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TO COMPARE THE STUDY OF THE EFFECTIVENESS OF THE USE OF TRAGAL CARTILAGE WITH TEMPORALIS FASCIA IN TYMPANOPLASTY

ENT

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ABSTRACT

Background: Hearing is a sense that enables man to establish contact with his fellows via speech to experience life more fully. Deafness in varying degrees of severity is a big impediment to the integration of a person into the social structure. The otologist in the past had not much to offer to hearing handicapped people with chronic middle ear disease. With recent times the advent of the antibiotic era, the operating microscope and modern anesthetics techniques aimed at producing a dry, magnified operating field, have radically altered the outlook.

Methods: This Prospective Randomised Comparative Study comprises of patients who were subjected to tympanoplasty for the treatment of chronic suppurative otits media. Each patient was subjected to a detail examination of nose, paranasal sinuses and throat to rule out any focus of infection, which could influence the result of tympanoplasty. 35 Patients were subjected to tympanoplasty with temporalis fascia while the remaining 35 patients underwent with tragal perichondrium in the age group of 15-50 years (males and females both). Patients with the complaint of discharging ear and decreased hearing were also screened .

Results: Majority of the patients preoperatively showed mild to moderate hearing loss.45.7% patients showed upto 20 db air bone gap range, 48.5% patients being in 21-40db air-bone gap and only 5.7% patients is above 40db. Graft take rate was overall 78.5%. Take-rate was 80% with temporalis fascia and 77.1% with tragal perichondrium. In the postoperative hearing analysis, 75.7% of the patients showed air- bone gap upto 20dB. 21.4% of the patients showed air- bone gap in the range of 21-40 Db. Mean improvement in hearing for temporalis fascia was 12.8 db and for tragal perichondrium was 11.4 db. Take rate of graft was not influenced by the size of perforation. Improvement in hearing was also not significantly influenced by the type of graft used.

Conclusion: Tympanoplasty is the most effective method for control of the tubotympanic type of CSOM disease and hearing improvement. Both temporalis fascia and tragal perichondrium are excellent graft materials for closure of perforation of tympanic membrane and hearing improvement. Graft uptake rate is good for both with slightly better take rates for temporalis fascia, than tragal perichondrium.Improvement in hearing is not significantly influenced by duration of disease, age or sex of patients site or size of perforation

KEYWORDS

Tympanoplasty, Tragal Perichondrium, Temporalis Fascia, hearing

INTRODUCTION

Hearing is a sense that enables man to establish contact with his fellows via speech to experience life more fully. Deafness in varying degrees of severity is a big impediment to the integration of a person into the social structure. The otologist in the past had not much to offer to hearing handicapped people with chronic middle ear disease. With recent times the advent of the antibiotic era, the operating microscope and modern anesthetics techniques aimed at producing a dry, magnified operating field, have radically altered the outlook. Permanent perforation of the tympanic membrane resulting as sequelae of chronic suppurative otitis media is a major cause of deafness. Stalwarts from past as far back as Hippocrates have asserted the same. Controversies range about every step of the operation from the incision to the material used for packing. The first known attempt to close a perforation of tympanic membrane to improve hearing was made by Marcus Banzer in 1640 using prosthesis made of pig"s bladder. Since then various graft materials like pig"s bladder, Thiersch skin graft, Split-skin graft, Pedicle graft from ear canal skin, temporalis fascia graft, Vein graft, Sclera, Corneal graft, tympanic membrane homograft and perichondrium have been used for closure of the perforated tympanic membrane. Various autografts have been used for repair of the tympanic membrane perforation like full thickness skin graft, Pedicled skin grafts (Frenckner 1955)5, split skin graft (Wullestein1 1952 and Zollner2 1953), vein graft (Shea10 1960), Fascia grafts (Heermann9 1960) and Perichondrium (Jansen191963 and Goodhill22 1967). Each of these grafts material has its advantages and disadvantages over each other. The healing of tympanic membrane perforation is preceded by ingrowths of connective tissue edges over which the epithelium migrates to close the perforation. Keeping this physiological principle in consideration it follows that connective tissue grafts, that is grafts of mesodermal origin like vein, perichondrium or fascia, prove superior to all other graft materials. Clinical investigations and animal experiments have shown that these connective tissues replace the missing fibrous element of the tympanic membrane and allow squamous epithelium and mucosal tissue to cover the medial and lateral surface.

Taking the above mentioned facts in consideration, this study was taken up to compare the results of the two connective tissue graft materials,viz temporalis fascia and the tragal perichondrium. The study includes the advantages and disadvantages of these graft materials vis-à-vis to each other.

AIMS AND OBJECTIVES

This is a comparative study of tympanoplasty operation using the temporalis fascia and tragal cartilage as a graft material.

This study is carried out to compare the:

1. Selection of grafting materials depending on type of defects in tympanic membrane.
2. Graft uptake rate of temporalis fascia and tragal cartilage in tympanoplasty.
3. Hearing improvement post operatively by using these materials.

MATERIALS AND METHODS

Present study is a prospective trial which was carried out from Sept 2015 to April 2017 on the patients attending the ENT Outpatient Department Department of ENT Muzaffarnagar Medical College and Hospital Uttar Pradesh where tympanoplasty is performed using temporalis fascia in 35 patients and tragal perichondrium in 35 patients in the age group of 15-50 years (males and females both)

- Patients with the complaint of discharging ear and decreased hearing were screened.
- Patients, in whom tubotympanic type of chronic suppurative Otitis Media was found, were taken for this study.
- The necessary permission and approval from ethics committee was taken.
- Informed written consents were obtained from the patients involved in the study according to the protocol approved by the Ethics Committee.
- This study comprises of patients who were subjected to

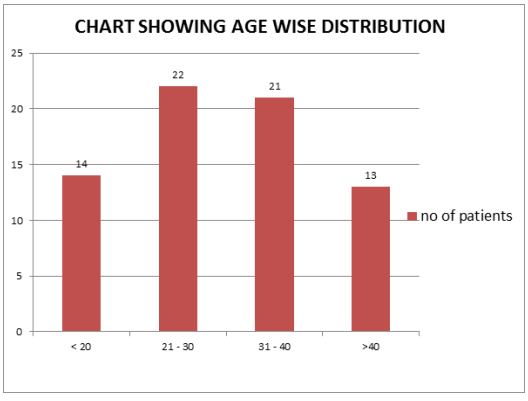
tympanoplasty for the treatment of chronic suppurative otits media. Each patient was subjected to a detail examination of nose, paranasal sinuses and throat to rule out any focus of infection, which could influence the result of tympanoplasty.

Method of Collection of Data

All the patients in the study were clinically evaluated by taking detailed history and clinical examination including Tuning fork test as per the proforma. Swab of ear discharge was sent for culture of organisms and antibiotic sensitivity. Antibiotics according to the sensitivity were given to dry up the ear discharge. Dry aural toilet was done to remove debris from ear canal. Otomicroscopy was performed. Septic foci in the nose or in the throat were treated if present before ear surgery. Pure tone audiometry was done as per American speech and hearing association (ASHA). For all patients X- ray mastoid were taken (Schuller view) Cases then were diagnosed and surgical plan of management was formulated. The patients routine Blood tests and urine tests were done for purpose of anaesthesia and to know the general condition of the patient Post operative pure tone audiometry and ear microscopy was done in every case at the end of 6th month to record the hearing and graft uptake respectively.

RESULTS:

Table-1: Shows Age wise Distribution



The above table indicates that maximum number of patients belonged between the age group of 21-40 years.

Table-2: Preoperative Hearing Levels

Preoperative Air- Bone Gap	No.of Patients			Percentage
	Temporalis Fascia	Tragal Perichondrium	Total	
<20	15	17	32	45.7%
21-40	18	16	34	48.5%
>40	02	02	04	5.7%

Majority of the patients shows mild to moderate hearing loss.
45.7% of being in 0-20 db air- bone gap range.
48.5% of being in 20-40 db air- bone gap range.
Only 5.7% of them had air- bone gap range above 40 db.

Table-3: Postoperative Hearing Levels

Postoperative Air- Bone Gap	No. of Patients			Percentage
	Temporalis Fascia	Tragal Perichondrium	Total	
<20	27	26	53	75.7%
21-40	07	08	15	21.4%
>40	01	01	02	2.8%

In the postoperative hearing analysis,
75.7% of the patients showed air- bone gap upto 20dB.
21.4% of the patients showed air- bone gap in the range of 21-40 dB .
77.1% of the patients operated with temporalis fascia showed air bone gap upto 20dB.

74.2% of the patients operated with tragal perichondrium showed air-bone gap upto 20dB.

Table 6: Post Operative Hearing Improvement Level

Mean change in hearing levels in dB	No of patients			Percentage
	Temporalis fascia	Tragal perichondrium	Total	
No change or worsen	03	03	06	8.5%
1-15	28	27	55	78.5%
16-30	04	05	09	12.8%
>30	00	01	00	1.4%

Hearing at 3 months

- 55 of 70 patients showed improvement in hearing between 0 to 15 db (78.5%).
- Out of these patients, 28 were operated using temporalis fascia i.e. 28 out of 35 patients (80%).
- 27 out of 35 using tragal perichondrium showed improvement in hearing i.e. (77.1%).
- There is no statistical significant difference in hearing improvement, using temporalis fascia or perichondrium for tympanoplasty.

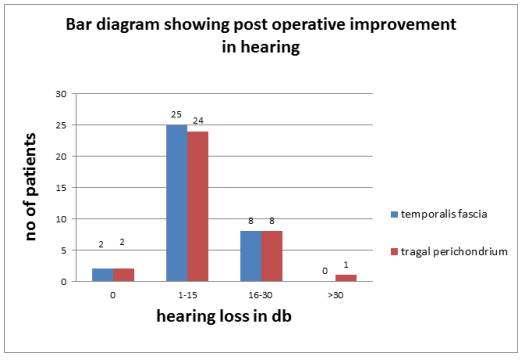


TABLE NO 8: Graft Uptake Rate

Type of graft	Graft uptake	Percentage
Temporalis fascia	28/35	80%
Tragal perichondrium	27/35	77.1%
Overall	55/70	78.5%

The above table indicates that 28 (80%) out of 35 ears operated using temporalis fascia graft healed completely at the end of 3 months with well taken graft.27 (77.1%) out of 35 ears operated using tragal perichondrium were dry with graft in place at the end of 6 months . No statistical significant association was found in graft uptake with respect to type of graft (P>0.05).

Most of the smaller perforations here were taken for tympanoplasty when they failed to respond to medical treatment of weekly trichloro – acetic acid cautery or when patient cannot come for repeated sittings.

FACTORS AFFECTING GRAFT TAKE RATE

TABLE 10: GRAFT UPTAKE RATE WITH RESPECT TO AGE OF THE PATIENTS (n = 70).

Age and sex of the patients were also compared with graft take rate:

Age in years	No of patients	Percentage %
≤ 20	11/14	78.5
21 – 30	19/22	86.3
31 – 40	15/21	71.4
>40	10/13	76.9

From the above table it is seen that maximum graft uptake rate observed in the age group 21-30 years (86.3%).

TABLE 11: GRAFT UPTAKE RATE WITH RESPECT TO SEX (n = 70).

Sex	Graft uptake	Percentage %
Male	24/32	75
Female	31/38	81.5

The above table shows that graft uptake rate was 75 % (24 out of 32 ears) in males and 81.5 % (31 out of 38 ears) in female.

P>0.005 so there is no statistical significant difference seen in graft uptake rate in sex.

DISCUSSION

This is the prospective study of 70 Tympanoplasties on patients between the age of 16 to 50 years, who were admitted in the from January 2015 to August 2016 on the patients attending the ENT Outpatien Department of ENT at Muzaffarnagar Medical College and Hospital Uttar Pradesh between Sept 2015 to April 2017. This entire study group of patient suffered from Chronic Suppurative Otits Media. Patients in this study were from all socioeconomic groups, including patients referred from other practitioners also. Conservative measures were first tried in all cases, particularly for small to moderately sized perforations. These included systemic antibiotics, trichloro-acetic acid cautery, repeated aural toilet in ears with active infections. Cases with bilateral ear diseases with suspected central septic focus were operated with tonsillectomy, adenoidectomy, septoplasty, etc. as needed. 35 patients were subjected to tympanoplasty with temporalis fascia remaining 35 with tragal perichondrium. Follow up of postoperative cases was for 6months.

Technical Aspects

Tympanoplasty is technically more difficult in patients having a narrow canal, undergoing revision surgery, by transcanal approach and in anterior perforations. Post-auricular approach is commonly used in our institution. The contour of tragus was found to be satisfactory in postoperative period without any cosmetic deformity.

GRAFT TAKE RATE

The graft take rate after 6 months was 78.5%.. Similar reports was given by **Palva T et al** (1995)[60] with graft take rate was 97%.

In our study, graft uptake rate for temporalis fascia was 80% as compared to tragal perichondrium (77.1%). Graft take-rate was slightly better for temporalis fascia than for tragal perichondrium (not significant p>>0.005).

These result compare well with Jyoti P Dabholkar (2007)[55] whose postoperative graft uptake rate with temporalis fascia 84% and tragal perichondrium showed 80%.

Tragal perichondrium was used in revision tympanoplasty where temporalis fascia was initially used. There was good graft-take in these cases. These reports compare well with **Jain CM** (1968) [61] who reports 83.33% success rate with temporalis fascia, **Ahad SA** (1986)[31], with 83.30% success with homologous temporalis fascia, **Blanshard JD** (1990)[62], 78% take-rate with tempoarlis fascia in pediatric tympanoplasty.

Most of graft failures seen in the follow-up period were due to infection probably transmitted either along Eustachian tube or along external auditory canal.

HEARING RESULT

78.5% of cases showed improvement in hearing, while 8.5% of them showed either deterioration or no improvement, at 6 month follow-up period. About 80% cases operated with temporalis fascia showed hearing improvement, while 77.1% of cases who were operated using tragal perichondrium showed improvement in hearing (statistically not significant p>> 0.05) as shown in the Table-6.

Mean improvement in hearing using temporalis fascia was 12.8 db and that with tragal perichondrium it is 11.4 db (statistically not significant p>>0.05). These result compare well with **Strauss et al**(1975) who found that improvement in air bone gap was 15 db. These result also compare well with **Ophir D** (1987)[64], **Terry RM** (1988)[37], result with fat myringoplasty.

Hartwein (1992)[42] claims reduction of air bone gap of around 15 db with tragal perichondrium graft.

This study compare well with Sunita Chhapola,Inita Matta (2011)[58] whose postoperative hearing accessed after 6 months of surgery, with temporalis fascia graft showed air bone gap of less than 10dB in 82% of patients and more than 10dB in 18% patients. Air bone gap closure with tragal perichondrium was less than 10 dB in 78% patients more than 10dB in 22% of patients.

The patient population attending our hospital was also from low socioeconomic status, many had poor personal hygiene and poor nutritional status. These were probably some of the factors which contribute to higher rate of graft rejection.

FACTORS AFFECTING GRAFT TAKE-RATE

In our study take-rate was not influenced by age, sex, size or site of perforation.

Similar opinion is expressed by **Blanshard JD** (1990)[62] who opines that age at operation, size of perforation and prior adenoidectomy had no significant influence on the success rate or audiological outcomes.

Factor such as duration of illness, age and sex of patients used, did not significantly affect graft uptake rate in our study. **Vartiainen E** (1993)[65] also states that the preoperative factor like dryness or discharging ear, site of perforation of technique (onlay/underlay) do not affect the take rate.

Berger G, et al (1997)[66], stated that results of myringoplasty were independent of patient's age, location and size of perforation and the seniority were not decisive factors in the result of myringoplasty

SUMMARY

- 70 tympanoplasties were performed on indoor basis.
- Age range from 16-50 years.
- 32 (46%) males and 38 (54%) females.
- Mean duration of illness was 15.78 months.
- Majority of the patients preoperatively showed mild to moderate hearing loss. 45.7% patients showed up to 20 dB air bone gap range, 48.5% patients showed 21-40dB air-bone gap and 5.7%
- Surgeries were performed by post-aural or end-aural approach.
- In all surgeries grafts were placed as underlay technique.
- 35(50%) patients were operated using temporalis fascia and 35(50%) patients using tragal perichondrium.
- Graft take rate was overall 78.5%.
- Take-rate was 80% with temporalis fascia and 77.1% with tragal perichondrium.
- In postoperative hearing analysis, 78.5% patients showed air-bone gap around 20db.
- Overall mean improvement in hearing was 12.1db.
- Mean improvement in hearing for temporalis fascia was 12.8 db and for tragal perichondrium was 11.4 db.
- Take rate of graft was not influenced by the age ,sex, site or size of perforation.
- Improvement in hearing was also not significantly influenced by the type of graft used.

CONCLUSIONS

- Tympanoplasty is the most effective method for control of the tubotympanic type of CSOM disease and hearing improvement.
- Both temporalis fascia and tragal perichondrium are excellent graft materials for closure of perforation of tympanic membrane and hearing improvement.
- Graft uptake rate is good for both with slightly better take rates for temporalis fascia, than tragal perichondrium.
- Hearing improvement does not depend on type of graft (No statistically significant difference – p>>0.5).
- In our study, uptake rate of graft was neither influenced by the site or size of the perforation.
- Improvement in hearing is not significantly influenced by duration of disease, age or sex of patients.

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