COMPARATIVE STUDY OF DIFFERENT GRAFT MATERIALS IN MYRINGOPLASTY- TYPE I TYMPANOPLASTY

K. S. Raghu Chanakya1, V. Shekar Naik2, Bhagya Jyothi Bodapati3, Narmada Vatti4, S. Surya Prakash Rao5

1Postgraduate, Department of ENT, Andhra Medical College, Visakhapatnam, Andhra Pradesh.
2Postgraduate, Department of ENT, Andhra Medical College, Visakhapatnam, Andhra Pradesh.
3Postgraduate, Department of ENT, Andhra Medical College, Visakhapatnam, Andhra Pradesh.
4Postgraduate, Department of ENT, Andhra Medical College, Visakhapatnam, Andhra Pradesh.
5Professor, Department of ENT, Andhra Medical College, Visakhapatnam, Andhra Pradesh.

ABSTRACT

BACKGROUND
Chronic otitis media is defined as chronic inflammation of mucoperiosteal lining of part or whole of the middle ear cleft characterized by ear discharge, a permanent perforation of tympanic membrane and impairment in hearing. It is one of the most common causes of deafness and recurrent ear infections in developing countries like India. In bilateral disease, hearing handicap becomes more evident. Surgical management of perforation is needed if perforation fails to heal by conservative therapy. The objectives of this study were- 1) to study the graft uptake by different graft materials in myringoplasty. 2) to evaluate hearing improvement by different graft materials in myringoplasty.

MATERIALS AND METHODS
A total of 100 patients with CSOM tubotympanic type were selected who underwent myringoplasty with 5 types of graft materials, 1) temporalis fascia, 2) cartilage, 3) periosteum, 4) perichondrium, 5) fascia lata in Government ENT Hospital, Andhra Medical College, Visakhapatnam, during November 2016 to April 2018 were studied during a period of one and a half year, for sex and age variations, graft uptake, hearing improvement.

RESULTS
In our study, male preponderance was observed with 56% when compared to 44% females. The male female ratio was 1.27:1. The most commonly affected age group was 26-35 with 35% of patients falling into this category. Least commonly involved age group is 16-25 with 15% patients. Temporalis fascia and cartilage showed highest (100%) graft uptake while periosteum, perichondrium and fascia lata showed 90% uptake. Hearing improvement was best with temporalis fascia (100%) and least with cartilage (85%).

CONCLUSION
In this study, of different graft materials in myringoplasty- type 1 tympanoplasty, the temporalis fascia evolved as the best for both graft uptake and hearing improvement. Even though cartilage graft uptake was 100%, hearing improvement was 85%, the least in our study. The other three graft materials like periosteum, perichondrium and fascia lata can also be considered for myringoplasty as graft uptake and hearing improvement were 90% in each. Our study showed male preponderance with 56%, compared to females 44% in need of myringoplasty. Age group of 26-35 years dominated with 35% patients belonging to this age category.

KEYWORDS
Myringoplasty, Temporalis Fascia, Perichondrium, Type 1 Tympanoplasty, Myringoplasty Graft Materials.


BACKGROUND
Chronic otitis media is defined as chronic inflammation of mucoperiosteal lining of part or whole of the middle ear cleft characterized by ear discharge, a permanent perforation of tympanic membrane and impairment in hearing. It is one of the most common cause of deafness and recurrent ear infections in developing countries like India. In bilateral disease, hearing handicap becomes more evident. Surgical management of perforation is needed if perforation fails to heal by conservative therapy. The function of tympanic membrane is restored by repairing perforation with graft materials such as temporalis fascia, periosteum, perichondrium, cartilage and fascia lata.1 However due to its anatomic proximity, translucency and suppleness, temporalis fascia and cartilage are the most preferred grafting materials. These graft materials act as a
scaffold and seal the perforation with migration of fibroblasts and epithelium.

Most common surgical procedure practiced nowadays is the post aural approach in myringoplasty\textsuperscript{2,3} but off late, Transcanal endoscopic ear surgeries have gained popularity. Despite the development in surgeries, many complications such as recurrent perforation, Epithelial pearl formation, blunting, medialisation or atelectasis, lateralization are seen. Injury to facial nerve and jugular bulb and iatrogenic cholesteatoma are rarely seen in myringoplasty.\textsuperscript{4}

Aims and Objectives
1. To study the graft uptake by different graft materials in myringoplasty.
2. To evaluate hearing improvement by different graft materials in myringoplasty.

MATERIALS AND METHODS
A total of 100 patients with CSOM tubotympanic disease who underwent myringoplasty in Government ENT hospital, Andhra medical college, Visakhapatnam, during November 2016 to April 2018 were studied during a period of one and a half year.

Study Design
Prospective study.

Inclusion Criteria
1. CSOM with tubotympanic type with conductive hearing loss.
2. Dry ear for minimum 2 months.
3. Age between 16 and 55 years.

Exclusion Criteria
1. Age below 16 and above 55 years
2. Revision myringoplasty
3. CSOM with polyp and granulations
4. CSOM with intracranial complications
5. CSOM with head and blast injuries
6. CSOM with Diabetes mellitus and Anaemia
7. Patients with post-operative infection

A total of 100 patients with CSOM tubotympanic disease with dry central perforation, were selected from Government ENT hospital, Andhra Medical College, Visakhapatnam, during November 2016 to April 2018 for a period of 18 months. These patients were thoroughly examined clinically with headlight, microscope and endoscope. Audiological tests such as Puretone audiometry and Impedance audiometry, radiological investigations such as x-ray mastoids and CT-temporal bones were done whenever required, along with routine blood investigations. Patients with systemic diseases like Diabetes and anaemia were excluded from the study.

To study the accuracy of results, the surgery was performed in all cases by the same surgeon and all cases were approached through postauricular William Wilde’s incision under local or general anaesthesia. 100 patients were divided into 5 groups with 20 patients in each group. Myringoplasty was undertaken using five different graft materials 1. Temporalis fascia, 2. Cartilage from tragus of 0.5 mm thickness, 3. Periosteum over mastoid, 4. Perichondrium from tragus, and 5. Fascia lata, to each group. Mastoid bandage was applied after surgery and removed after 7 days. Patients were discharged with instructions like 1. Avoiding allergic food 2. Regular intake of medicines 3. Avoiding entry of water into the ears. No postoperative infections were seen in any patients of this series. Patients were followed up for 1 month and 3 months post operatively. Audiometry was performed after 3 months in all cases.

RESULTS

<table>
<thead>
<tr>
<th>Sex</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>56</td>
<td>56%</td>
</tr>
<tr>
<td>Female</td>
<td>44</td>
<td>44%</td>
</tr>
</tbody>
</table>

Table 1. Sex Variation

In this series, males (56) have dominated females (44) in CSOM Tubotympanic type for myringoplasty. Male female ratio is 1.27:1.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>No. of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-25</td>
<td>15</td>
</tr>
<tr>
<td>26-35</td>
<td>35</td>
</tr>
<tr>
<td>36-45</td>
<td>30</td>
</tr>
<tr>
<td>46-55</td>
<td>20</td>
</tr>
</tbody>
</table>

Table 2. Age Variation

26-35 age group (35%) was affected more with CSOM inactive tubotympanic type. Later 36-45 age group (30%), 46-55 age group (20%), and 16-25 age group (15%) were involved in descending order.

<table>
<thead>
<tr>
<th>Graft Material</th>
<th>No. of Patients</th>
<th>Graft Uptake</th>
<th>Residual Perforation</th>
<th>Success %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporalis fascia</td>
<td>20</td>
<td>20</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Periosteum</td>
<td>20</td>
<td>18</td>
<td>2</td>
<td>90%</td>
</tr>
<tr>
<td>Perichondrium</td>
<td>20</td>
<td>18</td>
<td>2</td>
<td>90%</td>
</tr>
<tr>
<td>Cartilage</td>
<td>20</td>
<td>20</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Fascia lata</td>
<td>20</td>
<td>18</td>
<td>2</td>
<td>90%</td>
</tr>
</tbody>
</table>

Table 3. Graft Uptake Rate

Graft uptake rate was highest i.e., 100% in patients who underwent myringoplasty with temporalis fascia and cartilage, followed by the patients who had myringoplasty using periosteum, perichondrium and fascia lata with graft uptake rate 90% each.
Post-operative hearing improvement was maximum in patients who had surgery using temporalis fascia (100%), followed by periosteum, perichondrium and fascia lata (90%). The least is by cartilage (85%).

**DISCUSSION**

Otitis media refers to any inflammatory disease of the mucoperiosteal lining of the middle ear cleft. It has multifactorial origin such as infections, Eustachian tube dysfunction, allergy and trauma.5

The evolution of the tympanic membrane grafting has been based on biological tissues of mesodermal origin containing collagen matrix. Many autologous grafts such as temporalis fascia, fascia lata, perichondrium, cartilage can be used. Several allografts such as dura mater, pericardium, temporalis fascia, amniotic membrane, skin, cornea were tested in the past. Recently alloplastic graft materials such as absorbable gelatin, sponge and acellular dermal matrix are experimented. Still Temporalis fascia remains the most commonly used graft material.

The hearing impairment is primarily due to reduced surface area on which sound pressure is exerted with reduced hydraulic ratio and secondarily due to sound reaching the round window directly cancelling the baffle effect.

Kotecha B, Fowler S, et al6 showed male preponderance in myringoplasty 57%, 43% which is similar to our series 56%:44%.

In our study 26-35 age group dominated all other age groups with 35% which is similar to Palva T et al7 which is 38%.

The temporalis fascia is the most commonly used graft with success rates up to 97% in primary cases. There has been increase in the use of cartilage grafts primarily.

Van Rompey Farr MRB1 concluded that both conchal and tragal cartilage had similar outcomes regarding auditory properties and a 0.5 mm thickness was considered sufficient to maintain shrinkage resistance and sound conduction comparable to a normal tympanic membrane.

Mohammad et al8 found that tympanoplasty using temporalis fascia and cartilage showed similar functional outcomes regarding hearing, which varies from our study, temporalis fascia was 100% and cartilage was 85%.

In our study, it is observed that uptake of cartilage graft was same as that of temporalis fascia. Both have better uptake than that of other materials such as periosteum, perichondrium and fascia lata. B J Singh et al9 showed graft uptake and air-bone gap closure as 91% in all graft materials which is similar to our study.

**CONCLUSION**

In this study of different graft materials in myringoplasty-type 1 tympanoplasty, temporalis fascia evolved as the best for both graft uptake and hearing improvement. Even though cartilage graft uptake is 100%, hearing improvement is 85%. The other three, periosteum, perichondrium and fascia lata also can be considered as alternative materials because graft uptake and hearing improvement were 90% in all. Our study showed male preponderance with 56%, compared to females 44% in need of myringoplasty. Age group of 26-35 years dominated with 35% patients belonging to this age category.

**REFERENCES**


