ORIGINAL ARTICLE

Graft success and hearing results between temporal muscle fascia graft and cartilage graft in type 1 tympanoplasty

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Abstract:
Objective: To compare the effectiveness of temporalis fascia tympanoplasty with cartilage tympanoplasty in terms of graft uptake and audiological outcomes.
Introduction: Typmanoplasty is the surgical repair of tympanic membrane and ossicles of middle ear and it is the surgical method of choice for chronic otitis media. Tympanic membrane can be reconstructed by various surgical methods however type 1 tympanoplasty classified by Zonller and Wullstein is the most common technique.
Material and Methods: In this retrospective comparative study 100 patients with chronic otitis media with tympanic membrane perforation presenting to ENT department DHQ Abbottabad admitted between January 2018 and December 2021 matching inclusion and exclusion criteria were selected for study after approval from hospital ethical committee.
Results: Out of 100 patients 50 were in each group. Group A temporal fascia group and group B cartilage. Mean age in group A was 36.34±9.67 years while in group B it was 40.38±10.7 years. Pre-operative Airbone gap (ABG) was 37.28±6.29 in group A while 38.66±4.06 in group B with a p value of 0.1. Post-operative Air bone gap was 15.76±5.3 in group A while 16.56±6.5 in group B with a p value of 0.5. 35 (68.6%) patients in fascial group had successful graft compared to 44(88%) in cartilage group with a p value of 0.02.
Conclusion: There was no difference in surgical outcome of temporalis fascia graft and tragus cartilage graft in terms of hearing gain and functional outcome. However cartilage graft had a better uptake than temporalis fascia.

Keywords: Tympanoplasty, graft, cartilage, temporalis fascia, chronic non-suppurative otitis media.

Received
Date: 3rd March, 2022
Accepted
Date: 23rd November, 2022

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Introduction:
Chronic otitis media causes permanent damage of ear drum and of structures within middle ear cavity. Clinically these patients have ear discharge, perforation in tympanic membrane and pain in the ear. Chronic otitis media is when the discharge occurs for more than 3 months. Patients without ear discharge are labeled as having chronic non suppurative otitis media. In chronic non suppurative otitis media cases the purpose is to improve mucosa in middle ear by closure of tympanic membrane perforation.[1]

Tympanoplasty is the surgical repair of tympanic membrane and ossicles of middle ear and it is the surgical method of choice for chronic otitis media. Tympanic membrane can be reconstructed by various surgical methods however type 1 tympanoplasty classified by Zonller and Wullstein is the most common technique. There are two purposes; to re-establish the integrity of middle ear and cleanliness of middle ear cavity and hearing improvement.[2] Different graft materials have been used in tympanoplasty that includes temporalis fascia, perichondrium, cartilage, vein, fat, and periostium. Out of out these most surgeon find temporalis fascia as most convenient graft for harvesting.[3] Temporalis graft failure is mostly is mostly associated with retraction pockets, errors in technique and in-

fection. These grafts also prone to unpredictable changes due to graft instability. Shrinkage and graft atrophy are also causes of failure.[4] According to authors after temporalis fascia graft good hearing is often the usual outcome there is concern about characteristics in dimensional instability may cause residual perforation particularly in case of large perforations. In case of cartilage graft the two techniques palisade cartilage and cartilage island have shown to increase stability and strength of the graft but quality of hearing improvement is affected.[5] Recently cartilage graft taken from tragus or choncha are used due to rigidity and mechanical strength. The mechanical properties of cartilage graft provide adequate stability and make graft less resistant to infections or retraction caused by dysfunction of Eustachian tube. Main drawback is conductive hearing loss due to excessive firmness and thickness.[6] Cartilage is flexible, can with stand deformation as a result of increase elasticity and diffusion is the mode of nourishment that may improve graft uptake.[7]

Various graft materials have been used by various surgeons according to personal choices with different outcome. The purpose of this study is to compare the results of tympanoplasty using temporal fascia graft and tragus cartilage in terms of graft success and hearing.

Material and Methods:
In this retrospective comparative study 100 patients with chronic otitis media with tympanic membrane perforation presenting to ENT department DHQ Abbottabad admitted between January 2018 and December 2021 matching inclusion and exclusion criteria were selected for study after approval from hospital ethical committee. History, examination and laboratory investigations were carried out. Demographic data of patient like age, gender were recorded. Pre-operative audiological examination results, post-operative audiological examination, graft material used in operation, pre-operative microscopic examination, and graft success rate were all recorded. In all patients type 1 tympanoplasty was carried out. In group A temporalis fascia graft while in group 2 tragus cartilage was used. Post-operative graft success rate and hearing improvement were accessed. Patients were followed for 6 months. Data was analysed by SPSS. Continuous variable were expressed as mean±SD. Categorical variable were expressed in percentages. Student t test and chi square tests were used where required. A p-value of <0.05 was considered significant.

Results:
Out of 100 patients 50 were in each group. Group A temporal fascia group and group B cartilage. Mean age in group A was 36.34±9.67 years while in group B it was 40.38±10.7 years. There were 28 male and 22 female in group a while in group B 33 male and 17 female. Pre operative Airbone gap (ABG) was 37.28±6.29 in group A while 38.66.96±4.06 in group B with a p value of 0.1. Post-operative Airbone gap (ABG) was 15.76±5.3 in group A while 16.56±6.59 with a p value of 0.5. 35 (68.6%) patients in fascial group had successful graft uptake compared to 44(88%) in cartilage group with a p value of 0.02.

Discussion:
There is no general agreement between otolaryngologists about the type of material used for graft. In tympanoplasty various materials can be used as graft such as temporal fascia, cartilage, vein skin, dura graft material, fat graft, and perichondrium. However in majority of studies temporalis fascia or cartilage is used for tympanoplasty.[8] Myringoplasty involves repair of perforated tympanic membrane. Various tympanoplasty techniques are used for diseases in middle ear, mastoid and ossicles. Purpose of tympanic membrane repair is intact membrane along with improvement in hearing.[9] Many studies have shown successfulness of temporalis fascia graft in small and medium size perforations but the chances of graft failure was higher in cases of large and subtotal perforations also in case of malfunction of tube. They generally support the cartilage ability to stand the varying negative pressure in middle ear cavity and comparatively more time taken for reabsorption. The total graft success rate was 79% in our study.

In our study the temporalis graft was successful in 68.6% patients while cartilage in 88% patients. In another study the success rate of temporalis fascia graft was 84% while cartilage successful uptake was in 92% with a p value <0.05.[10]

This study like ours had shown that cartilage graft had better morphological outcome. The usual postulate in that cartilage graft plays a role against resistance against retraction because of its low metabolic rate, stiffness and rigidity. In contrast to this a study showed cartilage graft had success rate of 82% compared to temporalis fascia graft rate of 92%.[11]

In our study pre-operative Airbone gap was 37.28±6.29 in fascia group while 38.66.96±4.06 in cartilage group. Post-operative Airbone gap was 15.76±5.3 in fascia group and 16.56±6.5 in cartilage group. With a significant gain in hearing after 6 months in both groups. However there was no significant difference in hearing outcome between two groups. In another study mean ABG was reduced significantly in both study groups. In group A fascial graft the mean preoperative ABG was 25±10.2 dB and the mean post-operative ABG was 13.5±7.3 dB (P=0.038), whereas in cartilage graft the mean pre-operative ABG was 30.6±8.6 dB and the mean post-operative was 15.9±8.7 dB, which has shown a highly significant gain in decreasing ABG after surgical intervention (P=0.038).[12]

Another studied on 78 pediatric patients ranging from 7 to 18 years old who followed up their patients for a period of 6 months found that in the fascia group, the pre-operative ABG was 33.68±11.44 dB and post-operative ABG was 24.25±12.68 dB. In the cartilage group, the pre-operative ABG was 35.68±12.94 dB and post-operative ABG was 26.11±12.87 dB. There was no statistically significant difference in functional outcomes between the fascia and cartilage groups.[13] In a meta-analysis and systemic review done by Yang et al, focusing on retrospective trials published investigating the outcome of temporalis fascia grafts and cartilage grafts in type-1 tympanoplasty. They focused on 8 articles on 915 patients. They observed that the pooled mean ABG gain was 1.92 (95% confidence interval=0.12–3.95; P<0.00001 and there was no difference. Further in the cartilage graft of full thickness subgroup, the pooled mean ABG gains was 2.56 (95% confidence interval=1.02–4.10; P=0.14) and with a significant difference, which means that cartilage graft of full thickness subgroup got a superior hearing outcome than the temporalis fascia grafts group. They observed that uptake of graft in cartilage graft tympanoplasty was better than temporalis fascia grafts.

There are no significant differences between two groups interms of hearing outcomes.[11,14] A study showed reported functional success was higher in cartilage group than fascia group.[15] A study found that the hearing results of the patients using cartilage grafts were better than those using the temporal muscle fascia graft.[16]

The surgical technique used, sample size, the size of the tympanic membrane perforations, simultaneous different middle ear surgery, pathologies of middle ear and follow-up period influence the functional and anatomical success rates of tympanoplasty.[17] The success rate of graft vary between 71%–100% in the literature.[18] Over a period of time the success of tympanoplasty decreases, many studies have compared long follow-up with short term follow up of graft.[19,20] Long term follow up are often required as tympanic membrane often reperforates particularly if the prior perforation was subtotal of total.[13]

Conclusion:
There was no difference in surgical outcome of temporalis fascia graft and tragus cartilage graft in terms of hearing gain and functional aspect. While cartilage graft had a better anatomical success in terms of graft uptake as compared to temporalis fascia.

Conflict of interest: None

Funding source: None

Role and contribution of authors:
Naik Muhammad: wrote initial manuscript and

references, collected data.

Sameeah Hanif: collected data and helped in introduction writing

Soweba Hanif: Critical review and final changes

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