

Comparison of Temporalis Fascia Graft Medial and Lateral to Handle of Malleus in Dry Central Tympanic Membrane Perforation

Wael Hassan Abo El-Wafa and Ibrahim Ibrahim El-Dsoky

Otorhinolaryngology Department, Faculty of Medicine, AL-Azhar University, Egypt

Corresponding author: Ahmed Yehia Yehia Fouda, Mobile: 01021511120

ABSTRACT

Background: Tympanoplasty is a surgical method, to eradicate middle ear infection and improve its function. The two most common techniques for positioning the graft relative to the remnant of both the tympanic membrane and the tympanic annulus are the 'overlay' and the 'underlay' techniques.

Objectives: To compare two methods of tympanic membrane (TM) grafting when graft materials medial (**group A**) or lateral (**group B**) to malleus.

Materials and Methods: This prospective study was carried out on thirty patients (30) from May 2017 to August 2018. All operations were done at Hearing and Speech Institute. They were divided into two groups; the first one (**group A**): included 15 patients treated by grafting with temporalis fascia medial to handle of malleus. The second one (**group B**): included 15 patients treated by grafting with temporalis fascia lateral to it. Patients with obvious ossicular dysfunction or external ear pathology were excluded from the study. Patients with ear discharge were initially treated conservatively and were included in the study when their ear became dry for at least 3 months. Any patient requiring ossiculoplasty was subsequently excluded from the study. Diagnosis of the disease was established by clinical, otoscopic, endoscopic and microscopic examination. All patients examined and tested by audiometry 3 months after surgery. Success of surgery is defined as complete repair of TM, without lateralization, atelectasis or retraction pocket.

Results: 83.33 % was total graft success. 86.7% with (**group A**) underlay technique comparing this with 80.0% with (**group B**) over-underlay technique. Differences of air-bone gap in each group before and after surgery was 33.42 ± 3.71 dB in Group A, and 22.30 ± 5.56 dB in Group B. Improvement of hearing level was not significant between the two surgical methods.

Conclusions: Both techniques (medial and lateral to malleus handle) of TM grafting are effective with success rates 86.7% and 80.0% respectively.

Keywords: Chronic otitis media, Tympanoplasty, Tympanic membrane perforation.

INTRODUCTION

Tympanoplasty is a surgical method, to eradicate middle ear infection and improve its function⁽¹⁾. The two most common techniques for positioning the graft relative to the remnant of both the tympanic membrane and the tympanic annulus are the 'overlay' and the 'underlay' techniques⁽²⁾.

The underlay technique is perhaps more commonly used worldwide. This technique is easier to perform and less time consuming. In this technique, the graft is placed medial to the entire TM remnant and also to the malleus handle and is more suitable for posterior perforations⁽³⁾. In the overlay technique, after the elevation of squamous tissue, the graft is positioned lateral to the annulus and fibrotic layer of the TM residue⁽⁴⁾.

A new technique that has evolved from the two classical techniques of overlay and underlay and aimed at eliminating the disadvantages of these techniques is over-underlay myringoplasty. In this technique, graft is placed lateral (over) the handle of malleus but medial (under) the tympanic membrane remnant and annulus⁽⁵⁾.

Objectives

Evaluation of hearing outcome and healing of temporalis fascia graft in underlay procedure tympanoplasty by placing the graft medial (underlay technique) or lateral to the handle of malleus (over-underlay technique) in patients with dry central perforation.

MATERIALS AND METHODS

A randomised prospective study was conducted for thirty patients (30) from May 2017 to August 2018. All operations were done at Hearing and Speech Institute. They were divided into two groups; the first (group A) included 15 patients treated by grafting with temporalis fascia medial to handle of malleus. The second (group B) included 15 patients treated by grafting with temporalis fascia lateral to it. The two groups were followed up for 3 months post operatively. The preoperative and postoperative air bone (AB) gaps in both groups were compared. The success of surgery was defined as complete repair of tympanic membrane perforation

without lateralisation, atelectasis or blunting and with post-operative hearing gain.

All patients with the complaint of discharging ear and decreased hearing were screened. Those patients, in whom tubotympanic type of chronic suppurative Otitis Media was found, were taken for this prospective study with randomization.

The exclusion criteria:

- patients refuse surgery or unfit for surgery
- Traumatic perforation.
- Neoplastic perforation.
- CSOM cholesteatoma.
- Recurrent perforation.
- Patients with obvious ossicular dysfunction or external ear pathology.
- Patients with ear discharge were initially treated conservatively and were included in the study when their ear became dry for at least 3 months.

An informed consent was taken from patients. The scientific and ethical approval was also obtained at the Faculty of Medicine, Al-Azhar University.

Statistical analysis

In addition to the descriptive data, statistical analysis was done using IBM SPSS STATISTIC VERSION 23 PROGRAM. Data were expressed as mean ± SD and analyzed using the Student's t-test, Paired (t) test and ANOVA test to assess the significance of difference in the levels between different parameters. P <0.05 was accepted as significant. Coefficient (r) of two variables

was also done by using Pearson Correlation Coefficient (r) with P Value Calculation.

RESULTS

- ✓ Mean age of patients in group A was 27 ± 11.18 years with a range of 11 to 48 years and in group B, it was 26.27 ± 12.88 years, which ranged between 11 to 44 years (p 0.502). So that no statistically significant difference between two groups according to age (years).
- ✓ Comparison between groups according to sex in group A male to female were 3 (20%): 12 (80.0%) respectively and in group B male to female were 4 (26.7%): 11 (73.3%) respectively. So that no statistically significant difference between two groups according to sex.
- ✓ Mean air-bone gap closure in group A, was 33.42 ± 3.71 dB with a range between 26.25-38.75 dB whereas in group B, was 22.30 ± 5.56 dB with a range between 15-33 dB. The difference in results of hearing improvement between two groups was statistically not significant (p>0.05). Overall hearing improvement was noted in all patients whether treated by underlay or over-underlay technique except those who met with graft failure.
- ✓ Graft success rate in our study, was 83.33 % with total graft success. 86.7% with under-underlay technique with only 13.3% graft failure rate. Comparing this with over-underlay technique, 80.0% of patients had full graft take whereas only 20.0% had graft failure. When we compared graft success rate of both the techniques (p-value=0.624), it was found to be statistically insignificant.

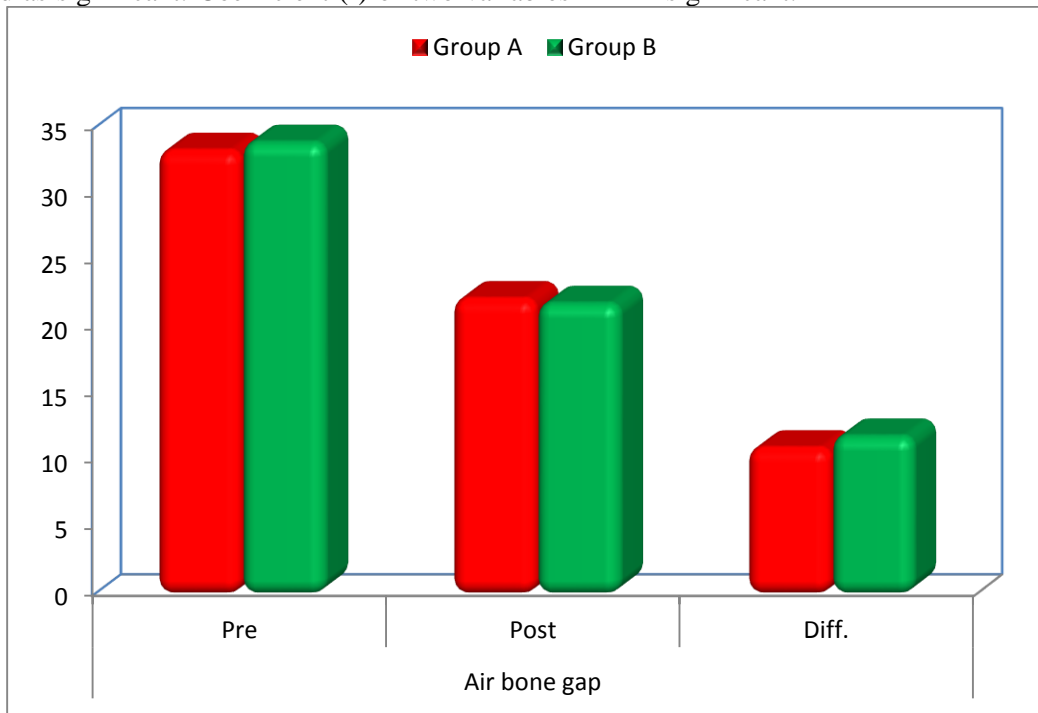


Figure (1): Bar chart between groups according to air bone gap.

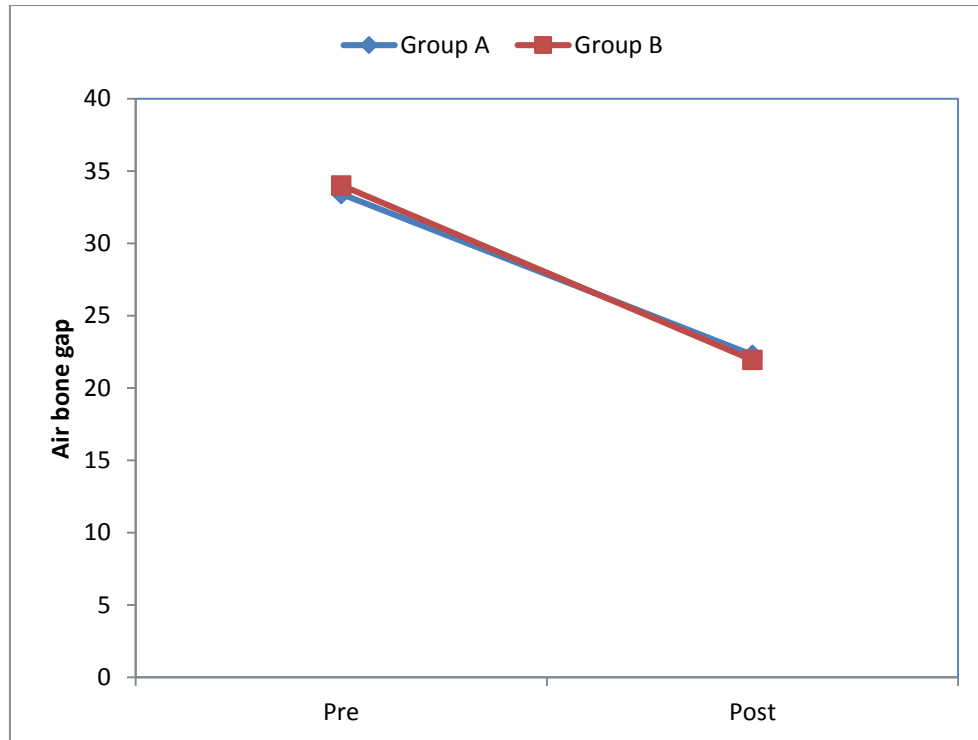


Figure (2): Line chart between pre and post according to Air bone gap in each group.

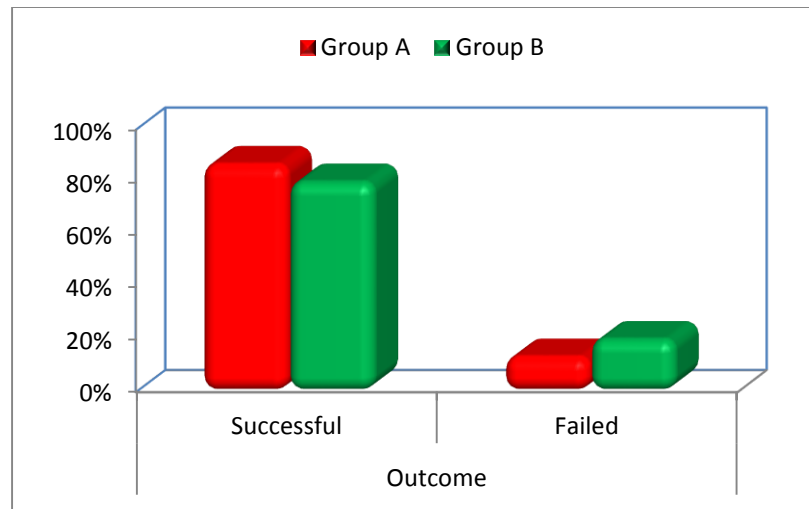


Figure (3): Bar chart between groups according to outcome.

Outcome	Group A	Group B	x2	p-value
Successful	13 (86.7%)	12 (80.0%)	0.240	0.624
Failed	2 (13.3%)	3 (20.0%)		

DISCUSSION

In a study, 100 patients with dry central perforation have been chosen for Tympanoplasty Type I by underlay technique. Exclusion criteria were strictly followed. Only patients with unilateral dry central perforation were included in the study and surgery was carried out to maintain uniformity. The patients have been divided into two groups of equal number. The perforation was closed by placing the graft medial to malleus in group A and lateral to malleus in group B. The mean hearing improvement in dB among the two groups was 6.34 dB among medial to malleus technique group and 6.8 dB in lateral to malleus technique (6).

In a similar study conducted in Alzahra and Kashani hospitals, between June 2010 and February 2012, 56 patients with chronic otitis media and perforated TM entered the study in two groups. In the first group (28 patients) the graft material was pierced in near central part of the graft and lodged so that the malleus handle projects through the graft perforation while the second group (28 patients) had grafting in the lateral side of the malleus. Three months after surgery both groups were examined and tested by audiometry. Both techniques (medial and lateral to malleus handle) of TM grafting were effective with success rates 96.42% and 92.85% respectively. Differences of air-bone gap in each group before and after surgery was 16.10 ± 4.89 in group A, and 15.78 ± 3.40 in group B. Improvement of hearing level was not significant between the two surgical methods ($P = 0.442$) (7).

In a retrospective study, 104 patients underwent tympanoplasty (via underlay technique in 46 patients and over-under technique in 58 patients). In the first group of patients with underlay technique (the graft was placed medial to the remaining drum and the manubrium), the success rate was 91.5%. In the second group with over-under technique (the graft was placed under the remaining drum and over the malleus), the success rate was 94.9%. In the patients operated by the underlay technique, the air-bone gap decreased by 16.55 db. This rate was 16.96 dB in those operated via the over-under technique (8).

In another study conducted in Michigan Ear Institute, the chosen technique had been over-under tympanoplasty, which was performed by placing the graft over the malleus and under the annulus. All their 120 patients had successful grafts. Lateralization of the grafted drum did not occur. Seventeen patients had late atelectasis, and 12 patients had late perforations; nearly all of these were noted more than 1 year after surgery and

were attributed to persistent Eustachian tube dysfunction or infections. Average improvement in air-bone gap for all patients was 5.3 dB, whereas speech reception threshold improved by 5.9 dB (5).

In study on 147 patients, overlay graft technique was highly successful for TM repair (98.75%), even in difficult cases (9). Other study reported graft success rate between 70 to 96% utilizing underlay technique (10). In another study, achieved graft success rate of 94.9% utilizing over-underlay technique in 58 patients(8).

CONCLUSIONS

On the basis of our study data, short-term outcomes of both techniques were good and there was no significant difference between their graft uptake and audiometric results. Good tympanoplasty procedure by the surgeon carries more significance in success of surgery than the type of technique preferred during the surgery.

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