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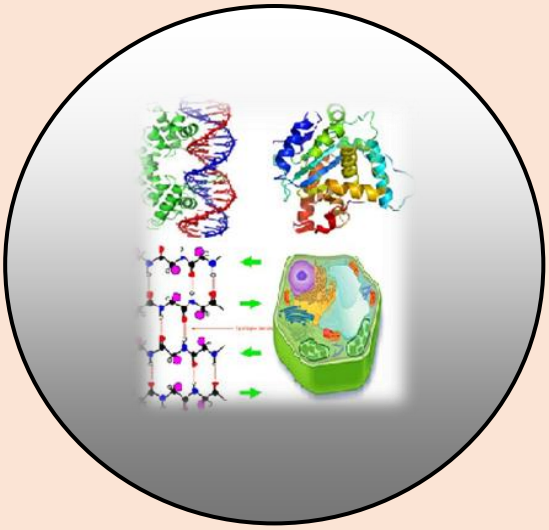

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RESEARCH PAPER

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Comparison of Between *Temporalis Fascia* and *Tragal perichondrium*in Myringoplasty

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ABSTRACT

CSOM is still a major ear problem in our country. Most common manifestations are hearing loss and recurrent otorrohoea followed by perforation, if ignored for long time may lead to dreadful complications. To compare the results of myringoplasty in the form of graft uptake and hearing improvement by using temporalis fascia and Tragal perichondriumas graft material. 60 patients, taken as subjects from Government Medical College OPD, were divided in to 2 groups, having 30 patients in each group on the basis of using 2 graft, group a with temporalis fascia, group b with Tragal perichondrium. In our study, success rate in terms of graft uptake was 53.33% with temporalis fascia, 73.33% with Tragal perichondrium. Mean hearing improvement in GROUP A (10db), in GROUP B (04db) and in. Use of Tragal perichondriumyielded better result in the present study in terms of graft uptake and hearing improvement.

Keywords: Temporalis Fascia, Tragal Perichondrium, Myringoplasty and Manifestations.

INTRODUCTION

Chronic suppurative otitis media is a major cause of acquired hearing impairment especially in the developing world. Global burden of illness from csom involves 65-330 million individuals with draining ears, 60% (39-200 million) of whom suffer from significant hearing impairment. The conductive hearing loss in csom can be upto 60-70dB. (Acuinet al., 2004). Tympanic membrane perforation is most commonly a result of infection, trauma or a sequel of tympanostomy tube insertion. Although 88% of traumatic perforation of any size heals without intervention, the remainders require treatment (Saliba, 2008). The repair of tympanic membrane has been attempted with large variety of synthetic, homologous and autogenous tissue. However, autogenous *temporalis fascia*, areolar tissue and *perichondrium* are used most commonly today (Singh, 2009). They are usually easily available, donot involve any immunological problems, are inexpensive and most important of all, there is no risk of HIV infection (Tos, 1972). Success rate is highly variable. *Tragal perichondrium*is mainly preferred due to its easy harvesting technique, decreased time consumption, minimal scarring and no significant postoperative morbidity. Temporalis fascia is generally considered to be superior with respect to the take rate probably due to its low basal metabolic rate. The success rate of temporalis fascia has been close to 90% (Sheehy, 1960). As regards the surgical techniques modification are still in progress. Keeping all this in view the study was undertaken to compare the most commonly used autogenous graft materials i.e., temporalis fascia and *tragal perichondrium*. The study was also aimed to compare results of these grafts in various aspects including closure of tympanic membrane perforation and hearing gain.

MATERIAL AND METHODS

The present study was a comparative study conducted in the Department of ENT and Head and Neck Surgery, SMGS Hospital, Government Medical College, Jammu for a period of 1 year commencing from October2012 to November 2013.

SELECTION CRITERIA

CSOM with central perforation with the ear which was dry for atleast 3 weeks.

Mild to moderate conductive hearing loss.

There should be no other disease condition which could affect the result of study except ear disease.

Those excluded from the study were children less than 12 years of the age, medically unfit patients, those without useful residual cochlear function, malignant neoplasms of external and middle ear, sensori-neural hearing loss and unsafe CSOM.

PROCEDURE

A written consent was taken from the selected patients. A detailed clinical history of each patient was taken and recorded as per the performa. All patients were examined clinically and following investigations were carried out:

Tuning fork tests

PTA(pure tone audiometry)

X-ray both mastoids lateral oblique view

Complete haemogram i.e., haemoglobin, bleeding time, clotting time, TLC, DLC.

Urine complete examination.

TECHNIQUE

In the selected patients, an autogenous graft material was used and they were divided into two groups.

Group A: Patients in which temporalis fascia was used as graft.

Group B:Patients in which *tragal perichondrium* was used as graft.

The myringoplasty was performed through post aural approach using temporalis fascia in 30 patients while transcanal approach using *tragal perichondrium*was performed in the rest of the 30 patients.

Statistical analysis:

Data obtained were entered into a computer spread sheet and analysed using the statistical package for social sciences computer software program version SPSS20.

The independent Sample t-test was used to compare differences in means in improvement of hearing of two groups i.e. Group A (Temporalis fascia) and Group B (*Tragal perichondrium*). Chi-Square test was used to compare differences in mean in successful and unsuccessful graft uptake of two groups i.e. Group A (Temporalis fascia) and Group B (*Tragal perichondrium*).

RESULTS

Age incidence of patients in series ranged from 12-50 years. Maximum patients were in the age group of 21-30 years. Mean age in years was 31.65+_10.94.

In the present study female and male patients were equal.

It was observed in the present study, right ear involvement in Group A was in 22 (73.33%) patients and in Group B in 16 (53.33%) patients. This shows that right ear was more involved in all age groups. Postoperative, follow up PTA was done in every patient at monthly for 3 months. In the present study majority of cases (26) were under general anaesthesia, while 34 cases were operated under local anaesthesia. In the present study, two grafts were taken- temporalis fascia and *tragal perichondrium*. *Tragal perichondrium* showed better success in terms of graft uptake. In the present study, maximum successful closure of perforation and maximum hearing improvement was seen in 21-30 tears of age group. In our study, success rate in terms of graft uptake was 86.67% with *tragal perichondrium* and 66.67% with *temporalis fascia*. Overall success rate 76.67%. Graft failure was seen in 14(23.33%) patients, who also denied of any hearing improvement. Among 14 cases of failure, 4 were of *tragal perichondrium* and 10 of *temporalis fascia*. Failure was most probably due to upper respiratory tract infection or may be due to poor hygiene and inattentive postoperative advice. Most common complication in the present study was ear discharge in 6 (10%) patients followed by metallic taste sensation in 4 (6.67%) patients (Table 1-5).

Table 1.

Age group (in years)	Group-A *Temporalis fascia* (n=30) No.(%)	Group-B *Tragal perichondrium* (n=30) No.(%)	Total (n=60) No.(%)
≤20	6(20.00)	8(26.67)	14(23.33)
21-30	16(53.33)	16(53.33)	32(53.34)
31-40	4(13.33)	4(13.33)	8(13.33)
›40	4(13.33)	2(6.67)	6(10)
Sex			
Male	20(66.67)	10(33.33)	30(50.00)
Female	10(33.33)	20(66.67)	30(50.00)
Ear			
Right	22(73.33)	16(53.33)	38(63.33)
Left	8(26.67)	14(46.67)	22(36.67)
Pre-operative AB gap (dB)			
‹20	4(13.33)	12(40.00)	16(26.67)
20-30	14(46.67)	12(40.00)	26(43.33)
›30	12(40.00)	6(20.00)	18(30.00)
Anaesthesia type			
General	16(53.33)	10(33.33)	26(43.33)
Female	10(33.33)	20(66.67)	30(50.00)

Ear			
Right	22(73.33)	16(53.33)	38(63.33)
Left	8(26.67)	14(46.67)	22(36.67)
Pre-operative AB gap (dB)			
‹20	4(13.33)	12(40.00)	16(26.67)
20-30	14(46.67)	12(40.00)	26(43.33)
›30	12(40.00)	6(20.00)	18(30.00)
Anaesthesia type			
General	16(53.33)	10(33.33)	26(43.33)
Local	14(46.67)	20(66.67)	34(56.67)

Table 2. Improvement in hearing.

Improvement in hearing (dB)	Group-A *Temporalis fascia* (n=30 No.(%)	Group-B *Tragal perichondrium* (n=30) No.(%)	Total (n=60) No.(%)
No change	10(33.33)	4(13.34)	14(23.33)
‹10	17(56.67)	15(50.00)	32(53.33)
›20	0()	1(3.33)	1(1.67)
Total	30(100)	30(100)	60(100)

Table 3. Graft uptake.

Results	Group-A *Temporalis fascia* (n=30) No.(%)	Group-B *Tragal perichondrium* (n=30) No.(%)	Total (n=60) No.(%)
Successful	20(66.67)	26(86.67)	46(76.67)
Unsuccessful	10(33.33)	4(13.33)	14(23.33)
Total	30(100.00)	30(100.00)	60(100.00)

Table 4. Comparison between Group A and Group B as per improvement of hearing.

Study Groups	Mean±standard deviation (dB)	Statistical inference (t-test for equality of means)
Group A- *Temporalis fascia* (n=30)	4.14±3.34	t=3.164; p=.002; Highly significant
Group B- *Tragal perichondrium* (n=30)	7.84±5.46	

Table 5. Comparison between successful and unsuccessful graft uptake.

Graft uptake	Mean ± standard deviation (dB)	Statistical inference (t-test for equality of means)
Successful	6.93±3.16	t=8.154; p=.000; Highly significant
Unsuccessful	0	

Table 6.

Source	No. of case	Age group in years	Maximum number of subjects in the range
Awan *et al.*	215	17-40	21-30(46%)
Singh(2009)	220	13-48	21-30(35%)
Zhang *et al.* (2011)	117	12-51	20-30(45%)
Present study (2013)	60	12-50	21-30(54%)

DISCUSSION

In the present study, maximum patients were in the younger age group. Exact cause was difficult to comment, possibly the patients were more conscious about their hearing at this age. Remaining cases were of middle age worried about their social life. The table 6 shows that the study group in our series was comparable to the following studies.

In the present study, there was equal number of male and female patients. In Group A (temporalis fascia), 33.33% and in Group B (*tragal perichondrium*), 66.67% were females and in Group A (66.67%) and in Group B (33.33%) were males. In the study carried by Awan *et al.* (2008), there were 53.3% female subjects, while 46.7% were males. In a study by Konstaninidis *et al.* (2010), male preponderance in the subjects was seen, wherein 66.67% were males and 33.33% were females. There was more involvement of right ear in the present study. In Group A right ear was pathological involved in 22 (73.33%) and in Group B 16(53.33%) patients. Altogether there was right ear problem in 38 (63.33%) patients, while in 22 (36%) patients, left ear was involved. In the present study, majority of patients presented with history of discharge since the last 1 to 2 years. Longer duration of ear discharge shows lack of awareness about the disease and its complications and lack of proper and adequate referral services in those with rural background may have contributed to the delayed seeking of specialized care. All the patients were adequately treated with conservative treatment and had a dry ear for atleast four weeks prior to surgery.

In the present study, temporalis fascia and *tragal perichondrium* grafts were used. *Temporalis fascia* was used in 30 cases (50%) and *tragal perichondrium* was also used in 30 cases (50%). Post aural approach provides better exposure and a wider operative field and overcomes the problem of narrow external auditory canal, while transcanal approach is suitable for small perforation. The present study observed that *tragal perichondrium* had more successful rate (86.6%) in terms of improvement in hearing and graft uptake as compared to *temporalis fascia.*

Singh *et al.* (2009) conducted a comparative study between different graft materials and success rate in terms of closure of tympanic membrane was observed, which came out to be with temporalis fascia 95% and 9.3dB hearing gain, ear lobule fat 90%, followed by *tragal perichondrium*90% and areolar tissue 80%. Overall success rate was 91%.

Source	No. of subjects	Success rate	*Tragal perichondrium*	*Temporalis fascia*
Morant*et al.* (1997)	188	-	-	72.82%
Raghavan*et al.* (2000)	144	96.23%	-	-
Ahmed and Umar (2004)	107	92.95%	-	-
Lackany and Sarkis (2005)	250	84%	88%	80%
Awan *et al.* (2005)	215	75%	85%	75%
Dabholkar *et al.* (2007)	50	84%	88%	70%
Singh *et al.* (2009)	220	91%	90%	95%
Demirpehlivan *et al.* (2011)	120	85%	97.7%	80.6%
Zhang *et al.* (2011)	117	95%	-	-
Present study (2013)	60	76.66%	86.66%	66.66%

Graft uptake

Lackany and Sarkis (2005) assessed functional results after myringoplasty with the use of different graft materials. Their study included 250 patients of whom 85 had central perforation, 78 had subtotal perforation and 87 had total perforation. Fascial graft was used in 110 cases while perichondrial graft used in 50 cases and composite graft in 90 cases. The results showed that tympanic membrane healing rate were 80% with fascia graft and it was better when we used perichondrial graft 88% and even the best when composite grafts were used 92.3%.

Gierek*et al.* (2004) demonstrated the anatomical and functional results of tympanoplasty in comparison with the material used. The study included a selected group of 142 patients who were operated on because of perforation of tympanic membrane. The analysed group consisted of 112 patients, wherein perichondrium and cartilage was used. In 30 patients, temporalis fascia was used to close the defect of the ear drum. In all cases, before and after operation, pure tone audiometry and verbal audiometry with indication of speech detection and speech reception threshold using mono-syllable NLA-93 was done. Tympanometry after operation and evaluation of anatomical results after surgery were done. The comparison of operation results showed that there was no significant difference between the two groups.

Healing of perforation in the present study was complete in most of the cases in 2-3 months except in 2 cases where *tragal perichondrium* was used and it took about 4 months for healing. Overall failure rate was 23.33%. Among the 14 cases of failure 10 (33.33%) were of temporalis fascia and 4 (13.33%) of tragal perichondrium. Failure might be due to infection mainly or may be due to poor hygiene and inattentive post-operative advice.

Biological graft materials act as scaffolds of tissue matrix which are applied to seal perforation and this subsequently revascularises in readiness for migration of fibroblasts and epithelium. Autogenous graf materials varied regarding their ease of harvesting, preparation time, placement ease, viability, graft uptake and hearing improvement. Such abundance of material implicity implied that there is no clear favorite and choice of graft depends on individual surgeon preference (Dabholka r*et al.,* 2007).

Hearing Improvement:

In the present study at 3months postoperative PTA revealed that 23.33% (14) patients had no improvement, while 76.67% (46) patients had hearing improvement with an AB gap of less than 10 dB and 21.67% (13) patients having an AB gap of 10-20 dB. Mean improvement in hearing was 4.14dB with *temporalis fascia* as compared to 7.84 dB in *tragal perichondrium* group.

Moran*et al.* (1997) explained the experiences which author had along a period of seven years, by using formaldehyde formed fascia graft, exposing the anatomical and functional results obtained after a minimum pursuit of five years on a sequence of 188 myringoplasties. With such method, authors got to close the tympanic membrane in 72.87% of the cases, getting improvement of audition determined by a reduction of the air-bone gap greater than 15 dB in the 62.77% of the cases where perforation was greater than 50% of tympanic membrane. De *et al.* (2004) performed myringoplasty using a subcutaneous soft tissue graft. 52 patients underwent myringoplasty using a subcutaneous soft tissue graft. Successful closure to give an intact tympanic membrane was observed in 82.7% patients, threshold improved on pure tone audiometry in 57.1% and deteriorated in one patient. There was no case of dead ear as a result of surgery. The subcutaneous tissue graft has comparable outcome withtemporalis fascia graft with additional advantage of similar incion, minimum dissection and a lower risk of bleeding. Harvinder *et al.* (2005) compared temporalis fascia with amniotic membrane in 50 patients. In the temporalis fascia and human amniotic group, there was statistically significance difference between the preoperative and postoperative mean air conduction threshold. In the temporalis fascia group, of the 30 ears tested postoperatively, 22 ears (73.33%) demonstrated AB gapclosure within 20dB, where as 20 ears tested in the human amniotic group (95%), showed air bone closure within 20dB. Dabholkar *et al.* (2007) conducted a prospective randomized control trial on 50 subjects to evaluate the comparative efficacy of *temporalis fascia* and *tragal perichondrium*as grafting material in underlay tympanoplasty. Surgical success was evaluated in terms of intact drum membrane during the follow up period and closure of A-B gap with in 10dB. *Temporalis fascia* achieved a graft uptake of 84% and a satisfactory hearing improvement in 76% of the patients. *Tragal perichondrium* achieved a success rate of 80% graft uptake and 75% hearing gain. Authors concluded that the rates were comparable with no statistical significance of the difference between them. Ahmed and Umar (2008) studied anatomical and functional outcome following type-1 tympanoplastyin CSOM and identified the complications of surgery. A total number of 107 cases of CSOM with dry central tympanic membrane perforation were selected. Out of these, 85 cases were available foe follow-up. An overall success rate was 92.95% as far as the graft uptake was concerned. Out of 85 cases, on examination perforation was closed in 79 cases and improvement in hearing was seen in 73 cases. The complications at the interval of 3 months were dislodgement of graft 1 (1.17%), residual perforation 5(5.8%), deterioration of hearing 1(1.17%), small retraction pockets 3(3.82%) cases and metallic taste in mouth 2(2.35%) cases. Saliba (2008) conducted hyaluronic acid fat myringoplasty in 21 patients with hearing loss and safe perforation. They observed the mean AB gap improvement for operated ears was 17dB and mean time of procedure was 10 minutes. Closure rate of perforation in this group was 100% so they concluded it as an alternative to traditional myringoplasty even for larger or total perforation. Singh *et al.*(2009) observed that PTA done in all cases had air conduction threshold range at 22.8-47.7(mean: 32.3dB) and range of bone conduction threshold 6.6-13(mean:8.8dB). Average AB gap were in a range of 16.5-41dB. In *temporalis fascia*, mean hearing improvement was 9.3dB, in *tragal perichondrium*8.9dB, in areolar tissue 8.9dB and in fat 6.8dB.

Demirpehlivan *et al* (2011) studied the functional results after type-1 tympanoplsty with *temporalis fascia*, perichondrium/cartilage island and cartilage palisades in 120 patients. Temporalis muscle fascia was used in 67 (55.8%), perichondrium/cartilage island flap was used in 34 (28.3%) and cartilage palisades were used in 19(15.8%) of the patients. The graft take rate was 85% (102/120). In the *perichondrium*/cartilage island flap group, the graft take rate was 97.7% whereas graft take rate for the fascia group and palisades group were 80.6% and 79.0% respectively. The postoperative pure tone averages were 20.54%dB for the *perichondrium*/cartilage island flap group, 24.51% dB for the fascia group and 23.33dB for the cartilage palisades group. Authors concluded that cartilage may be preferred more often for myringoplasties with high graft take rate and hearing improvement.

CONCLUSION

Hence, it is concluded that the use of *tragal perichondrium* yielded better result in the present study, in terms graft uptake and hearing improvement. Both grafts did not add to the operating time and did not carry any risk of atrophy or any other major complications.

REFERENCES

Acuin, J. (2004). Chronic suppurative otitis media- Burden of illness and Management Options. Geneva: World Health Organization.

Saliba, I. (2008). Hyaluronic acid fat plug myringoplasty: how we do it. *Clin Otolarygol*; 33(6): 610-4.

Singh, B.J., Sengupta, A., Das, S.K., Ghosh, D. and Basak, B. (2009). Comparative study of different graft materials used in myringoplasty. *Indian Journal of Otolaryngology and Head and Neck Surgery*; 61(2):131-134.

Tos, M. (1972). Assessment of the results of tympanoplasty. *J Laryngol Otol*; 86:487-500.

Sheehy, J.L. (1960). Ossicular problems in tympanoplasty. *Arch Otolaryngol*; 104:191-6.

Awan, Z., Bashin, H. and Hussain, A. (2008). Myringoplasty: a comparison study of different graft materials and various surgical procedures. *Ann Pak Inst Med*; 4(4): 209-11.

Zhang, Z.G., Huang, Q.H., Zheng, Y.Q., *et al.* (2011). Three autologous substitutes for myringoplasty: a comparative study. *Otology and Neurotology*; 32(8):1234-8.

Morant, R.B., Pereira, K.D. and Lazar, R.H. (1997). Fat graft myringoplasty in children a safe and successful day stay procedure. *J Laryngol Otol*; 111(2): 106-8.

Raghavan, U., Malki, D.S. and Mahmoud, N.A. (2000). Myringoplasty update on onlay pedicle skin flap and temporalis fascia sandwich graft. *J Laryngol Otol*; 114(3): 174-7.

Ahmed, Z. and Umar, S. (2008). Anatomical and functional outcome following Type-1 tympanoplasty in CSOM. *Pak Armed Force Med J*; issue 1. Military hospital Rawalpindi, combine military hospital, Multan.

Lackany, M.A. and Sarkis, N.N. (2005). Functional results after myringoplasty and type-1 tympanoplasty with the use of different graft materials. *Journal of the medical Research Institute*; 26:369-74.

Dabholkar, J.P., Vora, K. and Sikdar, A. (2007). Comparative study of underlay tympanoplasty with *temporalis fascia* and *tragal perichondrium*. *Indian J of Otolaryngology and Head and Neck Surgery*; 59 (2): 116-9.

Demirpehlivan, I.A., Onal, K., Arslanoglu, S., Songu, M., Ciger, E. and Can, N. (2011). Comparison of different tympanic membrane reconstruction techniques in type 1 tympanoplasty. *Ear Arch Otolaryngol*; 268(3): 471-4.

Harvinder, S., Hassan, S., Sidek, D.S., et al. (2005). Comparison of human amniotic membrane to temporalis fascia graft. *Med J Malaysia*; 60(5): 585-9.

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