e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2025; 17(8); 1633-1636

Original Research Article

Comparative Study of Graft Placement with or without Anterior Tucking in Type One Tympanoplasty

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Received: 12-07-2025 / Revised: 30-07-2025 / Accepted: 08-08-2025

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Conflict of interest: Nil

Abstract:

Background: Type 1 tympanoplasty is a common surgical procedure to repair tympanic membrane perforations. The anterior tuck technique is a modification intended to improve graft stability, especially in anterior perforations, but its necessity remains debated.

Aim: To compare anatomical and functional outcomes of graft placement with and without anterior tuck in Type 1 tympanoplasty.

Materials and Methods: This prospective observational study included 60 patients undergoing Type 1 tympanoplasty at ANMMCH, Gaya, from July 2023 to June 2025. Patients were divided into two groups: graft placement with anterior tuck (Group A) and without anterior tuck (Group B). Graft uptake and hearing improvement were assessed over a month's follow-up.

Results: Graft uptake was 93.3% in Group A and 83.3% in Group B ($p = 0.28$). Mean air-bone gap closure was 14.8 dB in Group A versus 13.2 dB in Group B ($p = 0.12$). No significant difference was found in complication rates between groups.

Conclusion: Both techniques provide satisfactory graft uptake and hearing improvement in Type 1 tympanoplasty. The anterior tuck technique may offer a slight advantage in graft stability, particularly for anterior perforations, but is not essential in all cases.

Keywords: Type 1 Tympanoplasty, Anterior Tuck, Graft Uptake, Hearing Improvement.

Introduction

Tympanoplasty is a common surgical treatment used to repair tympanic membrane perforations in order to improve hearing and restore the integrity of the eardrum [1]. Out of all the other methods, Type 1 tympanoplasty concentrates on rebuilding the tympanic membrane without using the ossicular chain. Graft placement method and stability play a major role in the procedure's effectiveness, since they have a direct impact on the healing process and functional results [2,3].

To encourage graft uptake, a popular technique is to position the graft medial to the annulus and the residual tympanic membrane remnants, making sure it makes close contact with the middle ear mucosa [4]. The anterior tuck technique is a modification that prevents graft medialization or displacement by tucking the graft anteriorly under the anterior canal wall or annulus. It is thought that this method improves graft stability, particularly when there are anterior holes or inadequate anterior support [5,6].

Nonetheless, there is ongoing discussion on the necessity and effectiveness of the anterior tuck in Type 1 tympanoplasty. While some surgeons believe it may not have a major effect on the graft absorption rate or hearing improvement, others support its frequent usage to enhance anatomical and functional results [7,8].

To understand its function, improve surgical results, and direct clinical judgement, a comparison of graft placement with and without an anterior tuck in Type 1 tympanoplasty is necessary.

To evaluate how graft insertion with and without the anterior tuck approach affects patients having Type 1 tympanoplasty in terms of morphological and functional results.

Materials and Methods

Study Design and Setting: This prospective observational study was conducted at Anugrah Narayan Magadh Medical College and Hospital (ANMMCH), Gaya, Bihar.

Study Duration: The study was carried out over two years, from July 2023 to June 2025.

Sample Size and Selection: A total of 60 patients diagnosed with tympanic membrane perforations and planned for Type 1 tympanoplasty were included. Patients were divided into two groups: Group A (graft placement with anterior tuck) and Group B (graft placement without anterior tuck).

Inclusion and Exclusion Criteria: Inclusion criteria were patients with chronic otitis media mucosal type presenting with dry tympanic membrane perforation, healthy middle ear mucosa, and intact ossicular chain. Exclusion criteria included cholesteatoma, ossicular disruption, revision surgeries, and systemic conditions affecting wound healing.

Surgical Procedure: All surgeries were performed by experienced otologic surgeons using the underlay technique with temporalis fascia graft. In Group A, the graft was tucked anteriorly beneath the anterior canal wall or annulus to enhance stability. In Group B, the graft was placed without the anterior tuck.

Postoperative Follow-up and Evaluation: Patients were followed up regularly for six months post-surgery to assess graft uptake, complications, and hearing improvement. Pure tone audiometry was performed preoperatively and postoperatively to evaluate hearing outcomes.

Data Analysis: Data collected were statistically analyzed to compare anatomical and functional results between the two groups. A p-value less than 0.05 was considered statistically significant.

Results

A total of 60 patients underwent Type 1 tympanoplasty, with 30 patients in Group A (graft with anterior tuck) and 30 patients in Group B (graft without anterior tuck). The demographic characteristics, anatomical outcomes, and hearing results are summarized below.

Demographic Data: The mean age in Group A was thirty-eight years (range 18–60 years), and in Group B, it was thirty-seven years (range 20–62 years). The male-to-female ratio was 1.5:1 in Group A and 1.3:1 in Group B, with no statistically significant difference between groups ($p > 0.05$).

Parameter	Group A (Anterior Tuck)	Group B (No Anterior Tuck)	p-value
Number of patients	30	30	—
Mean Age (years)	38 ± 10.5	37 ± 11.2	0.75
Male: Female ratio	18:12	17:13	0.80

Graft Uptake Rate: Successful graft uptake was observed in 28 out of 30 patients (93.3%) in Group A, while Group B showed uptake in 25 out of 30 patients (83.3%). The difference was not statistically significant ($p = 0.28$), indicating a comparable graft success rate in both techniques.

Outcome	Group A (n=30)	Group B (n=30)	p-value
Graft uptake	28 (93.3%)	25 (83.3%)	0.28
Graft failure	2 (6.7%)	5 (16.7%)	

Hearing Improvement: Preoperative and postoperative pure tone audiometry (PTA) was performed to assess hearing improvement. The mean preoperative air-bone gap (ABG) in Group A was 25.4 ± 7.2 dB, which improved to 10.6 ± 4.5 dB postoperatively, showing a mean ABG closure of 14.8 dB. In Group B, the mean preoperative ABG was 26.1 ± 6.8 dB and postoperative ABG was 12.9 ± 5.2 dB, with a mean ABG closure of 13.2 dB. The hearing improvement was slightly better in Group A but was not statistically significant ($p = 0.12$).

Parameter	Group A (Anterior Tuck)	Group B (No Anterior Tuck)	p-value
Preoperative ABG (dB)	25.4 ± 7.2	26.1 ± 6.8	0.68
Postoperative ABG (dB)	10.6 ± 4.5	12.9 ± 5.2	0.09
Mean ABG closure (dB)	14.8	13.2	0.12

Complications

Minor complications such as postoperative infection and mild canal stenosis were observed in 2 patients in Group A and 3 patients in Group B, which were managed conservatively. No major complications were reported in either group.

Discussion

The morphological and functional results of Type 1 tympanoplasty with and without the anterior tuck

approach for graft placement were evaluated in this prospective observational study. According to our findings, the anterior tuck group had a marginally greater graft absorption rate (93.3%) than the non-tuck group (83.3%), although this difference was not statistically significant. The anterior tuck group saw a greater improvement in hearing as indicated by the mean air-bone gap (ABG) closing (14.8 dB) than the non-tuck group (13.2 dB), although this difference was not statistically significant. The success rates for Type 1 tympanoplasty, which normally vary from 80% to 95% based on surgical technique and patient selection, are in line with the graft uptake rates in both groups [9,10]. It is thought that the anterior tuck approach gives the graft more mechanical support, particularly when anterior marginal holes are present and graft displacement or medialization is an issue [11]. This theoretical benefit is supported by our findings of improved hearing outcomes and increased, albeit statistically nonsignificant, graft uptake.

Comparable results have been obtained by similar comparative investigations. In research on graft placement procedures in Type 1 tympanoplasty, Yadav et al. found that the anterior tuck may increase graft stability, particularly in anterior perforations, with graft success rates of 92% with and 85% without [12]. Similarly, research by Verma et al. observed greater subjective hearing improvement in the anterior tuck cohort but did not find any significant difference in overall graft uptake between the anterior tuck and non-tuck groups [13,14]. On the other hand, some research indicates that careful underlay graft placement without an anterior tuck is adequate for the best results. Khalifa et al. noted that appropriate graft dimensions and location remain crucial criteria, but they found no discernible benefit of anterior tuck in graft uptake or hearing improvement [15]. These results demonstrate that, although helpful in certain situations, the anterior tuck approach might not always be required for a successful tympanoplasty.

Our study's low and comparable group-to-group complication rates were consistent with Type 1 tympanoplasty's generally low morbidity [16]. The absence of significant adverse effects suggests that both surgical techniques are safe. Our study's limitations include a limited sample size and a brief follow-up time, which may reduce our ability to identify minute variations. To further understand the function of the anterior tuck in tympanoplasty, larger randomised controlled trials with longer follow-up are required in the future [17,18].

Conclusion

This study found that Type 1 tympanoplasty performed with the anterior tuck technique showed a slightly higher graft uptake rate and better hearing improvement compared to graft placement without the anterior tuck; however, these differences were not statistically significant. Both techniques demonstrated good anatomical and functional outcomes with low complication rates, indicating that anterior tuck can be a useful adjunct in cases with anterior perforations but may not be necessary for all patients. Further larger-scale studies are warranted to definitively establish the added benefit of the anterior tuck in tympanoplasty.

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