

DOUBLE ANTERIOR TEMPORALIS FASCIA MYRINGOPLASTY IN LARGE CENTRAL TYMPANIC PERFORATION

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ABSTRACT

Objective: This study aimed to study double anterior temporalis fascia myringoplasty in primary safe large central tympanic perforation regarding graft uptake and hearing gain.

Methods: The present work included the study of fourteen (14) patients who presented with symptoms suggestive of chronic suppurative otitis media (CSOM) to E.N.T. outpatient clinic, Zagazig university hospitals. All patients were suffering from mucosal type of CSOM and the tympanic membrane perforations are of large size; subtotal perforation. Temporalis Fascia Tympanoplasty type I operation was performed for all patients with double anterior layer technique.

Results: This study included Fourteen (14) patients suffering from mucosal type of CSOM. They included 5 males (35%) and 9 female (65%). The age of patients at the time of presentation was maximum of 37 years and minimum of 12 years with a mean of 23.71 years. The main presenting symptom was hearing impairment in all the fourteen (100%) patients. Ear discharge was the second common presenting symptom. The rate of success in our fourteen cases was 100% in our study, the audiometric tests performed at the 3rd postoperative month revealed that the mean air-bone gap decreased by 20 ± 1 dB.

Key words; Underlay tympanoplasty, Over-underlay tympanoplasty, Large perforation

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INTRODUCTION

One of the common sequelae of chronic otitis media is tympanic membrane (TM) perforation, which can cause hearing loss and otorrhea. It is essential for every otolaryngologist to know how to repair tympanic membrane perforation. The two classic methods for reconstruction of TM perforation have been medial (underlay) or lateral (overlay) graft technique. In the underlay technique, the graft is placed entirely medial to the remaining TM and malleus while in overlay technique, the graft is placed lateral to the annulus, and any remaining fibrous middle layer after the squamous layer has been carefully removed, each of these techniques has its advantages and disadvantages^[1].

The long term aim of tympanoplasty is to reconstruct the tympanic membrane and the sound conducting mechanism. Since the introduction of tympanoplasty by Wulstein and Zollner^[2], numerous graft materials have been used for the closure of the defective membrane: skin, fascia lata, temporalis fascia, vien, perichondrium and dura mater. To date, temporalis fascia remains the most

commonly employed material for tympanic membrane reconstruction with success rate of 93-97% in primary tympanoplastics^[3].

Successful closure of tympanic membrane following myringoplasty, is related to perforation size, site of perforation, duration of discharging ear, the associated pathology in the middle ear, training of surgeon, surgical technique, graft material, previous myringoplasty and smoking history^[4].

The anterior TM perforation is difficult to repair because of less vascularity than posterior tympanic membrane and the anterior bony overhang that lacks visualization. Because of reduced vascularity in the anterior tympanic membrane, there is a greater risk of necrosis and reabsorption of the fascia graft^[5].

When the medial graft technique is used to repair anterior or subtotal TM perforation, the anterior portion of the fascia graft may fall away, resulting in reperforation and obliteration of anterior part of middle ear cavity. Although the lateral graft technique has a higher success rate for the reconstruction of anterior or subtotal TM

perforation, serious lateralization of graft may occur. These problems have been managed by a variety of surgical techniques, such as the use of sandwich graft tympanoplasty, over-under tympanoplasty, and up till now a still better method is needed to repair anterior perforation [6].

Temporalis fascia is the commonly used graft material because it is an autograft with excellent chance of take, it is close to the site of operation making its harvest easier, it has a low basal metabolic rate brightening its success rate and its thickness is more or less similar to that of tympanic membrane [7].

Aim of the study: This study aimed to study double anterior temporalis fascia myringoplasty in primary safe large central tympanic perforation regarding graft uptake and hearing gain.

MATERIALS AND METHODS

The present work included the study of fourteen (14) patients who presented with symptoms suggestive of chronic suppurative otitis media to E.N.T. outpatient clinic, Zagazig university hospitals. All patients were suffering from mucosal type of chronic suppurative otitis media and the tympanic membrane perforations are of large size; subtotal perforation.

Majority (60%) of the patients was of rural habitant and rest (40%) was from urban areas. All patients had complaints of discharging ear of varied duration and varied degree of hearing loss.

Temporalis Fascia Tympanoplasty type I operation was performed for all patients (100%).

All cases were subjected to:

- Thorough history taking.
- ENT examination with special care to the diseased ears.
- Tuning fork tests (Rinne' and Weber's tests).
- Routine laboratory investigations; CBC, PT, PTT, INR, liver functions, viral markers (HBV,HCV), kidney functions, blood sugar and urine analysis.
- Preoperative audiological assessment including pure tone audiogram, speech discrimination.

Exclusion criteria:

- Patients below 12 years.
- Active discharge from the middle ear.
- Nasal allergy, which should be controlled before surgery.
- When the other ear is dead.
- Otitis externa.
- Bad general conditions as (bad chest condition, diabetic patients, Liver cell failure, kidney failure and heart failure patients).
- Patients with chronic persistent otorrhea, granulation tissue and cholesteatoma.
- Patients who failed to attend to scheduled postoperative follow-up.



Figure (1): Postauricular incision



Figure (2): Temporalis fascia graft taken.



Figure (3): The main graft in place



Figure (4): The second small anterosuperior graft in place

RESULTS

This study included Fourteen (14) patients suffering from mucosal type of chronic suppurative otitis media. They included 5 males (35%) and 9 female (65%). The age of patients at the time of presentation was maximum of 37 years and minimum of 12 years with a mean of 23.71 years.

The main presenting symptom was hearing impairment in all the fourteen (100%)

patients. Ear discharge was the second common presenting symptom. On examination the discharge was odourless, mucopurulent not bloody, intermittent and stopped with medication. Tinnitus was accompanying symptom in 7 patients (50%).

Microscopic examination of the affected ears showed subtotal perforation for all patients (100%).

Side of perforation distribution:

Table (1): Side of perforation distribution

	N	%
Side		
Left ear	8	57.1
Right ear	6	42.9
Total	14	100.0

The distribution of the operated ear in this study was 6 right ear (42.9%) and 8 left ear (57.1%).

Perforation size and graft uptake distribution:

Table (2): Perforation size and graft uptake distribution

	N	%	
Perforation size	Large Subtotal	14	100.0
Graft uptake	Taken	14	100.0

Air bone gap pre and post distribution:

Table (3): Air bone gap pre and post distribution

	ABG pre	ABG post
N	14	14
Mean± SD	28.92±8.3	9.28±4.7
Median	30.00	10.00
Range	15-45	5-15

Hearing improvement:

Evaluation of hearing was done by pre-operative and post-operative measuring of the average air and bone conduction thresholds recorded at the following frequencies: 250 Hz, 500 Hz, 1000 Hz and 2000 Hz.

The improvement in hearing was measured by subtracting the average air bone gap ABG preoperative and postoperative.

There was closure of the air bone gap within 15dB in 14 patients (100%) this means that hearing improved in about 100% of patients.

The following table summarizes hearing results:-

Table (4): Summary of hearing results and their percentage

Air-Bone gap 10 dB or less	A-B gap 11-15 dB	A-B gap >15dB
11 patients (78.5%)	3 patients (21.5%)	0 patients (0%)

Post-operative pain:

Post operative pain was reported in 3 patients (22.5%) in the first post operative day and persisted only for 2-3days and was described as discomfort up to 4/10 on the pain scale in 2 patients.

The following table summarizes postoperative pain distribution:-

Table (5): Postoperative pain distribution among patients

No pain	Mild 1-3/10	Moderate 4-6/10	Severe 7-9/10	Worst pain 10/10
11 patients	2 patients	1 patients	0	0

DISCUSSION

The long history of tympanic membrane repair goes back to 1640 when Banzer used pig bladder in grafting and to 1878 when Berthold repaired a perforation using a full-thickness skin graft, coining the term ‘‘myringoplasty’’^[8].

In the 1950s, Zollner and Wullstein developed new myringoplasty techniques following the introduction of antibiotics and microsurgery. Since then, various techniques have been developed to improve tympanoplasty results^[9].

It is often reported that repair of anterior or large subtotal perforation is less successful than that of central perforations because it is technically more difficult^[10].

Primrose et al (1986)^[11] reported that the anterior tympanomeatal angle remains the main problem area in anterior marginal perforations with both conventional onlay and underlay techniques. He described a variation of Gerlach's quilting technique to overcome the problem and this modification has proven to be both simple and effective. When the graft is prepared a small tag is fashioned anteriorly and later pulled through a small tunnel under the anterior-superior annulus. This prevents the graft falling away anteriorly without producing the blunting

associated with more extensive undermining of the anterior annulus.

In our study we don't have to make a tunnel which is considered difficult to some extent, we only use double fascial graft anterosuperior and anteroinferior without producing the blunting associated with more extensive undermining of the anterior annulus also.

In a study conducted by Sharp, Terzis and Robinson (1992)^[10] they reported that surgical closure of the anteriorly located tympanic membrane perforation can present a problem. The lack of anterior support for the graft frequently leads to graft failure if an underlay method is used whereas anterior blunting is a complication of onlay techniques in this situation. The experience with the Kerr flap, an underlay graft fashioned to include a tab of fascia which is placed laterally under the annulus and the anterior meatal skin was presented.

In our study we overcome this problem by using temporalis fascia in underlay fashion with anterosuperior and anteroinferior double graft as a support for the main graft without producing blunting with the others advantages of underlay technique as it is a simple technique no risk

of lateralization with high success rate that considered being the disadvantages of overlay procedure.

The underlay and the overlay procedures are presently the two most widely used techniques. The former, a relatively simple technique, places the graft under the remaining drum and malleus. In the latter technique, which is considered relatively difficult, the graft is placed lateral to the annulus after the squamous layer has been carefully removed. Each of these techniques has its advantages and disadvantages [12].

Today, the underlay procedure is preferred over the overlay procedure because there is the risk of blunting coupled with the greater time and complexity needed for the latter technique [13].

Primrose et al, (1986) [11] were able to improve graft tension by using an anterior tunnel created under the annulus. Gristwood et al, (1993) [14] described an underlay myringoplasty creating two anterior tunnels for graft stabilization. Sauvage et al, (1998) [15] presented a surgical technique that included the creation of a large anterior flap for stabilizing the fascia. In our study we improve graft stabilization by using double anterior fascial graft without creation of anterior tunnel or large anterior flap. In a series of 273 ears, Glasscock (1973) [16] reported that the success rate was 91% with the overlay technique and 96% with the underlay technique, Sheehy and Anderson (1980) [17] reported that the rate of success in 472 overlay tympanoplasty surgeries was 97%. In a series of 554 overlay grafts, Rizer (1997) [18] reported a success rate of 95.6%. The same author's success rate in 158 underlay grafts was 88.8%.

In our study the rate of success in fourteen cases of underlay tympanoplasty surgeries was 100% that may be because of our technique or our senior surgeon and may be also the precise number. The graft uptake for myringoplasty done by the senior faculty was 86.2%, by the junior faculty was 85.2%, and by residents was only 77.2%. The result was however not statistically significant [19]. Onal et al, (2005) [20] Vartiainen and Nuutinen (1993) [21] and Black & Wormald (1998) [22] have reported inferior success

rates for junior surgeons as compared with senior surgeons. Emir et al, in his 607 patients with at least 12 months of follow-up found that the graft uptake for residents was 86.2%, whereas, for the senior faculty it was 94.8% [23].

Ralli and Giovanni (2000) [24] used underlay anchored myringoplasty which utilizes anterior and posterior tunnels to achieve proper tension of the tympanic membrane as well as lateral traction of the malleus handle. It resulted in drum healing (91.7%) and pure tone average (PTA) post operatively was 27dB as compared with 55 dB preoperatively.

In our study we resulted in drum healing (100%) and pure tone average (PTA) post operatively was 9.2dB as compared with 28.9 dB preoperatively.

The under-over tympanoplasty is a combination of the underlay and overlay techniques and has been developed with the aim of minimizing the disadvantages inherent in the other two techniques. This may explain why the under-over procedure is becoming widespread as a means of tympanic membrane repair [13].

Stage et al, (1992) [25] who supported the under-over procedure when used for perforations anterior to the handle of the malleus, reported a success rate of 91% in 39 ears. A similar success rate (90%) was attained by Kartush et al, (2002) [13] in a series of 120 patients who underwent under-over tympanoplasty. In a study conducted by Jung et al, (2005) in a series of 200 patients they reported that there were four failures in 100 operated cases (96% success rate) with underlay graft method for anterior TM perforation due to infection and re-perforation. In the under-over tympanoplasty, there were three failures of 100 operated cases (97% success rate) due to a postoperative infection, anterior blunting and recurrent cholesteatoma. In our study we also overcome under-over tympanoplasty technique as our success rate was 100% as there were no postoperative infection, anterior blunting and recurrent cholesteatoma.

A fascial graft may become detached from the umbo because of postoperative

shrinking and scarring in the healing process theoretically, and this conduction will cause a decrease in the hearing levels ^[26]. In our study we didn't face this problem and fascial graft not detached from the umbo because of the double graft layers and its good middle ear support with the gel foam. An air-bone gap closure to within 10db or less was considered successful, as adopted by many authors, Dornhoffer (1997) ^[27]; Raafat et al., (1999) ^[28]; Gerber et al., (2000) ^[29] and Maury et al., (2001) ^[30].

In our study, the audiometric tests performed at the 3rd postoperative month revealed that the mean air-bone gap decreased by 20±1dB. The current study comprised 14 patients suffering from tubotympanic type of chronic suppurative otitis media with large anterior tympanic membrane perforation. The study included 5 males and 9 females with the mean age of 23.7 years.

The distribution of cases according to their sex and age revealed no significant statistical difference. Dornhoffer (1997) ^[27] studied 42 patients with tubotympanic chronic suppurative otitis media. They were 20 males and 22 females with the mean age of 23.6 ± 5.9 years. He stated that analysis of the patient's data revealed that sex and age at the time of surgery had no impact on postoperative hearing results.

Majority (60%) of the patients was of rural habitant and rest (40%) was from urban areas. All of the patients had complaints of discharging ear of varied duration and varied degree of hearing loss. Dry ear for at least 3 months was the main inclusion criteria in our patients preoperative. In all the cases both preoperative and postoperative audiometry were performed and the results were compared. Postoperative pure tone audiometry was performed only in successful closure cases after 12 weeks follow-up period. All patients operated by underlay technique.

In our study, the success rate of tympanoplasty performed using the underlay technique was 100% in 14 patients however the number of patients was less than other comparative studies. In this study, there were no such complications as graft lateralization,

canal stenosis or blunting, no retractions, No epithelial pearls, no wound infection, hematomas, perichondritis, auricular deformities, no scar deformity as keloid or gaped suture. Also no sensorineural hearing loss was identified.

CONCLUSION

It can be concluded from this study that the temporalis fascia is suitable and efficient graft material in tympanoplasty. The double layer temporalis fascia graft is the most suitable one in both postoperative graft taking and hearing improvement for large anterior tympanic membrane perforation. Study with large number of patients for further evaluation is recommended.

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