty with anterior tucking has a better graft acceptance. The only disadvantage of type-1 tympanoplasty with anterior tucking is anterior marginal blunting.

**Keywords:** tympanoplasty, anterior tucking, graft

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## Introduction

The TM is a pearly grey colored semitransparent oval- shaped membrane that forms the lateral wall of the middle ear cavity (MEC) that isolates the MEC from the external auditory canal (EAC), thus acting as a protector of the middle ear. It has a major contribution to the normal hearing mechanism. TM perforation is the most common acquired disease of TM, which can result from either trauma or infection due to acute or COM. Although traumatically perforated TM tends to regenerate and heal in a spontaneous manner, perforation due to COM heals poorly[1] TM perforation leads to disturbance in conducting pathway of sound, causing conductive hearing loss.

Tympanoplasty is a surgical procedure that eliminates the pathology of the middle ear and provides a normal middle ear hearing mechanism with or without repair of TM, whereas myringoplasty is limited only up to TM repair without further manipulating the ossicles or middle ear. Since the inception of the surgical procedures for repair of the perforated TM in 1640 by Banzer and the description of tympanoplasty in 1951 by Wullstein, myringoplasty and tympanoplasty has come a long way and has evolved tremendously[2] The ideal technique of performing the surgery to give optimal results is still evolving. Studies are still going on to devise a way to give optimal graft uptake and maximum postoperative hearing improvement with minimal instrumentation. As per the classification of Wullstein, type 1 tympanoplasty is the functional restoration of the normal middle ear by repairing the TM[3] Success of type-1 tympanoplasty is subjected to numerous factors like technique, size and site of perforation, graft material, duration of the dry ear, associated middle ear cleft pathology, state of the contralateral ear, smoking, socioeconomic status and history of earlier ear surgery[4,6]

Trans canal endoscopic repair of TM perforation has been in practice since the 1990s. Its superiority is less invasiveness and allows multi-angled complete visualization of the TM and other areas that generally remain out of sight or difficult with the microscope.[7,8] Various studies have been done comparing the conventional microscopic post auricular approach and endoscopic trans canal approach for TM repair with comparable outcomes with regard to graft success and hearing gain and the endoscopic method having additional advantages of anterior margin visibility, minimal invasiveness, lesser operative time, lesser postoperative pain and better cosmesis[9,10] Regarding the size, large and subtotal perforations have lesser rates of success of graft uptake whereas in terms of the site, anterior and marginal perforations have been reported for having a negative impact over the success of type-1 tympanoplasty.[11]

## Material and methods

This prospective comparative study was carried out in the Department of ENT, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India, for 12 months. after taking the approval of the protocol review committee and institutional ethics committee.

## Methodology

Patients with only tympanic membrane perforation due to COM were included. Patients with cholesteatoma with atticofacial disease, hearing impairment more than 50 dB which indicates ossicular chain discontinuity, already undergone tympanoplasty or any other otologic surgery, sensorineural hearing loss were excluded. For all patients; age, sex, presence of contralateral perforation or otitis media with effusion, type and location of perforation, preoperative and postoperative hearing levels were recorded. 100 Patients were divided into 2 groups and

group 1 underwent type 1 tympanoplasty with anterior tucking and group 2 underwent type-1 tympanoplasty without anterior tucking.

All cases were done by using the post auricular approach. After the post auricular incision was made, temporalis fascia graft was harvested and anteriorly based palva flap was elevated. Weitlaner self-retaining retractor was used to avoid the hanging of the flap. The middle ear was examined for the status of the mucosa, ossicular chain continuity and mobility assessed. Anterior tucking was done using a small horizontal incision (approximately 3 mm) placed lateral to the annulus in the superior part of the anterior wall of the external auditory canal. Through this incision, the annulus is raised, and a small part of temporalis fascia is pulled up, to rest between the canal skin and the bone of anterior external auditory canal. Pure-tone audiometry (PTA) was measured before the surgery and at a postoperative period of 6 months.

Data were collected and analyzed used using independent student t test and Pearson chi square test.

## Results

In this study 100 patients were included, 50 patients under type 1 tympanoplasty with tucking and 50 patients underwent without tucking. The age group of this study patients ranged from 10 to 50 years, more patients was noted in 20 to 30 years 45%, followed by 30 to 40 years 30% (Table 1). Out of 100 patients, 54% were male and 46% were female patients In our study when we compare pre and post-operative audiometry in type-1 tympanoplasty with and without anterior tucking, the p-value was 0.57 in both the groups which were statistically not significant. The hearing improvement was almost the same in both the groups. Graft uptake was good in type 1 tympanoplasty with tucking (94%) when compared to without tucking tympanoplasty (90%). Complications like residual perforation were seen in both groups equally, anterior marginal blunting was noted (10%) in type 1 tympanoplasty with tucking.

**Table 1: Demographic profile**

Gender	Number of patients	%
Male	54	54
Female	46	46
Age in years		
10-20	15	15
20-30	45	45
30-40	30	30
40-50	10	10

**Table 2: Pre-operative pure tone audiometry amongst the groups**

	With tucking	%	Without tucking	%
20-30	12	24	7	14
30-40	16	32	13	26
40-60	22	44	30	60

**Table 3: Postoperative audiometry between 10-30 dB**

Postoperative audiometry	With tucking	%	Without tucking	%
	37	74	30	60

**Table 4: Distribution of graft uptake.**

Distribution of graft uptake	With tucking	%	Without tucking	%
	47	94	45	90

### Discussion

Several factors influence the success of tympanoplasty such as status of the middle ear, site and size of perforation, surgical technique and graft material. Medialization of graft and adherence to promontories are the drawbacks of the underlying technique.

Tympanoplasty performed in childhood is sometimes thought to be unsuccessful due to weak immune system, recurrent upper respiratory tract infections, the shorter and unpredictable function of the eustachian tube and difficulties in postoperative care in children.[11,12] Various recommendations have been made about the ideal age for the surgery of children by different authors, such as 8, 10, 12 years old.[14,15] On the other hand, in some articles, it is stated that there has been no correlation between age and surgical success.[16,17] In a recent study, which compares the anatomic and hearing outcomes of tympanoplasty in 136 patients, the pediatric tympanoplasty success rate was found similar to adults.[18]

The anterior part of the graft is a challenge to stabilize in cases of anterior, large central and subtotal perforations due to the acute angulation of the tympanic membrane, limited anterior margin, poor visualization of the ear canal and prominent anterior canal wall bulge. A variety of surgical techniques have been developed to increase the success in treating anterior perforations, including sandwich graft tympanoplasty, over-under tympanoplasty, Medio lateral graft tympanoplasty, "anterior hitch" technique, "window shade" technique and "hammock tympanoplasty".

In a study conducted by Burse et al, 50 clinically diagnosed cases were randomly divided into two groups of 25 each to be operated by anterior tucking method and cartilage support method of tympanoplasty[19] Successful graft uptake

was observed in 94% of patients in both the groups but it was not statistically significant. Pradhan et al, in a prospective study, obtained 93% success in subtotal perforations and 84% in anterior perforations in type-I tympanoplasty by circumferential elevation of 10 tympanometry flap technique.[20] A retrospective study by Jung et al, reported 97% graft take-up success rates in anterior/subtotal perforations using the Medio lateral graft tympanoplasty method.[21] Mundra et al, achieved 98.94% of success in terms of graft uptake by using a slice of cartilage support in subtotal perforations, by underlay technique.[22]

### Conclusion

The hearing improvement following type-1 tympanoplasty with anterior tucking and without anterior tucking was comparable. No statistical difference was found in either of the groups. Type-1 tympanoplasty with anterior tucking has a better graft acceptance. The only disadvantage of type-1 tympanoplasty with anterior tucking is anterior marginal blunting.

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