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Comparative study between endoscopic cartilage myringoplasty and endoscopic temporalis fascia myringoplasty

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ABSTRACT

Background: Myringoplasty is a common ear surgery performed all over the world. This study is focused on prospective comparative study using two different graft materials.
Methods: This was a prospective study done in the Department of ENT Stanley Medical College, Chennai during the period from March 2013 to September 2013. Sample size was 60 patients. Follow up was done till 6 months.
Results: Graft acceptance was achieved in 28 patients (93%) who underwent palisade cartilage myringoplasty, whereas it was achieved in 24 patients (80%) in the temporalis fascia myringoplasty group.
Conclusions: The outcomes in our patient series indicate that cartilage myringoplasty achieves good results. Cartilage, a very effective material for the reconstruction of the TM and grafts can provide an excellent anatomical result, perfect stability and good functional outcome.

Keywords: Myringoplasty, Cartilage, Temporalis fascia, Endoscopic

INTRODUCTION

Chronic otitis media is a chronic inflammation of the middle ear cleft which presents with persistent otorrhoea through a perforated tympanic membrane for a period of more than 3 months. To improve the hearing, to make the discharging ear dry and to prevent the recurrence of disease, two surgical procedures are offered by otologists i.e. cartilage myringoplasty and temporalis fascia myringoplasty.[1,2] This study conducted at the Department of ENT, Stanley Medical College, Chennai, discusses the effectiveness of these two surgical procedures in terms of hearing improvement, graft uptake, reperforation in carefully selected patients in inactive cases of chronic otitis media.

METHODS

Study design: Prospective study

Study place: Department of ENT Stanley Medical College, Chennai.

Study period: March 2013 to September 2013.

Sample size: 60 patients.

Inclusion criteria

Inclusion criteria were age 20 to 60 years, duration of symptoms-2 yrs, no foci of sepsis in the nose, paranasal sinus or nasopharynx, no history of previous otological surgery in the ear of interest, conductive hearing loss of

not more than 55 dB and cases with good cochlear function.

Exclusion criteria

Exclusion criteria were age less than 20 and more than 60 years, cases with any foci of sepsis in nose, paranasal sinus, nasopharynx; previous otological surgery in the ear of interest, conductive hearing loss of more than 55dB; presence of sensorineural hearing loss, patients with posterosuperior retraction or cholesteatoma.

Methodology: Myringoplasty

Steps

Harvesting of temporalis fascia

Temporalis fascia is a time tested material with an excellent take up rate because of its low metabolic rate.[3] The fascia is elevated from the underlying temporalis muscle by injecting saline underneath the fascia to facilitate easy removal. Temporalis fascia is harvested under direct vision by sharp dissection.

Freshening of margins of perforation

The margins of perforation are freshened by using sickle knife and the rim is removed by using cup forceps.

Canal incision and elevation of tympanomeatal flap

A U shaped incision is made in the bony canal skin. The superior incision is started at 12'O clock position and inferior incision started at 7'O clock position. The tympanomeatal flap is elevated up to the fibrous annulus. The middle ear is entered using sickle knife. The handle of malleus is skeletonised.

Assessment of ossicular chain

Each of the ossicles has to be assessed for mobility.

Underlay temporalis fascia grafting

Temporalis fascia is placed under the remnant of tympanic membrane with fibrous annulus and under the handle of malleus. Underlay technique of grafting has replaced the overlay technique due to higher chance of lateralization of graft, anterior blunting, longer healing time and formation of epithelial pearl associated with overlay technique. After grafting, the tympanomeatal flap is repositioned. Gel foam is kept around the flap and graft.

The study population included 60 patients who were not selected according to age or sex. In all patients, a unilateral retraction with perforation was detected. A total of 30 patients underwent a myringoplasty using temporalis fascia, while in the other 30 patients, palisade cartilage was used as a graft material to close the tympanic membrane retraction with perforation.[4]

The indication for surgery was the presence of a unilateral retraction with perforation, an intact ossicular chain, at least a one month dry period and normal middle ear mucosa. Patients who had history of previous ear surgery were excluded from this study. In the patients who underwent palisade cartilage myringoplasty, concha cartilage was used in all cases. The perichondrium was removed from one side of the cartilage, and the cartilage was then cut into several slices with, on average, four or five palisades placed in an over-under fashion (two placed anterior to the malleus handle and two or three placed posteriorly). The remaining perichondrium was left attached to the cartilage slices on the lateral side. The perichondrium layer removed at the beginning of the procedure was then laid on the cartilage palisades, so that all the unwanted small openings between the slices were covered to improve the healing process.[5] In the patients who underwent myringoplasty where the temporalis muscle fascia was used as a grafting material, the graft was harvested from the ipsilateral deep temporal muscle fascia and placed lateral to the long process of the malleus, and medial to the drum remnant and tympanic annulus. Gelfoam was placed both medial and lateral to the graft, and the wound was closed using absorbable sutures.

Postoperatively, the patients were evaluated in a regular clinical manner and audiometrically at a six month follow up appointment. A successful myringoplasty was defined as successful acceptance of the graft, and intact healing of the TM without perforation, retraction, or lateralization within a follow up period of six months from the operation. Auditory outcomes were evaluated using pure tone audiogram. Audiological data were gathered from the preoperative and postoperative audiograms of the patients.[5]

The patients' data were reviewed for changes in the preoperative and postoperative air bone gaps (ABG), which was defined as the difference between the preoperative and postoperative air bone gap; pure tone averages (PTA) at 500 Hz, 1000 Hz, 2000 Hz and 4000 Hz. Follow up was done till 6 months.

The collected data was analysed with SPSS 16.0 version. To describe about the data descriptive statistics, mean, S.D were used. To find the significance difference between the independent samples (cartilage and fascia) independent t-test was used and for the paired samples (pre-op and post-op) paired t-test was used and for categorical variable (reperforation response) Chi-square test was used. In all both the above statistical tools the probability value p=0.05 is considered as significant level.

RESULTS

The patients' ages ranged from 20 to 60 years with a mean of 40 years; 27 patients (45%) were female and 33 (55%) were male. In the patients who underwent palisade cartilage myringoplasty, 17 (56.7%) were female and 13 (43.3%) were male, and in the group, who underwent temporalis fascia myringoplasty, 10 (33.3%) were female and 20 (66.7%) were male. In all patients, a pure tone audiogram from 250 Hz to 8 MHz was obtained preoperatively. The follow-up period was six months postoperatively.

Table 1: Group statistics.

	Groups	N	Mean	Std. deviation	Std. error mean
Pre op	Cartilage	30	47.47	4.946	.903
	Fascia	30	48.33	4.663	.851
Post op	Cartilage	30	29.80	5.346	.976
	Fascia	30	32.10	9.106	1.663
Pre-post diff	Cartilage	30	17.67	6.305	1.151
	Fascia	30	16.23	8.721	1.592

Table 2: Descriptive statistics (groups: cartilage).

	N	Mean	Std. deviation
Age	30	34.63	12.274
Pre op	30	47.47	4.946
Post op	30	29.80	5.346
Pre-post diff	30	17.67	6.305
Valid N (list wise)	30		

Table 3: Descriptive statistics (groups: fascia).

	N	Mean	Std. deviation
Age	30	35.90	10.571
Pre op	30	48.33	4.663
Post op	30	32.10	9.106
Pre-post diff	30	16.23	8.721
Valid N (list wise)	30		

Table 4: Sex (groups: cartilage).

		Frequency	Percentage (%)	Valid percentage (%)	Cumulative percentage (%)
Valid	F	17	56.7	56.7	56.7
	M	13	43.3	43.3	100.0
	Total	30	100.0	100.0	

Table 5: Sex (groups: fascia).

		Frequency	Percentage (%)	Valid percentage (%)	Cumulative percentage (%)
Valid	F	10	33.3	33.3	33.3
	M	20	66.7	66.7	100.0
	Total	30	100.0	100.0	

Table 6: Crosstabs (reperforation *Groups cross tabulation).

			Groups		Total
			Cartilage	Fascia	
Reperforation	No	Count	28	24	52
		% within groups	93.00	80.00	87.00
	Yes	count	2	6	8
		% within groups	7.00	20.00	13.00
Total		Count	30	30	60
		% within Groups	1.0	1.0	1.0

Table 7: Chi-square tests.

	Value	Df	Asp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson chi-square	2.308	1	0.129		
Continuity correction	1.298	1	0.255		
Likelihood ratio	2.401	1	0.121		
Fisher's exact test				0.254	0.127
Linear-by-linear association	2.269	1	0.132		
N of valid cases	60				

Graft acceptance was achieved in 28 patients (93%) who underwent palisade cartilage myringoplasty, whereas it was achieved in 24 patients (80%) in the temporalis fascia myringoplasty group. This difference was not statistically significant according to the chi-squared test (p=0.127). Two graft failures were observed in the patients who underwent palisade cartilage myringoplasty, but six graft failures were observed in the temporalis fascia myringoplasty group. In both graft failures, a small perforation developed at the central part of the TM.

There were no significant complications such as graft lateralization, blunting, or infection. In each group, the postoperative results were satisfactory. Also, a comparison of the mean ABG changes between the two groups was not statistically significant either (p>0.05). Overall, a comparison of all the audiologic results between the two groups did not reveal any statistically significant differences.

DISCUSSION

The use of cartilage is experiencing a renaissance in ear surgery because it appears to offer extremely reliable method for reconstruction of the TM in cases of advanced middle ear pathology and eustachian tube dysfunction.

In this short term study patients with retraction with perforations, an intact ossicular chain, at least a one month dry period, and normal middle ear mucosa were included. The graft acceptance rate was 93% for the patients who underwent a palisade cartilage myringoplasty and 80% for the patients who underwent temporalis fascia myringoplasty. This difference was not statistically significant.[7]

Our results were comparable to other studies. For example, Neumann and colleagues reviewed 84 cases of patients who underwent palisade technique, with mixed pathologies such as retraction with perforation, adhesive processes and chronic mesotympanal otitis, and found an overall graft acceptance rate of 97.6%.[8] No perforations were found in patients following palisade cartilage myringoplasty, whereas there were four perforations in the patients who underwent fascia myringoplasty.

In our study, auditory function in palisade cartilage myringoplasty patients was not statistically different when compared to the gains observed in the patients who underwent temporalis fascia myringoplasty. Other studies in the literature have also reported good or acceptable hearing results with cartilage grafting.[8] Kazikdas and colleagues demonstrated that a comparison of the gains in mean speech reception threshold, air bone gap, and pure tone average scores between the palisade cartilage myringoplasty and temporalis fascia technique showed no significant differences.[9]

Following cartilage perichondrial composite graft myringoplasty, Levinson reported that 65% of his patients had closure of the ABG to within 10 dB and 86% to within 20 dB.[10] In a study by Dornhoff, no significant differences were demonstrated in gains in auditory function in patients who had cartilage perichondrium grafting compared with patients who had grafts of perichondrium alone.[11]

Kirazli et al also found no significant difference between the audiologic results after cartilage perichondrium and temporalis fascia myringoplasty.[12] Similarly, a study by Cabra et al observed no relevant differences between the functional results of the two procedures (palisade cartilage myringoplasty and temporalis fascia myringoplasty).[13] The ideal acoustic thickness of cartilage should be approximately 0.5 mm. The full thickness is 0.7 to 1 mm. However, thinning the cartilage makes the reconstruction process more difficult due to the inevitable twisting of the cartilage. We applied full thickness cartilage in our procedure. Experimental histopathologic studies have shown that cartilage is stable because of the fibrillar structure of the matrix, which is independent of the survival of cellular elements.[14,15]

Reconstruction of the TM using the palisade cartilage technique in myringoplasties allowed us to achieve good anatomic and audiologic results that were at least similar, if not better than, traditional methods of reconstruction in high risk cases.

CONCLUSION

The comparative study of using temporalis fascia graft and palisade cartilage graft in myringoplasty surgeries for perforation of tympanic membrane, yielded a better graft take up and audiologically far better results with the palisade cartilage grafting technique..

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