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MYRINGOPLASTY: CARTILAGE PALISADES VS TEMPORALIS FASCIA IN LARGE PERFORATIONS

Objective:
To compare the graft uptake rate and postoperative hearing results of myringoplasty with cartilage palisades and temporalis fascia in large perforations.

Materials and methods:
Patients of age 13 years and above with diagnosis of chronic otitis media – mucosal type with large perforation that is more than 50% of tympanic membrane were included. Pure Tone Audiometry were done within 1 week before surgery. 61 cases were included for myringoplasty which were randomly allocated by lottery method with 30 cases in cartilage palisades group and 31 cases in temporalis fascia group. Graft uptake results were assessed after 6 weeks and postoperative hearing was evaluated and compared within and between the groups.

Results:
Graft uptake rate in cartilage palisades group was 86.66% and in temporalis fascia group was 90.32% with no significance difference in the graft uptake rate ($p = 0.707$) between the groups. The mean pre and post-operative air bone gap in cartilage palisades group and temporalis fascia group were 29.26dB ± 10.66, 20.41 ± 10.54dB and 29.52 ± 11.12dB, 17.93 ± 8.83dB, respectively with highly significant difference obtained within the groups ($p < 0.001$) showing improvement in the hearing after surgery. However, there was no significant difference between the groups ($p = 0.384$).

Conclusion:
The graft uptake rate and hearing results after cartilage palisades are comparable to those of temporalis fascia in large perforations. Thus cartilage palisades myringolplasty is recommended as an alternative option.

Key words: Myringoplasty, Chronic otitis media, large perforation, temporalis fascia, cartilage palisades, pure tone audiometry.

INTRODUCTION:

Chronic Otitis Media (COM) is the condition which leads to permanent changes in tympanic membrane and in other middle ear structures.[1] COM has been classified as cholesteatomatous and non-cholesteatomatous types. COM-mucosal type is one of the non-cholesteatomatous type.[2] Myringoplasty is the surgical procedure that is done for the repair and closure of pars tensa of tympanic membrane perforation.[3] At present, temporalis fascia is the most frequently used graft material for myringoplasty with uptake rate ranging from 90-100%[4] and is considered as gold standard to compare against other graft material.[1] Currently, cartilage tympanoplasty is recommended in certain high risk situations such as large perforation (>50% of pars tensa), subtotal perforation, bilateral perforations, revision cases, anterior perforation, atelectatic ears, those with craniofacial abnormalities, eustachian tube dysfunction and in cholesteatoma cases as well.[1]

MATERIALS AND METHODS:

This prospective, longitudinal, comparative, randomized, interventional study was conducted in the department of ENT, Ganesh Man Singh Memorial Academy (GMSMA), TU Teaching Hospital, Kathmandu from Dec 2010 to July 2012. Included were all gender, age more than 13 years, with COM-mucosal type having large perforations (>50%). Audiogram was done 1 wk before and 6-8 weeks after the surgery. All surgeries were done under local anaesthesia. Grouping of patients done with group A as cartilage palisades and group B as temporalis fascia. Surgical approaches were permeatal, postauricular or endaural as needed or by convenience of the surgeon. For cartilage palisades, tragal cartilage was harvested under local anesthesia. The perichondrium from the anterior side of tragal cartilage was removed where as the other side preserved. The standard tympanomeatal flap was raised. Middle ear was packed with gelfoam and cartilage palisades of appropriate sizes with perichondrium facing laterally were prepared and placed first at anterior margin and then parallel to handle and under the annulus using over underlay technique. For Temporalis fascia, ipsilateral temporalis muscle fascia was harvested by a transverse supra-auricular incision during permeatal approach and from the same incision site in post-aural and endaural incision and placed in underlay technique. Results were analyzed as graft uptake rate and change between pre- and post-operative hearing. Data were analyzed using Fisher's exact test, Chi square test, dependent and independent 't' test on a SPSS statistical package version 18.0. The level of statistical significance was set at the $p < 0.05$.

RESULTS:

Total of 67 patients were enrolled and 6 patients, 3 in each group were excluded due lost to follow up (Table 1). Age distribution between two groups were as shown in table 2. Mean age in cartilage group was 28.37 and in fascia was 22.94 which was statistically not significant (Table 3). Gender distribution in both groups was not statistically significant as well (Table 4). In cartilage palisades group (Group A), graft uptake was found in 26 (86.66%) cases and failure in 4 (13.33%) cases whereas in temporalis fascia group (Group B), graft uptake was observed in 28 (90.32%) cases and failure in 3 (9.67%) cases. There was no statistical difference noted between these two groups ($p = 0.707$) (Table 5). For the homogeneity of the study, only those with the normal ossicular chains were taken for the comparison of hearing results in both groups leaving only 21 cases with the normal ossicular function in cartilage palisades group (Group A) and 26 in temporalis fasica group (Group B). (Table 6) In group A, the mean pre-operative air conduction threshold was 45.29 dB (SD = 10.70) and post-operative air conduction threshold was 33.15 dB (SD =12.63). The mean pre-operative air bone gap was 29.26 dB (SD = 10.66) and post-operative air bone gap was 20.41 dB (SD = 10.66). Hearing improvement after surgery was found to be statistically highly significant ($p < 0.001$) (Table 7). In group B, the mean pre-operative air conduction threshold was 40.96 dB (SD = 10.16) and post-operative air conduction threshold was 28.26 dB (SD = 10.16). The mean pre-operative air bone gap was 29.52 dB (SD = 11.12) and post-operative air bone gap was 17.93 dB (SD = 8.83). Hearing improvement after surgery was found to be statistically highly significant ($p < 0.001$) (Table 8). Between the two groups, the mean pre-operative PTA-AC threshold was found to be 45.29 dB and 40.96 dB, post-operative PTA-AC threshold was 33.15 dB and 28.26 db, pre-operative PTA-AB Gap was 29.26 db and 29.52 dB, post-operative PTA-AB Gap was 20.41 dB and 17.93 dB in cartilage palisades group (group A) and temporalis fascia group (group B) respectively. Applying independent T-test, the difference in means between the groups in each category was found to be not significant statistically. (Table 7)

Table 1: Distribution of enrolled patients

No. of Cases	Enrolled	Excluded (Lost to follow up)	Total
Group A (Cartilage palisades)	33	3	30
Group B (Temporalis fascia)	34	3	31
Total	67	6	61

Table 2: Age distribution of patients in two groups

Age group	Group A (Cartilage Palisades) (n = 30) (%)	Group B (Temporalis fascia) (n = 31)
13-20 year	9 (30.00)	16 (51.66)
21-30 year	10 (33.33)	9 (29.03)
31-50 year	9 (30.00)	6 (19.35)
>50 years	2 (6.66)	0 (0)
Total	30 (100)	31 (100)

Table 3: Mean age distribution of patients in two groups

	Group A (Cartilage Palisades)	Group B (Temporalis fascia)
Mean age (years)	28.37	22.94
p value	0.032	

Table 4: Gender distribution of patients in two groups

Groups	Male	Female	Total
Group A (Cartilage palisades) (n = 30)	19 (63.33%)	11 (36.66%)	30 (100%)
Group B (Temporalis fascia) (n = 31)	13 (41.93%)	18 (58.06%)	31 (100%)

Chi-square test : p = 0.078 : Statistically not significant

Table 5: Post-operative graft status in two groups

Groups	Uptake	Failure	Total
Group A (Cartilage palisades) (n = 30)	26 (86.66%)	4 (13.33%)	30 (100%)
Group B (Temporalis fascia) (n = 31)	28 (90.32%)	3 (9.67%)	31 (100%)

Fisher's Exact test : (p = 0.707): Statistically not significant

Table 6: Ossicular status between the two groups

	Ossicular status				
Group	Fixed	Restricted	Dislocated/ necrosed	Not assessed	Normal
Group A Cartilage palisades	4	1	2	2	21
Group B Temporalis fasica	1	2	1	1	26
Total	5	3	3	3	47

Table 7: Comparison of pre- and post-operative hearing between two groups

Mean	Group A (Cartilage palisades)	Group B (Temporalis fascia)	p value
Pre-operative PTA-AC threshold (dB)	45.29	40.96	0.163
Post-operative PTA-AC threshold(dB)	33.15	28.26	0.149
Pre-operative PTA-AB Gap(dB)	29.26	29.52	0.934
Post-operative PTA-AB Gap(dB)	20.41	17.93	0.384

DISCUSSION:

Graft uptake rate of myringoplasty using cartilage palisades was 86.66% and with temporalis fascia was 90.32%. This difference was not statistically significant (p = 0.707). Post- operative hearing results obtained with this study was comparable to other similar studies however our study shows better graft uptake results with fascia as compared to cartilage palisades which is in contradiction to other studies. This can be attributed to lesser experience of surgeons with cartilage myringoplasty.

Kazikdas et al.[5] achieved graft uptake rate of 95.7% i.e. 22/23 patients in cartilage palisades group and 75% graft uptake rate i.e. 21/28 patients in temporalis fasica group in large perforation with mean age of 27.6 years with mean follow up period of 18.7 months. The result was statistically significant between the two groups (p<0.05). His result had statistically significant difference between the two groups. The reason for low success rate in cartilage palisades group in our study might be due to learning curve. Besides, short follow up period might be the reason for high success rate in fascia group in our study as some studies have shown the reason for failure of fascia being its unpredictable changes, atrophy and shrinkage along with time.[6]

RCT done by Cabra et al.[1] included 64 patients in palisades group and 59 patients in fascia group with mean age of 39 years in both groups, had graft uptake rate of 92% in palisades group and 74.6% in fascia group in follow up period of 6 months (p-0.009). Our study is comparable to his study. Ozbek et al.[66] had achieved graft uptake rate of 100% in 21 patients undergoing cartilage palisades and 70.2% in 24 patients having temporalis fascia with mean follow up period of 19 months in palisades and 18 months in fascia group. Nuemann et al.[7] had graft uptake of 93% in 30 patients in cartilage type I tympanoplasty using palisades. Amedee et al.[8] had 100% graft uptake in cartilage palisades in 52 patients with mean follow up period of 2 years. Milewski et al.[9] had 91.5% graft uptake rate using cartilage palisades in 197 patients with follow up period of 6 months. Dornhoffer[10] had achieved result of more than 95% graft uptake rate in cartilage palisades technique in this 1000 patient's case series. All these studies were done without comparison to temporalis fascia but had achieved graft uptake rate slightly higher than the result obtained by our study and the reason for this can again be related to our learning curve experience.

The hearing results obtained in this study was similar to the results of others. Kazikdas et al.[5] had mean pre- and post-operative AC threshold of 31.4 ± 10.7 and 22.4 ± 12.0 dB in cartilage palisades group respectively and mean pre- and post-operative AC threshold of 42.2 ± 14.6 dB and 29.7 ± 17.0 dB in temporalis fascia group respectively. The mean AC threshold change between the groups was not statistically significant (p> 0.05).

The results in our study was similar to the other studies. Cabra et al.[1] found no significant difference in hearing results between cartilage palisades and temporalis fascia group. He had pre-operative ABG of 25.7±10.7 dB in cartilage palisades group and 23.1±7.8 dB in temporalis fascia group. Post-operative ABG was 17.2±12 dB in cartilage palisades group and 15.6±9.8 dB in temporalis fascia group. There was no statistically significant difference between the two groups regarding the hearing status which is comparable with our study.

In a study done by Kazikdas et al.[5] the average pre-operative ABG in cartilage palisades group was 25.6 ± 8.6 dB, and post-operative ABG was 17.3 ± 8.8 dB, whereas the average pre- and post-operative ABG in temporalis fascia group was 30.7 ± 12.6 and 20.2 ± 12.1 dB, respectively. The mean ABG changes between two groups were not statistically significant either (p > 0.05) which is again comparable to our study. Similarlty, all other studies done utilizing cartilage palisades for myringoplasty without comparing with temporalis fascia as done by Dornhoffer12, Neumann et al.[13], Ozbek et al.[65], Milewski et al.[15], and Amedee et al.[8] reported significant hearing improvement after the surgery which is comparable with our study.

The findings for all these above mentioned studies showed that the hearing results were comparable between the cartilage palisades group and temporalis fascia group. There had always been the uncertainty regarding cartilage to affect hearing status as it has a property of rigidity, mass and stiffness.

There are certain limitations of this study as it has short follow up period and only addresses short-term graft uptake and audiologic results which might have changed with time. There were evidences mentioned in literature suggesting the improvement of post-operative hearing status with cartilage myringoplasty with time, thus a longer follow up period would be ideal to clear these doubts.

CONCLUSION:

The graft uptake rate and hearing results after cartilage palisades are comparable to those of temporalis fascia in large perforations. Thus we recommend that cartilage palisades can be used as an alternative option for the repair of tympanic membrane in large perforations.

REFERENCES:

1. Cabra J, Monux A. Efficacy of cartilage palisade tympanoplasty: randomized controlled trial. Otol Neurotol2010; 31: 589-95.
2. Fukuchi I, Cerchiari DP, Garcia et al. Tympanoplasty: Surgical results and a comparision of the factors that may interfere in their success Rev Bras Otorrinolaringol 2006;72(2):267-71.
3. Aggarwal R, Saeed RS, Green J M K. Myringoplasty J Laryngol Otol 2006; 120 :429-432.
4. Aidonis I, Robertson TC, Sismanis A. Cartilage shield tympanoplasty: a reliable technique. Otol Neurotol 2005; 26:838-41.
5. Kazikdas KC, Onal K, Boyraz I, Karabulut E. Palisade cartilage tympanoplasty for management of subtotal perforations: a comparison with the temporalis fascia technique. Eur Arch Otorhinolaryngol 2007; 264:985-989.
6. Beutner D, Huttenbrink KB, Stumpf R et al. Cartilage Plate Tympanoplasty. Otology & Neurotology 2009; 31:105-110.
7. Neumann A, Jahnke K. Tympanic membrane reconstruction using cartilage - indications, techniques and results. HNO 2005;53:573-84.
8. Amedee RG, Mann W et al. Cartilage Palisade Tympanoplasty. The American Journal Of Otology 1989; 10: 447-450.
9. Milewski C. Composite graft tympanoplasty in the treatment of ears with advanced middle ear pathology. Laryngoscope 1993; 103: 1352–6.
10. Dornhoffer J. Cartilage tympanoplasty: indications, techniques and outcomes in a 1000 patient series. Laryngoscope 2004;113:1844–56.
11. Brown C, Yi Q, Mc. Carty DJ, Briggs RJS. Success rate following myringoplasty at the Royal Victorian eye and ear hospital. Aus J Otolaryngol 2002.
12. Dornhoffer J. Hearing results with cartilage tympanoplasty. Laryngoscope 1997; 107: 1094–9.
13. Neumann A, Kevenhoerster K, Gostian AO. Long-Term Results of Palisade Cartilage Tympanoplasty Otology & Neurotology 2010 31:936-939.
14. Ozbek C, Ciftci O, Tuna EU et al. A Comparison of Cartilage Palisades and Fascia in Type I Tympanoplasty in Children: Anatomic and Functional Results. Otology & Neurotology 2008; 29: 679-683.
15. Milewski C. Composite graft tympanoplasty in the treatment of ears with advanced middle ear pathology. Laryngoscope 1993; 103: 1352–6.