

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



Medical Science

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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, temporalis 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 temporalis 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 1 ½ year attending ENT OPD at Bharti Hospital Sangli, to compare the use of temporalis fascia graft and tragal perichondrium graft material in view of graft uptake and hearing improvement. Every alternate patient was operated using temporalis 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.
4. Gelfoam in external auditory canal.

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 hearing improvement which was less than 10 dB. Of the 30 patients 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 inflammatory 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 infections, Eustachian tube dysfunction, allergy and barotraumas. 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, tympanosclerosis, tympanic membrane perforation and cholesteatoma. Traditionally chronic otitis media is classified into tubotympanic disease characterized by the presence of a central perforation and attic/contral disease characterized by the presence of a Cholesteatoma.

Tympanoplasty is main the surgical treatment for tubotympanic 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 Tympanoplasty 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 stapes footplate via either an intact or a reconstructed ossicular chain.

To accomplish the two physiologic principles of Tympanoplasty, 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 continuity between the large tympanic membrane and the small oval window.

Raine and Singh in a retrospective analysis of 114 Tympanoplasties in children in the age group of 7 to 16 demonstrated 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 13 years of age. Ronal Strahan documented that the incidence of graft failure and failure to restore hearing were higher in older age group.

Over the years different grafting materials have been introduced 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. Perichondrium 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 re-perforated. 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 perichondrium and temporalis fascia grafts used for the repair of the perforated tympanic membrane using underlay technique. Both tragal perichondrium and temporalis fascia accessible near the operative site, available in adequate amount have excellent survival capacity. Thus they fulfill all the criteria of ideal graft tissue. Both being mesodermal in origin, they are free from the possibility of post Cholesteatoma.

In the study conducted by Gibbs using temporalis fascia as graft material by the underlay technique, the percentage take rate was 87.5%. Strahan achieved graft uptake success rate for temporalis fascia graft of 87% by underlay technique. The hearing restoration rate for temporalis fascia graft was 82% in the study conducted by R.W. Strahan, Paul H. Ward, Mario Acquirelli, 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 uptake. 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 otolaryngology – head and neck surgery, university of Arkansas to study the hearing results using perichondrial 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 6.8 dB in postoperative 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

Graft Material	Graft Uptake	Residual Perforation	Z-test	P value
Temporalis Fascia (n=30)	25 (83.33%)	5 (16.67%)	0.04	0.97
Tragal Perichondrium (n=30)	26 (86.67%)	4 (13.33%)		

Table 2: COMPARATIVE TABLE OF HEARING IMPROVEMENT

Graft material	Post-op Air-bone Gap in < 10 dB	Post-op Air-bone Gap in > 10 dB	Z	P value
Temporal Fascia (n=30)	24 (80%)	6 (20%)	0.26	0.80
Tragal Perichondrium (n=30)	25 (83.33%)	5 (16.67%)		

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