

Comparative study of temporalis fascia and fascia lata graft in type I tympanoplasty

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Abstract

Hearing outcome in tympanoplasty depends on many variables, one of them being the type of graft used. A number of materials like skin, vein, periosteum, perichondrium and fat have been used as grafts to seal the perforation, each having some advantages as well as disadvantages. Over past three decades temporalis fascia continues to be the graft of choice for tympanoplasty. However with the advent of endaural/endomeatal incision and cosmetic awareness, fascia lata an autologous free fascia graft from the thigh is gaining importance as graft in tympanoplasty. At Dr. D Y Patil Medical College Hospital, Kolhapur, we conducted a prospective randomized controlled trial on 100 subjects with inactive mucosal type of chronic suppurative otitis media and central perforation, with the aim to evaluate the comparative efficacy of temporalis fascia and fascia lata graft in type I tympanoplasty. In 50 patients temporalis fascia was used as a graft and in remaining 50 fascia lata was used. In this study surgical success was evaluated in terms of intact drum, average gain in hearing threshold and average hearing gain in audiometric frequency spectrum (low frequency-250, 500 and 1000Hz and high frequency-2, 4 and 6 kHz) at 3 months post-operatively. Temporalis fascia and fascia lata both achieved a graft uptake of 96%. Statistical analysis was done by using Z-test for proportion by using Graph pad quickcal software. The means of threshold gains, high frequency gains were significantly better at specific frequencies in the fascia lata group, and low frequency gains were better in temporalis fascia group and significantly much better in fascia lata group. However by Z-test for proportion this difference was statistically not significant. Except for residual perforation in two patients of each group and thigh wound infection in two patients of fascia lata group, no other complications were encountered. Thus we conclude that fascia lata may also be a preferred graft material in tympanoplasty.

Keywords: Fascia Lata graft, Temporalis fascia graft, Type I Tympanoplasty.

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INTRODUCTION

Deafness due to chronic suppurative otitis media (CSOM) is a serious disablement having a major impact on the social life of a person. Mucosal type of CSOM can be treated by tympanoplasty using various graft materials. Over past 3 decades temporalis fascia continues to be the graft of choice for tympanoplasty. However due to a few

disadvantages of temporalis fascia like poor dimensional stability and difficulty in handling that contributes to failure of closure of large perforations, a search for better graft continued. With the advent of endaural / endomeatal approach for tympanoplasty and cosmetic awareness, fascia lata, an autologous free fascia graft from thigh is recently being used as a graft in tympanoplasty. Fritz Zollner in 1956 first successfully used fascia lata to repair tympanic membrane perforations. This graft material has qualities like better dimensional stability, easy maneuvering and availability in surplus. In the past fascia lata has been used as a soft tissue filler in hernia repair, augmentation surgeries, blepharoplasty, bladder suspension surgeries, etc. There is one study published in literature comparing temporalis fascia and fascia lata with regards to dimensional stability. The present study was undertaken to evaluate and compare the results of type I tympanoplasty using temporalis fascia and fascia lata grafts with respect to dry ear and hearing status. The

objectives were to assess the take up rate of individual grafts and to analyze the hearing gain in audiometric frequency spectrum by drawing parallel comparisons between the two.

MATERIALS AND METHODS

Patients in the age group of 15 to 50 years attending ENT O.P.D with complaints of ear discharge and deafness were screened by detailed history, clinical examination and oto- microscopy. 100 cases with central perforation and with a pure conductive hearing loss but without ossicular chain pathology undergoing ear surgery for the first time were included in the study. Patients were divided into two groups by random assignment. The detailed procedure was explained in a vernacular language and those patients willing to give a written consent underwent tympanoplasty after investigations including routine haemogram, audiometry and anesthesia fitness. All the cases were operated under local anesthesia with sedation. 50 patients underwent tympanoplasty by postaural approach using temporalis fascia graft (TFG), (Figures 1-4) while the remaining 50 underwent tympanoplasty, by endaural approach in 16 [patients and endomeatal approach in 34 patients using fascia lata graft (FLG), (Figures 5-9). For fascia lata graft, a separate incision was made on the thigh. After local infiltration, a longitudinal incision 2cms in length was made along the lateral thigh approximately 4 inches above the lateral condyle of tibia. Great care was taken when making incisions on the graft so as to avoid incision of the underlying muscle. The distal tranverse incision was

made followed by the proximal transverse incision, and the fascia gently elevated off the underlying muscle. The wound was closed with cotton thread and dressing applied. The ear was then approached by endaural/endomeatal incision depending on the width of the external auditory canal. Thereafter in both the groups, edges of the perforation were freshened and tympanomeatal flap elevated. Ossicular chain was inspected and mobility checked. Graft was placed by underlay technique and flap reposed. Incision was closed and dressing given. Patients were discharged on the fourth post-operative day. They received antibiotics for two weeks along with analgesics, antihistamanics and multivitamins. Mastoid dressing for temporalis fascia cases and thigh dressing for fascia lata cases was changed on fourth post-operative day. Postaural sutures/endaural sutures were removed on seventh post-operative day while the thigh sutures were removed on tenth post-operative day. Topical antibiotic eardrops were prescribed after ten days and continued for next four weeks. Patients were called for follow up weekly upto one month and on every 15th day for next two months. All patients underwent ear microscopy to assess the graft uptake and complications (if any) at every follow up visit. Pure tone audiometry was done at the end of third month to evaluate the average gain in hearing thresholds and to analyze the average hearing gain in audiometry frequency spectrum (low frequency (250, 500 and 1000Hz) and high frequency (2,4 and 6 kHz) in both the groups.



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6



Figure 7



Figure 8

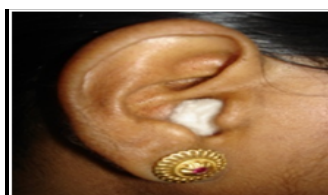


Figure 9

Figure 1: Temporalis fascia harvestment

Figure 2: Temporalis fascia graft

Figure 3: Post aural sutured wound

Figure 4: Post aural scar

Figure 5: Incision for fascia lata on thigh

Figure 6: Fascia lata graft

Figure 7: Fascia lata being placed endomeatally

Figure 8: Post operative thigh wound

Figure 9: Cosmetic ear without scar

Statistical Analysis

Results were tabulated and statistical analysis was done using Graph pad quickcal software, Z-test for proportion was applied for comparison between TFG and FLG. (P<0.05) was considered to be statistically significant at 5% l.s.

RESULTS

The results of graft take up with both the grafts were 96 %.(Table 1and2). Assessment of gain in hearing threshold- At 3 months follow up, 22 of temporalis fascia group (TFG) and 14 of fascia lata group (FLG) had 0-10dB gain in hearing threshold, 18 of TFG and 20 of FLG had 11-20dB gain, 8 of TFG and 4 of FLG had 21-30dB gain and 2 of TFG and 12 of FLG had 31-40dB gain. Assessment of Low frequency hearing gain- 14 of TFG and 16 of FLG had 0-10dB gain, 24 of TFG and 16 of FLG had 11-20dB gain and 8 of TFG and 8 of FLG had 21-30dB gain. Assessment of High frequency hearing gain- 10 of TFG and 10 of FLG had 0-10dB high frequency gain, 30 of TFG and 18 of FLG had 11-20dB gain, 8 of TFG and 10 of FLG had 21-30dB gain and 2 of TFG and 12 of FLG had 31-40dB gain. Thus the average threshold gain and low frequency gains at 31-40dB were significantly better in fascia lata group while high frequency gains were significantly better at 11-20dB in the temporalis fascia group and at 31-40dB in the fascia lata group.(Table 3 to 6). Post operative complications were seen in 8 patients. Granulations were seen in 2 of FLG and 1 of TFG, acute otitis media was seen in 2 of TFG, otomycosis was seen in 1 and thigh wound infection was seen in 2 patients of FLG. 2 of the patients in the TFG who had acute otitis media and 2 of the patients in FLG who had granulations, ended up with residual perforations. (Table7).

Table 1: Graft uptake

Graft type	Graft take up	Residual perforation	Take up rate %	Failure rate %
Temp Fascia	48	2	96	4
Fascia Lata	48	2	96	4

Table 2: Graft take up in various studies

Study	No. of cases	Graft take up %
Umar <i>et al</i> ¹	85	92.95
Singh B J <i>et al</i> ²	80	95
Karela <i>et al</i> ³	211	91.5
Glasscock ⁴	180	96
Guo <i>et al</i> ⁵	168	85.7
Indorewala ⁶	789	98.6
Sergi <i>et al</i> ⁷	52	94.2
Mishra <i>et al</i> ⁸	100	97
Stage <i>et al</i> ⁹	39	97
Patil K <i>et al</i> [10]	120	85-87.5
Our study	100	96

Table 3: Pre-op Hearing loss in dB

Conductive loss in db	TFG	FLG
20-30	08	02
31-40	32	20
41-50	04	16
51-60	06	06
61-70	00	06
Average loss in dB	40	45

Table 4: Post operative gain in hearing threshold

Gain in dB	TFG	FLG	p value
0-10	22	14	0.094
11-20	18	20	0.68
21-30	08	04	0.21
31-40	02	12	0.0039

Table 5: Post operative hearing gain at Low Frequencies (250,500and1000Hz)

Gain in dB	TFG	FLG	p value
0-10	14	16	0.65
11-20	24	16	0.10
21-30	08	08	1
31-40	02	08	0.045
41-50	02	02	1

Table 6: Post operative hearing gain at High Frequencies (2, 6 and 8kHz)

Gain in dB	TFG	FLG	p value
0-10	10	10	1
11-20	30	18	0.016
21-30	08	10	0.60
31-40	02	12	0.016

Table 7: Post Operative Complications

Complications	Umar ¹	Mishra ⁸	Singh M ¹¹	Our Study	
				Temp Fascia	Fascia lata
Granulations	-	-	-	2%	4%
Wound infection	-	-	-	-	4%
Rejection of graft	5.88%	2%	6.6%	2%	2%
Acute otitis media	-	2%	-	4%	-
Otomycosis	-	-	-	-	2%

DISCUSSION

The study was carried out on 100 patients at Dr. D Y Patil Medical College Hospital Kolhapur a tertiary care centre, for over a period of 2 years. The minimum age of a patient in the study was 15 years and maximum was 50 years. Maximum number of patients were in the age group between 15-30 years. Females comprised 60% (60 cases) and males comprised 40% (40 cases) showing a female preponderance which was statistically insignificant ($p=0.41$). All the patients had complaints of both discharge and reduced hearing while 2 patients had tinnitus. Of 100, 98 patients had an infective etiology while 2 had history of trauma. In a study by Kotecha *et al*¹² 69.6% had infective etiology and 3.2% had history of trauma. In our study 50 patients had small perforation (<30% of drum), 26 had medium sized perforation (30-60% of drum) and 24 had large perforation (>60% of drum). Both ears were found to be almost equally affected. Central malleolar perforations accounted to 42% and had an average hearing loss of 46.1dB, followed by posterior central perforations being 26% with hearing loss of 46.7dB, inferior central 16% with hearing loss of 39.6dB, large central 12% with average hearing loss of 45.7 dB and anterior central perforations accounted to 4% with loss of 42.5dB. Our findings correlate well with Kotecha *et al* study. In our study 10% of patients had 20-30dB loss, 52% had 31-40dB loss, 20% had 41-50dB loss and 18% had >50dB hearing loss. The average hearing loss was 40dB in the TFG and 45dB in the FLG. In a study conducted by Mathai *et al* 47% patients had 20-30dB loss, 31.5% had 31-40dB loss, 17% had 41-50dB loss and 3.5% had >50dB hearing loss. As stated by Anirban Biswas,¹³ in otitis media the degree of deafness may be anything between mild to severe. No definite correlation has been established between the size/location of perforation and the degree of deafness. In a study by Bhusal *et al*¹⁴ posterior central perforations caused more hearing loss than anterior central type. The same was noted in our study. The approach for surgery in our patients was post aural in 50 TFG group while endaural in 32% and endomeatal in 68% of FLG group with underlay grafting. In the study by Kotecha *et al* 44% had postaural approach, 28% endaural and 38% had endomeatal approach. Indorewala *et al*⁶ used underlay technique in 100% of his cases, preferring the endomeatal

approach for FLG and postaural for TFG. Dabolkar *et al*¹⁵ have used postaural incision for all patients. At 3 months follow up about 0-30dB threshold gains were seen in TFG and 0-40dB gain were seen in FLG. However 22 patients of TFG in comparison to 14 of FLG had 10-20dB hearing threshold gain ($p 0.094$) and 12 of FLG in comparison to 2 of TFG had 31-40dB gain ($p 0.0039$). 0-30dB low frequency gains were seen in TFG and 0-40 dB in FLG. However 8 of FLG in comparison to 2 of TFG had 31-40 dB low frequency gain ($p 0.045$). 0-30dB high frequency gains were seen in TFG and 0-40 dB in FLG. However 30 of TFG and 18 of FLG had 11-20 dB high frequency gain. ($p 0.016$) and 12 of FLG in comparison to 2 of TFG had 31-40dB high frequency gain ($p 0.016$). In a study by Indorewala *et al* the hearing was better at 1 kHz frequency with TFG however there was no statistical significance in hearing improvement at 0.5, 2 and 4 kHz between the 2 groups. In a study by Fatih Oktem *et al*,¹⁶ vibration capacity of tutoplast fascia lata was better compared to tutoplast dura and tutoplast temporalis fascia in invitro studies. This may probably be the reason for comparatively better average hearing threshold gains, low frequency and high frequency gains, seen with fascia lata than temporalis fascia in our study. To conclude both temporalis fascia and fascia lata have excellent graft take up. Fascia lata due to its better dimensional stability and dynamic performance showed relatively better average hearing threshold gains, high and low frequency gains than temporalis fascia. Thus fascia lata may also be a preferred graft material for tympanoplasty.

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