Research Paper

Comparative Study Between Temporalis Fascia Versus Tragal Perichondrium Graft In Type 1 Tympanoplasty

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**ABSTRACT**

The perforation of the tympanic membrane may be of traumatic origin or due to chronic otitis media. If a perforation fails to heal conservatively, they require surgical closure. Autologous graft materials have stood test of time, in repairing of tympanic membrane perforations.

In our tertiary care institution we conducted a prospective study trial on 60 subjects, to evaluate the comparative efficacy of Temporalis fascia & Tragal perichondrium as grafting material in underlay Type 1 Tympanoplasty. In this study surgical success was evaluated, in terms of closure of tympanic membrane perforation & closure of air-bone gap, within 10dB during the follow up period.

Temporalis fascia achieved 83% graft uptake & satisfactory hearing improvement in 76% of patients. Tragal perichondrium achieved a success rate of 86% graft uptake & 83% hearing gain.

The rates are comparable with no statistical significance of difference between them.

**INTRODUCTION**

A tympanic membrane perforation irrespective of the cause, will require surgical closure, if it fails to heal on its own. Repairing of tympanic membrane perforation helps to restore the vibratory area of tympanic membrane & affords round window protection which would improve hearing. In addition to above mentioned advantage, repair drum would prevent exposure of the middle ear to external infection and allergen.

Biological autologous graft material, act as a scaffold of tissue matrix, when applied to seal the perforation and this subsequently revascularises and stimulates migration of fibroblast and epithelium. Autologous graft material includes vein, fat, fascia lata, perichondrium, temporals fascia and cartilage. The material used varies and are based on their ease of harvesting, preparation time, placement ease, viability, graft uptake and hearing improvement. Abundance of various material used for grafting shows that, there is no clear cut favorite choice of graft material which depends on the individual surgeon’s preference. However, due to the anatomic proximity, temporalis fascia and tragal perichondrium , are the two most preferred graft material of otologists.

In this paper, we present our experience in underlay tympanoplasty, while comparing temporals fascia and tragal perichondrium, as the ideal graft material with regard to graft uptake and hearing improvement.

**MATERIAL AND METHOD**

In this prospective observational type of study, we have selected 60 patients, in over a period of 1½ year attending ENT OPD at Bharti Hospital Sangli, to compare the use of temporals fascia graft and tragal perichondrium graft material in view of graft uptake and hearing improvement. Every alternate patient was operated using temporals fascia graft and tragal perichondrium graft materials.

In this study group we have included patients between the age group of 16 - 50yrs, irrespective of being male/female, with unilateral/bilateral safe dry perforation, pure conductive hearing loss , intact ossicular chain & controlled diabetes and hypertension.

Patient with active mucosal otitis media, were treated conservatively, and were included them in the study when their ear became inactive mucosal by at least 6weeks.

Patient with sensory neural hearing loss, mixed hearing loss, ossicular chain discontinuity, revision type – 1 Tympanoplasty, external ear pathology, Air- Bone gap > 40dB, evident tympanosclerosis were subsequently excluded from the study.

**OBSERVATION AND RESULT**

Patients were followed post-operatively at 6th, 12th and 24th week, for evaluation of graft uptake and hearing improvement.

At the end of 6th week it was observed that, in majority of cases there is no significant improvement in hearing, the possible causes for which may be-

1. Incomplete graft uptake
2. Edematous middle ear
3. Eustachian tube dysfunction due to gelfoams at Eustachian tube orifice in middle ear.

Under normal circumstances post-operatively, it takes 2-3 months for a perforation to heal completely. However in some cases where tragal perichondrium was used it took about 4 months for healing.

At the end of 24th week it was observed that, Out of 60 cases, 11 failed to achieve expected hearing improvement, of which 9 were because of failure of graft uptake while 2...
due to unknown etiology. Of these failed 11 cases 6 were
grafted using temporalis fascia & 5 were grafted using
tragal perichondrium as graft material. Out of 30 patient
on whom temporalis fascia was used as graft 25 (83.33%)
showed successful graft uptake, while 5 (16.67%) showed
residual perforation. Of the 30 patients who were grafted
with tragal perichondrium, 26 (86.67%) showed successful
graft uptake, while 4 (13.33%) showed residual perforation.
( Table – 1 )

30 patients who were grafted using temporalis fascia, 24
(80%) showed hearing improvement less than 10 dB, while
remaining 6 (20%) patients did not achieve expected hear-
ing improvement which was less than 10 dB. Of the 30 pa-
tients who were grafted with tragal perichondrium as graft
material, 25 (83.33%) showed hearing improvement less
than 10 dB, while remaining 5 (16.67%) patients did not
achieve expected hearing improvement which was less than
10 dB ( Table – 2 )

DISCUSSION
Otitis media is a general term used to describe any inflam-
atory disease of the mucous membrane lining the middle
ear cleft. It is an important disease of children and adults
and is caused by multiple interrelated factors including in-
factions, Eustachian tube dysfunction, allergy and barotrau-
mas. Chronic otitis media is most advanced disease state in
the spectrum of otitis media and is associated with some
form of irreversible pathological condition in the middle
ear such as granulation tissue, ossicular changes, tympan-
ocochleosis, tympanic membrane perforation and choleste-
toma. Traditionally chronic otitis media is classified as
tubotympanic disease characterized by the presence of a
central perforation and atticoconal disease characterized by
the presence of a Cholesteatoma.

Tympanoplasty is main the surgical treatment for tubotym-
panic disease. It is defined as an operation performed to
eradicate disease in the middle ear and to reconstruct the
hearing mechanism without mastoid surgery, with or
without tympanic membrane grafting. The ideal Tympa-
nonplasty restore sound protection for the round window
by constructing a closed, air containing middle ear against
the round window membrane and restores sound pressure
transformation for the oval window by connecting a large
tympanic membrane or substitute membrane with the sta-
pes footplate via either an intact or a reconstructed ossicu-
lar chain.

To accomplish the two physiologic principles of Tym-
panonplasty, sound protection for the round window must
first be provided by means of a tissue graft to repair the
tympanic membrane defect, and the middle ear must be
lined with mucosa and must contain air to the protected
window. Then sound pressure transformation for the oval
window must be provided by the mobile ossicular continu-
ity between the large tympanic membrane and the small
oval window.

Raine and Singh in a retrospective analysis of 114 Tym-
panonplasties in children in the age group of 7 to 16 demon-
strated a significant higher rate of failure between 8 and 12
years. The probable explanation of high incidence of failure
in young children is due to increased incidence of upper
respiratory tract infection and immature Eustachian tube
function. They advocate deferring surgery till 12 years for
achieving better results. In our study the youngest patient
was 13years of age. Ronal Strahan documented that the in-
cident of graft failure and failure to restore hearing were
higher in older age group.

Over the years different grafting materials have been in-
troduced right from pig’s bladder membrane by Benzer in
1640 to canal wall by William house in 1958 to temporalis
fascia in 1964 by Ned chalet and cartilage in 1963. Peri-
chondrium was used by Allesandro Trombetta 1963 . Since
then skin as a grafting material has been discarded due to
its desquamation formation properties with chances of
Cholesteatoma formation. Vein grafts also have not been so
popular due to its chances of getting reperforated. To date
temporalis fascia and perichondrium have been the two
most commonly used grafting materials.

In this study we have compared the results of tragal per-
ichondrium and temporalis fascia grafts used for the repair
of the perforated tympanic membrane using underlay
technique. Both tragal perichondrium and temporalis fas-
cia accessible near the operative site, available in adequate
amount have excellent survival capacity. Thus they fulfill
all the criteria of idea graft tissue. Both being mesodermal
in origin, they are free from the possibility of post Chole-
steatoma.

In the study conducted by Gibbs using temporalis fascia
as graft material by the underlay technique, the percentage
rate was 87.5%. Strahan achieved graft uptake suc-
cess rate for temporalis fascia graft of 87% by underlay
technique. The hearing restoration rate for temporalis fa-
sia graft was 82% in the study conducted by R.W. Strahan,
Paul H. ward, Mario Acqurelli, Bruce Jafek. The present
study achieves a take rate of 84% and hearing restoration
of 76%.

Goodhill achieved near 10% success rate with tragal perichondrium
in underlay Tympanoplasty. Strahan recorded 86% tragal perichondrium
graft rate. Eviator noted that graft uptake with tragal perichondrium by
underlay method was 90.47%. a study was conducted by John L.Dornhoffer from the department of oto-
larngology – head and neck surgery, university of Arkansas to study the
hearing results using pachycondrial grafts. Out of 22 patients who
underwent the surgery, the graft was taken up in all the patients and the average A-B gap was 6.8dB in postop-
erative period. Present study achieves 80% take rate and a hearing restoration rate of 75% the overall graft take rate
and hearing restoration with tragal perichondrium and temporalis fascia is nearly identical.

Table 1: COMPARATIVE RESULT OF GRAFT UPTAKE

<table>
<thead>
<tr>
<th>Graft Material</th>
<th>Graft Uptake</th>
<th>Residual Perforation</th>
<th>Z-test</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporalis Fascia</td>
<td>25 (83.33%)</td>
<td>5 (16.67%)</td>
<td>0.04</td>
<td>0.97</td>
</tr>
<tr>
<td>Tragal Perichondrium</td>
<td>26 (86.67%)</td>
<td>4 (13.33%)</td>
<td></td>
<td></td>
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</tbody>
</table>

Table 2: COMPARATIVE TABLE OF HEARING IMPROVEMENT

<table>
<thead>
<tr>
<th>Graft material</th>
<th>Post-op Air-bone Gap in</th>
<th>Post-op Air-bone Gap in</th>
<th>Z</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporalis Fascia</td>
<td>&lt;10 dB</td>
<td>&gt;10 dB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tragal Perichondrium</td>
<td>24 (80%)</td>
<td>6 (20%)</td>
<td>0.26</td>
<td>0.80</td>
</tr>
</tbody>
</table>
REFERENCES:

6. Glasscock and Shambaugh the American academy of ophthalmology and otorhinolaryngology 5th edition pg no. 466
18. Abraham Eviator: Traagal Perichondrium and cartilage in reconstructive ear surgery; laryngoscope no. 11;88:1-23