COMPARISON OF HEARING OUTCOMES IN PATIENTS UNDERGOING TYPE I TYMPANOPLASTY WITH TEMPORALIS FASCIA VS TENSOR FASCIA LATA GRAFT

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ABSTRACT

Background: Mucosal type of chronic otitis media is characterized by a central perforation of the tympanic membrane with or without ossicular chain involvement. The perforation is in the pars tensa and is mostly sequelae to an earlier attack of acute otitis media. In addition, the tympanic membrane perforation may be caused by chronic suppurative otitis media (CSOM) or following trauma, mostly resulting in hearing loss. Aim: To compare the hearing outcome in patients undergoing type one tympanoplasty using temporalis fascia versus patients undergoing type one tympanoplasty using fascia lata graft. Method: Patients with mucosal chronic suppurative otitis media were chosen from the OPD or outpatient department of otorhinolaryngology at Dr DY Patil Hospital; between May 2019 and April 2021. This prospective study includes 50 patients, of which 25 patients were operated on for myringoplasty with temporalis fascia, and the other 25 were operated on for myringoplasty with fascia lata graft. The pre-operative and post-operative hearing assessment was done by audiometry (AB gap), and improvement in PTA findings was compared. Results: There is a significant improvement in the AB gap in patients undergoing type one tympanoplasty with tensor fascia lata compared to those who underwent the same surgery but with temporalis fascia. Conclusion: As observed by our study, significant improvement in AB gap in patients undergoing type 1 tympanoplasty with tensor fascia lata was present compared to those who underwent the same surgery but with temporalis fascia. Thus, performing type one tympanoplasty with tensor fascia lata can be suggested to improve the AB gap.

KEYWORDS fascia lata, temporalis fascia, tympanoplasty, myringoplasty, mucosal, randomised control trial

Introduction

Hearing loss following CSOM is disabling and causes major considerable on a person’s social life and is a major cause of deafness in India [1]. Perforations in the Mucosal type of CSOM can be corrected by tympanoplasty using various graft materials and is currently an established surgery for tympanic membrane perforations being performed routinely by otorhinolaryngologists all over the world.[2] Myringoplasty can be defined as the surgical repair of the eardrum. Wullstein, in 1956 [3], classified tympanoplasty with myringoplasty being classified as a Type one tympanoplasty. This surgery aims to correct the tympanic membrane defect and the sound conducting mechanism in a long-lasting period [4]. Since the introduction of this surgery in the early 1950s by Wullstein [3,4] and Zoellner [4,5], various graft materials and placement methods have been reported to reconstruct the perforated tympanic membrane.
Some commonly used autologous graft materials include vein, fascia lata, temporalis fascia, tragal perichondrium and cartilage [6,7]. The abundance of such graft materials suggests that there is no definite favourite and the type of graft material solely depends on the surgeon’s choice [8]. The temporalis fascia, among all the graft materials, is the most commonly used in primary tympanoplasties, with high success rates for graft retentions [9].

However, there are chances of recurrence of tympanic membrane perforations with temporalis fascia graft in cases like advanced middle ear pathology, retraction pockets, and atelectatic ear [10]. Additionally, failure rates are higher in larger perforations with temporalis fascia as a graft material. [11,12] Displacement of graft, incorrect placement [13], autolysis, infection, haemorrhage, and dysfunction of Eustachian tube are known to cause the failure of closure of perforation [14]. Therefore, the search for a better graft material went on. Fascia lata, an autologous free fascia graft derived from the thigh, has recently gained prominence as a graft in tympanoplasty with the advent of several new procedures for tympanoplasty and cosmetic awareness. In 1956 [2], Fritz Zoellner was the first surgeon to use fascia lata for tympanoplasty.

Facia lata has better dimensional stability [15] and encircles typically and tightens the thigh muscles. Because of this, it has been used as grafts for patients with facial paralysis by supporting the facial muscles [16].

**Materials and methods**

Patients with mucosal chronic suppurative otitis media were chosen from the OPD or outpatient department of otorhinolaryngology at Dr DY Patil Hospital; between May 2019 and April 2021. This prospective study includes 50 patients, of which 25 patients were operated on for myringoplasty with temporalis fascia, and the other 25 were operated on for myringoplasty with fascia lata graft.

**Inclusion criteria:**

1. Chronic suppurative otitis media, inactive, mucosal and with central perforation
2. Patients, both male and female between the age group 15 to 60 years
3. Pure tone average or PTA between 20dB to 45dB AB gap
4. Ear should be dry and discharge-free for a minimum of 2 weeks before the procedure
5. Eustachian tube function should be patent and normal
6. Middle ear should be free of disease
7. Ossicular chain continuity should be intact (intraoperatively)

**Exclusion criteria:**

1. Patients less than 16 years of age and more than 60 years of age
2. Sensorineural type of hearing loss
3. Squamosal type of disease
5. Severe anaemia.
6. Re-perforation

A comparative study was done based on Audiological outcome, i.e., Closure of the AB gap.

**Operative procedure:** Patients were randomized and subjected to type one tympanoplasty using temporalis fascia or fascia lata.

**Positioning and preparation:** The patient is placed in a supine position on the operating table, with the head supported on a rubber ring and rotated to the opposite side of the surgeon. Antiseptic paint was applied, and draping was done.

**Anesthesia:** All surgeries were performed under local anaesthesia after the xylocaine sensitivity test. Local anaesthesia was achieved by using 2% xylocaine with adrenaline in the post auricular region’s subcutaneous tissue and four external auditory canal quadrants.

**Approach:** A post-aural approach with Wilde’s incision was given 5-10mm behind the post-auricular groove, starting from the superior part of the pinna along with the post-auricular groove to the mastoid tip using a 15-no. blade. In 25 patients, a temporalis fascia graft was harvested, and the incision was subsequently deepened to the periosteum. Next, the fascia lata was harvested by an incision made along the lateral thigh, about 3-5 cm long, over the junction of the upper and middle one-third of the upper leg. Overlying fat was bluntly dissected off the area’s fascia to be extracted. A medial longitudinal incision over the fascia was made first, followed by a lateral longitudinal incision. This determines the graft’s width. Incisions in the underlying muscle should be avoided. The fascia was then gently lifted off of the underlying muscle by a distal transverse incision in the fascia. In no manner should the muscle be harmed in any way? Finally, the graft was administered through a proximal transverse incision.

3-0 nonabsorbable sutures were used to seal the wound. The margins of the tympanic membrane perforation were viewed and freshened using a sickle knife or a pick. Incisions were made at 6 and 12 o’clock positions, and the tympanomeatal flap was elevated. The middle ear was examined, and the ossicular chain was verified for continuity. The malleus handle was denuded, and middle ear gel foam was placed beneath it. Then, either temporalis fascia or tensor fascia lata graft was placed over the denuded malleus handle. The tympanometry flap was repositioned. Suturing was done in layers, and a Mastoid dressing was applied after gel foam was placed over the graft.

**Postoperative period:** Mastoid dressing was removed on POD2, and daily dressings were done on the surgical wound. All the patients were given a week’s course of antibiotics, analgesics, and decongestants. The sutures were removed on POD7, and antibiotic ear drops were started. The patients were then called for follow-up for at least 3 months, following which post-operative PTA was performed to compare the findings.

**Results**

Our study compared the hearing outcomes in patients undergoing type one tympanoplasty with Temporalis fascia and Tensor Fascia lata graft. After satisfying the inclusion criteria, 50 patients were selected for the study. The purpose and details of the study were shared with the patient’s informed consent was obtained from them in their native language. The participants were subsequently divided into two groups. Group A, the first group, were subjected to type one tympanoplasty with tensor fascia lata and group B, the other group, underwent the same with temporalis fascia.

The mean preoperative AB gap (Table 1) was 32.8 dB and 32 dB in groups A and B, respectively. The P-value was 0.610 and
**Table 1** Preoperative AB gap
The mean preoperative AB gaps were 32.8 dB and 32 dB in groups A and B, respectively. Therefore, the P-value was 0.610 and was non-significant.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensor fascia lata</td>
<td>32.8</td>
<td>5.2</td>
<td>25</td>
<td>40</td>
<td>0.610</td>
</tr>
<tr>
<td>Temporalis fascia</td>
<td>32</td>
<td>5.8</td>
<td>25</td>
<td>40</td>
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**Table 2** Postoperative AB gap
The mean post-operative AB gaps were 15.8 dB and 18.6 dB in groups A and B. The p-value was 0.138 and was not statistically significant.

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<tr>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensor fascia lata</td>
<td>15.8</td>
<td>7</td>
<td>5</td>
<td>30</td>
<td>0.138</td>
</tr>
<tr>
<td>Temporalis fascia</td>
<td>18.6</td>
<td>6</td>
<td>10</td>
<td>30</td>
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was non-significant. The mean post-operative AB gap (Table 2) was 15.8 dB and 18.6 dB in groups A and B. The p-value was 0.138 and was not statistically significant. Finally, the mean improvement in the AB gap (Table 3) was 17 dB and 13 dB, respectively, in groups A and B, making it significant at a P-value of 0.011. Thus, as observed from the above findings, improvement
The mean improvement in the AB gap was 17 dB and 13 dB, respectively, in groups A and B, making it significant at a P-value of 0.011.

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<th>Min</th>
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</thead>
<tbody>
<tr>
<td>Tensor fascia lata</td>
<td>17</td>
<td>5.8</td>
<td>10</td>
<td>30</td>
<td>0.011</td>
</tr>
<tr>
<td>Temporalis fascia</td>
<td>13</td>
<td>4.8</td>
<td>5</td>
<td>20</td>
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</tbody>
</table>

In the hearing was significantly better in the group undergoing type one tympanoplasty with tensor fascia lata compared to the temporalis fascia group.

In the study conducted by Indorewala et al. [15], a gain of 15 dB for fascia lata was noted, while a gain of 17 dB was observed for temporalis fascia. In contrast, in the study by Ayman Ali Abdel Fattah et al. [17], the preoperative AB gap average was 34.6 ± 6.7 dB in the temporalis fascia group and 35.3 ± 6.4 dB in the fascia lata group, with no significant difference among both the groups. Furthermore, the post-operative AB gap in the temporalis fascia group was 17.5 ± 4 dB after 1 month and 8.6 ± 6.9 dB after 3 months, while in the fascia lata group, the mean postoperative AB gap was 17.6 ± 4.9 dB after a month and 9.4 ± 7.5 dB after 3 months with no statistically significant difference.

Conclusion

As observed by our study, there is a significant improvement in the AB gap in patients undergoing type 1 tympanoplasty with tensor fascia lata compared to those who underwent the same surgery but with temporalis fascia. Thus, performing type one tympanoplasty with tensor fascia lata can be suggested to improve the AB gap.

Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>TM</td>
<td>Tympanic membrane</td>
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<tr>
<td>COM</td>
<td>Chronic Otitis Media</td>
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<td>CSOM</td>
<td>Chronic Suppurative Otitis Media</td>
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<td>AB gap</td>
<td>Air Bone Gap</td>
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<td>dB</td>
<td>Decibels</td>
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<td>OPD</td>
<td>Outpatient department</td>
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<td>POD</td>
<td>Post-operative day</td>
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<td>PTA</td>
<td>Pure Tone Audiometry</td>
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Funding

This work did not receive any grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest

There are no conflicts of interest to declare by any of the authors of this study.

References

3. Wullstein HL. Functional operations in the middle ear with split-thickness skin graft [in German]. Arch Otorhinolaryngol 1952; 161:422-35


