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Original Research Article

Comparison of conventional temporalis fascia myringoplasty with fascia lata myringoplasty among patients with hearing loss

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ABSTRACT

Background: In selection of a graft tissue factors considered include its biological properties, probability of survival, its adequacy in size and ease of procurement The present study aims to preoperatively predict hearing improvement by paper patch test and compare with postoperative hearing improvement i.e. pre and post operatively hearing assessment.
Methods: The study was conducted on 25 cases undergoing myringoplasty with Fascia lata and Temporalis fascia as a graft material among the patients fulfilling the standard criteria for myringoplasty i.e. pars tensa perforation, good cochlear reserve, dry ear and normal eustachian tube function were considered for surgery. Myringoplasty was done from post aural route for harvesting fascia temporalis graft & from upper 1/3rd of thigh laterally to harvest fascia lata. Each case was followed up post operatively monthly for 3 months.
Results: Factors which influence graft take up are the size of perforation and lack of infection at the time of surgery and postoperative. Large perforations were difficult to repair as it took more time to heal. Surgery performed postaurally underlay technique using temporal fascia was associated with less morbidity, better uptake and lesser postoperative complications but permeatal route also serve similar purpose and does not affect the result of study significantly.
Conclusions: This study compared both temporal fascia and fascia lata as graft materials for myringoplasty and proved that myringoplasty done by postaural underlay technique using temporal fascia holds best as per graft uptake, hearing improvement and postoperative complications when compared to fascia lata myringoplasty.

Keywords: Graft, Myringoplasty, Tympanic membrane perforation

INTRODUCTION

Hearing is one of the vital sensations to man. For man the ear is the main portal through which his mind and faculties develop and are trained. Tympanic membrane is an integral part of one ear. Wullstein said "The tympanic membrane has two functions, sound pressure transformation for the oval window and sound protection of the round window."[1,2]

The perforation of tympanic membrane results from acute suppurative otitis media (ASOM) results not only in loss of hearing, but also gives way to middle ear infection and problem of otorrhoea, tinnitus and dizziness.[3]

Myringoplasty is the operative procedure performed to repair the tympanic membrane perforation and to improve hearing level.[4] Banzar was the first to close a tympanic membrane perforation in the year 1640. He used pigs bladder membrane stretched on an ivory tube.

Since then myringoplasty has gone through many changes in techniques and materials.[5]

The materials used range from homograft and autograft, skin, duramater and fascia to synthetic prosthetic material. Connective tissue like fascia lata, dura, temporalis fascia, vein graft and perichondrium are preferable because they are easier to handle, problem of cholesteatoma formation is less and more resistant to infection.[6]

In selection of a graft tissue factors considered include its biological properties, probability of survival, its adequacy in size and ease of procurement.[7] Temporalis fascia is the most widely used material for closure of tympanic membrane perforation.

The present study not only compared the use of temporalis fascia with fascia lata as graft material in myringoplasty, but also preoperatively predicted the likely hearing gain after the surgery by doing the paper patch test. The present study aims to preoperatively predict hearing improvement by paper patch test and compare with postoperative hearing improvement i.e. pre and post operatively hearing assessment.

METHODS

The study was conducted on 25 cases undergoing myringoplasty with fascia lata and temporalis fascia as a graft material in the Department of Otorhinolaryngology, Gajra Raja Medical College, J.A. Group of Hospitals, Gwalior, Madhya Pradesh over a period of 1 year. Patients irrespective of age, sex, religion and socioeconomic status were included in this study. A detailed history regarding the illness of patient followed by a thorough systemic and local examination was carried out on the patients in a systemic manner as per proforma. All the patients fulfilling the standard criteria for myringoplasty i.e. pars tensa perforation, good cochlear reserve, dry ear and normal eustachian tube function were considered for surgery. Patients were revived with radiological and audiometric assessment before surgery with paper patch and after surgery at 3 weeks and 3 months.

Pure tone audiometry was done before surgery, after paper patching, 3 weeks and 3 months after myringoplasty. Radiological assessment was done. Perforations were categorized with respect to size i.e. small sized perforation involving <25% of area of pars tensa, medium <25-50% of pars tensa, large >50% of area of part tensa. Myringoplasty was done from post aural route for harvesting fascia temporalis graft & from upper 1/3rd of thigh laterally to harvest fascia lata. Each case was followed up post operatively monthly for 3 months. Results of myringoplasty using temporalis fascia were compared with patients undergoing fascia lata graft. Also results will be correlated in terms of hearing gain after paper path & after myringoplasty.

Local examination of ear was conducted. The appearance of pinna, external auditory canal and tympanic membrane was noted. Any discharge in the canal if present, its colour, amount of odour is noted. The condition of tympanic membrane with otoscope & examination under microscope mobility of tympanic membrane was checked by valsalva's maneuver & seigalization. Eustachian tube patency & normal functioning is tested by instilling ear drops in ear & asking patient to perform swallowing movements. If the patient says that he can feel the ear drop coming in throat eustachian tube patency is confirmed.

In both cases either for using temporal fascia or fascia lata the post aural approach was used as this approach facilitates a large area of tympanic annulus exposure of space for placing graft with underlay technique. Also when using temporal fascia a single incision approach can help in harvesting graft. For harvesting fascia lata graft at the function of middle and upper 1/3rd of lateral part of thigh an incision is given after giving local anaesthesia the fascia lata graft is taken to a size as per need. After giving local or general anaesthesia, an incision about 2cm away from post auricular groove was given and dissection was done till the bone was reached. Spine of Henle is palpated and posterior wall of external auditory canal was dissected in a way to expose the tympanic annulus. The rim of the annulus was freshened by sickle-knife. A tympanic meatal flap was raised and middle ear cavity is examined for ossicular mobility. The pre-dried graft (either temporal fascia or fascia lata) was then placed under the annulus after filling the middle ear cavity by antibiotic ear drop soaked gel foam. The gel foam keeps the graft in place and helps in early take up. The tympanomeatal flap was replaced back, external auditory canal was packed with antibiotic ointment soaked gauge piece. Mastoid dressing was done, pack from external auditory canal is removed after 5 days, stitches are removed after 7 days. Patients were followed up monthly for about 3 months by doing pure tone audiometry. The collected data were analyzed using SPSS Software.

RESULTS

Maximum number of patients were in age group of 15-25 years. Youngest of them was of 16 years and oldest was of 49 years (Table 1). In our study males dominated but there were also considerable number of females. In temporal fascia group 72% males & 28% females were present & in fascia lata group 56% were males & 44% were females (Table 1). Although, age and sex of patient did not affected the study results. Table 2 shows distribution of side, side and site of perforation. Both sides i.e. right & left ears were almost equally affected. Majority of perforations were medium sized perforation. The maximum number of patients had perforation involving the central part of tympanic membrane. Chronic suppurative otitis media of tubo-tympanic type was the most common cause of perforation in the study

(Table 3). Discharge was the complaint found in almost all cases, but surgery was performed only after the ear was dry for at least 6 weeks. Hearing loss was seen in 88-92% cases. Earache, tinnitus & vertigo were variably seen. Majority of cases were within 1year in which 68% were of temporal fascia & 60% were of fascia lata (Table 3).

Table 1: Age and sex wise distribution.

Parameters		Temporal fascia myringoplasty		Fascia lata myringoplasty	
		No. of patients	%	No. of patients	%
Age (in years)	15-25	13	52	12	48
	26-35	07	28	09	36
	36-45	03	12	03	12
	46-55	02	08	01	04
Sex	Male	18	72	14	56
	Female	07	28	11	44

Table 2: Distribution of side, size and site of perforation.

Parameters	Side	Temporal fascia myringoplasty		Fascia lata myringoplasty	
		No. of patients	%	No. of patients	%
Side	Right	09	36	07	28
	Left	08	32	07	28
	Bilateral	08	32	11	44
Size	Small	04	16	03	12
	Medium	20	80	20	80
	Large	Nil	00	01	04
	Subtotal	01	04	01	04
Site of perforation	Central	18	72	15	60
	Ant. Quadrant	03	12	04	16
	Post. Quadrant	04	16	06	24

Table 3: Cause of tympanic membrane perforation.

	Cause of perforation	Temporal fascia myringoplasty		Fascia lata myringoplasty	
		No. of patients	%	No. of patients	%
Cause of perforation	Chronic tubo-tympanic disease	23	92	21	84
	Trauma	02	08	04	16
Symptoms	Discharge	25	100	25	100
	Hearing loss	22	88	23	92
	Earache	19	76	16	64
	Tinnitus	03	12	02	08
	Vertigo	01	04	01	04
Duration of disease	<1 year	17	68	15	60
	1-5 years	05	20	06	24
	5-10 years	03	12	04	16

Table 4: Pre-operative audiological evaluation.

Pre-operative average airbone gap	Temporal fascia myringoplasty		Fascia lata mmyringoplasty	
	No. of patients	%	No. of patients	%
1-20 dB	00	00	00	00
21-40 dB	12	48	11	44
41-60 dB	13	52	14	56
>60 dB	0	0	0	0

Table 5: Improvement in hearing post-patch and post-myringplasty.

	Air-bone gap (in dB)	Post-paper patch		Post-operative fascia lata myringoplasty	
		No. of patients	%	No. of patients	%
At 3 weeks post-operatively	0-10	00	00	00	00
	11-20	08	32	06	24
	21-30	05	20	05	20
	31-40	05	20	05	20
At 3 months post-operatively	0-10	00	00	00	00
	11-20	04	16	03	12
	21-30	15	60	19	76
	31-40	06	24	03	12

Table 6: Relation of status of middle ear mucosa to result.

Status of middle ear mucosa	Temporal fascia myringoplasty		Fascia lata myringoplasty	
	No. of patients	%	No. of patients	%
Healthy	18	72	16	64
Diseased/oedematous	07	28	09	36

Table 7: Distribution of success rate.

Status of middle ear mucosa	Temporal fascia myringoplasty		Fascia lata myringoplasty	
	No. of patients	%	No. of patients	%
Success	24	96	23	92
Failure	01	04	02	08

Majority of cases in both groups showed Air-bone in range of 41-60 dB (Table 4). The air-bone gap was reduced to range of 0-30 dB in cases having fascia lata myringoplasty after 3 weeks post-operatively (Table 5). After 3 months post-operatively, the air-bone gap was reduced to range of 0-30 dB in cases having fascia temporalis myringoplasty. Paper patch test was significant in predicting the likely improvement in hearing post-operatively.

Maximum cases showed healthy mucosa but few cases also showed diseased on oedemaotus middle ear mucosa. Diseased/oedematous mucosa may be responsible for graft rejection (Table 6). 2 cases of fascia lata myringoplasty had failure, 1 because of infection and other because of gaping anteriorly (Table 7). 1 case of fascia temporalis myringoplasty showed improper take up due to faulty freshening of annular rim.

DISCUSSION

Myringoplasty for persistent central perforation by means of a variety of tissue materials is an accepted surgical procedure. Since the time of Berthold (1878) who coined the term "Myringoplasty" various studies have been done comparing different graft materials and techniques.[6]

This study is a step forth in proving that postaural underlay technique using temporal fascia is still the best and most trust worthy technique of myringoplasty using conventional fascia temporalis graft when compared to fascia lata graft.

Various surgeons have used different kinds of grafts to repair tympanic membrane perforations. Most popular are autogenous grafts. Zollner and Frenckner used pedicled ear canal skin graft to close perforations.[8,9] Shea introduced vein graft to close tympanic membrane perforations.[10] It goes to the credit of Heermann for introducing temporalis fascia as a grafting material in tympanoplasty.[11]

In our study maximum number of patients was in 15-25 yrs of age group. In any of the patients were females of marriageable age, hence their parents thought appropriate to get the disease corrected before marriage, while boys were concerned about their recruitment in armed forces and other jobs which required them to have a healthy ear. This probably could explain the high incidence in 15-25 yrs of age group. We didn't find much difference between the results of the two techniques in relation to age. Males dominated the study. The results were not affected by the sex difference**.** Shea, Palva et al in their series also concluded that sex and age do not influence the final outcome.[12,13]

Tubotympanic variety of chronic suppurative otitis media was the commonest cause of perforation (92% case of

temporalis fascia and 84% in case of fascia lata). Only 2 cases gave history of trauma as the cause of perforation in temporalis fascia and 4 in case of fascia lata. There was no significant difference between the results of the two graft materials in relation to the cause. In 36% of patients the perforation closed was in right side and 28% was on left side. There was no difference in the results in relation to the side of perforation. Most of the perforations were in the central part of the tympanic membrane (72%) while perforations of posterior quadrant were 16% and anterior quadrant was 12%. In our series there was no significant difference in hearing improvement produced by two techniques, as regards to site of perforation. Small, medium, large, subtotal and total perforations were all included in the study. Though maximum number of cases had medium size perforation surgery of small perforation was easier, took lesser time and the tympanic membrane post operatively at 3 months looked absolutely normal. Mehta et al carried a study and predicted that a perforation will cause a conductive hearing loss that is largest at low frequencies; increases as the size of the perforation increases; does not depend on location of the perforation; and will vary inversely with the middle-ear volume. Merchant et al and Ahmad et al also reported similar results.[14-16]

Hearing was judged preoperatively by paper-patch and post operatively at an interval of 1 and 3 months by pure tone audiometry. In our study we achieved an audiological closure of air bone gap in range of 0-30 dB in 88% cases of temporal fascia and 80% in fascia lata after surgery. Overall, patients derived a marked benefit to hearing improvement by having closed perforation. Few cases in which hearing improvement could not be achieved were those with profound hearing loss (due to fixed ossicles or ossicular disruption) or sensorineural hearing loss preoperatively.

At the time of surgery, few pathological conditions such as oedematous or polypoidal middle ear mucosa, fixed ossicles or ossicular disruption were observed. In 7 cases the middle ear mucosa was found diseased of this 5 cases had oedematous middle ear mucosa and 2 had serous otitis media. 2 cases had fixed ossicles. These findings did not affect the final outcome in both the groups. Other authors have also stated that status of middle ear mucosa does not affect the final graft results.[17-19]

Successful take rate was 96% in temporal fascia myringoplasty and 92% in fascia lata myringoplasty. 2 cases of fascia lata had failure 1 because of infection and other because of gapping anteriorly. 1 case of fascia temporalis showed improper take up due to incomplete freshening of annular rim.

The graft materials used in our study was temporal fascia and fascia lata. Fascia lata harvested from upper lateral 1/3rd of thigh and temporal fascia from behind the ear from temporal region. Advantages of using temporalis fascia over other graft materials like fascia lata includes that it is an autograft and excellent chance of take rate, is available close to the site of operation making its harvest easier, has a low basal metabolic rate, brightening its success rate and its thickness is more or less similar to that of tympanic membrane.

CONCLUSION

This study compared both temporal fascia and fascia lata as graft materials for myringoplasty and proved that myringoplasty done by postaural underlay technique using temporal fascia holds best as per graft uptake, hearing improvement and postoperative complications when compared to fascia lata myringoplasty. Factors like age, sex, cause of perforation do not influence graft take up. Duration of disease had an impact on the status of middle ear and ossicles which was difficult to revert following simple myringoplasty. Paper patch test audiological closure of air bone gap is range of 0 30 dB was achieved in 80% cases. This is comparable to audiological closure following myringoplasty (88% achieved audiological closure of 0 30 dB). So paper patch test is a useful tool to predict the likely hearing gain postoperative. In the temporal fascia group the graft take up rate was 96% as compared to fascia lata group in which the same was 92%.

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REFERENCES

1. Wullestein H. Theory and practice of tympanoplasty. Laryngoscope. 1956;66:1076–95.
2. Rance W, Raney MD. Myringoplasty and tympanoplasty BCM (Baylor College of Medicine) Bobby R Alford. Department of otolaryngology-Head and Neck Surgery. 1995.
3. Naderpour M, Shahidi N, Hemmatjoo T. Comparison of tympanoplasty results in dry and wet ears. Iran J Otorhinolaryngol. 2016;28(86):209-14.
4. Aslam MA, Aslam MJ. Comparison of over-underlay and underlay techniques of myringoplasty. Pak Armed Forces Med J. 2009;59(2):189-93.
5. Malhotra M, Varshney S, Malhotra R, Joshi P. Indian perspectives on graft materials used for repair of tympanic membrane. J Clin Diagn Res. 2017;11(7):ME01-6.
6. Sarkar S. A review on the history of tympanoplasty. Indian J Otolaryngol Head Neck Surg. 2013;65:455–60.
7. Murugendrappa MA, Siddappa PN, Shambulingegowda A, Basavaraj GP. Comparative study of two different myringoplasty techniques in mucosal type of chronic otitis media. J Clin Diagn Res. 2016;10(2):1-3.

8. Zollner F. Eingriffe bei Gehorgangs-und Mittelohrmi bildung. Acta Otolaryng. 1954;44:517–24.
9. Frenckner P. Eine operationsmethode zum plastichen verschlub von Trommelfell perforationen. Acta Otolaryngol. 1995;45:19–24.
10. Shea JJ. Vein graft closure of ear drum perforation. J Laryngol Otol. 1960;74:358–62.
11. Heermann H. Frommel fill plastik mit fuzoengewebe von muskulus temporalis nach. Begradrgung der vordenen gehorgangswand. HNO. 1960;9:136–7.
12. Shea J. Vein graft closure of ear drum perforation. J Laryngol Otol. 1961;74:358.
13. Palva T, Palva A, Käkjä J. Xcii Myringoplasty. Ann Otol Rhinol Laryngol. 1969;78(5):1074-80.
14. Mehta RP, Rosowski JJ, Voss SE, O'Neil E, Merchant SN. Determinants of hearing loss in perforations of the tympanic membrane. Otol Neurotol. 2006;27(2):136-43.
15. Merchant SN, Rosowski JJ. Auditory physiology. In: Glasscock ME, Gulya AJ (eds). Surgery of the Ear. 5th edition. Hamilton, Ontario: B.C.Decker, Inc; 2003: 59–82.
16. Ahmad SW, Ramani GV. Hearing loss in perforations of the tympanic membrane. J Laryngol Otol. 1979;93:1091–8.
17. Smyth GD, Kerr AG. Tympanic membrane homografts. J Laryngol Otol. 1969;83(11):1061-6.
18. Booth JB. Myringoplasty. The lessons of failure. J Laryngol Otol. 1974;88:1233 6.
19. Kacker SK. Suggestions for improving results in Myringoplasty. Indian J Otolaryngol Head Neck Surg. 1976;28(2):73-5.

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