

Original Research Article

Comparative study of graft materials used in myringoplasty

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ABSTRACT

Background: Various graft materials are used for myringoplasty in practice. Present study was done to compare the hearing improvement and graft uptake rate in patients with inactive mucosal type chronic otitis media with central perforation undergoing myringoplasty using either of the two graft materials: temporalis fascia and conchal perichondrium.

Methods: Patients with tubotympanic type of chronic suppurative otitis media were selected from patients attending the ENT OPD of SMGS Hospital, Government Medical College, Jammu between July 2016 to March 2018. This study included 100 patients out of which 50 were subjected to myringoplasty with temporalis fascia grafting (Group 1) and remaining 50 to conchal perichondrium grafting (Group 2) using underlay technique. The comparative study was done on following parameters-graft uptake and audiological outcome.

Results: 82% patients were of age less than 30 years. The overall male: female ratio was 1.3:1. In Group 1, 76% had gain of 15 db while 12% had gain of >15 db. In Group 2, 72% had gain of 15 db and 8% had gain of >15 db. The graft was intact in 84% patients. 12% of Group 1 patients, showed residual perforation whereas it was 20% in Group 2 patients.

Conclusions: The study showed that: the temporalis fascia graft is better than conchal perichondrial graft for closure of perforations in inactive mucosal type of chronic otitis media with central perforation because of maximum hearing improvement and minimal failure rate in group receiving temporalis fascia graft.

Keywords: Conchal perichondrium, Myringoplasty, Temporalis fascia

INTRODUCTION

Myringoplasty is a surgical procedure of closure of tympanic membrane perforations. Myringoplasty involves the use of a graft as a scaffold for the epithelium to grow over the graft and close the perforation. The goal of myringoplasty surgery is to achieve a dry ear by eradicating middle ear disease and also to improve hearing by the closure of tympanic membrane perforation by grafting. The results of myringoplasty are usually measured in terms of success or failure of graft take up and hearing improvement.¹

Permanent perforation of the tympanic membrane resulting as sequelae of chronic suppurative otitis media is a major cause of deafness. Otolologists have attempted to close tympanic membrane perforation for 300 yrs. It has been in the past 50 yr. that closure with autograft material has been consistently successful. Homografts have seen successful for the past 35 yrs. Various trials to close the tympanic membrane perforation had been performed till the date by various methods and by many authors.² Various graft materials like pig's bladder, thiersch skin graft, split-skin graft, pedicle graft from ear canal skin, temporalis fascia graft, vein graft, sclera, corneal graft, tympanic membrane homograft and perichondrium have

been used for closure of the perforated tympanic membrane. Autologous graft materials such as, temporalis fascia, tragal perichondrium, cartilage, fat, and fascia lata have stood the test of time in repairing tympanic membrane perforations. Such abundance of materials implies that there is no clear cut favorite and the choice of graft material depends on individual surgeon's preference. However, due to its anatomic proximity, translucency, and suppleness, temporalis fascia is the most preferred grafting materials among the otologists. Various autografts have been used for repair of the tympanic membrane perforation like full thickness skin graft, pedicled skin grafts, split skin graft, vein graft, fascia grafts and perichondrium.³⁻¹⁰ Each of these grafts material has its advantages and disadvantages over each other. The present study aims to compare temporalis fascia grafting and conchal perichondrium grafting in myringoplasty in terms of hearing results, graft uptake and air bone gap closure.

METHODS

The current study was conducted at Department of ENT, SMGS Hospital, Government Medical College, Jammu, from July 2016 to March 2018. The study population was the patients who had come to the department with inactive mucosal type chronic otitis media with a dry central perforation. On total 100 patients were included in the study. Selected patients for the study were randomly divided alternatively into one of the two study group, i.e. receiving either temporalis fascia graft (Group 1) or conchal perichondrium graft (Group 2). The investigations carried out to assess the patients for the study included examination under microscope, pure tone audiogram, diagnostic nasal endoscopy, Xray paranasal sinuses, chest X-ray, routine blood investigations, ECG. pure tone audiogram was done to establish the pre operative air –bone gap and to rule out any sensori-neural hearing loss. Diagnostic nasal endoscopy was done for all cases to out ant focus of sepsis in the para-nasal sinuses and nasopharynx. X-ray para-nasal sinuses to rule out any coexistent sinusitis. X-ray mastoid was done to know the type of mastoid pneumatization.

Inclusion criteria

Inclusion criteria were chronic suppurative otitis media, inactive mucosal type with central perforation; patients both male and female between age group 10 to 50 years; pure tone average between 20 -45 dB hearing loss; ear to be operated should be dry for atleast 4 weeks prior to surgery; eustachian tube function normal.

Exclusion criteria

Exclusion criteria were active discharging ear; sensorineural hearing loss; hearing loss >40 db on PTA; associated factors like uncontrolled hypertension, diabetes and severe anemia.

Procedure

All patients were done under either LA or GA. For all the cases the same operative procedure was followed. The head of the patient was turned to the opposite side so that the ear to be operated was facing up. Infiltration with 2% xylocaine and 1:1,00,000 adrenaline in post auricular region and also in supra-auricular region. The perichondrial graft is harvested via the post aural incision itself. A small piece of temporalis muscle fascia, for closure of a total perforation can easily be obtained in the retro auricular approach by elevating the skin at the superior borders of the post auricular incision, exposing the fascia. The lateral surface of the deep fascial layer is cleaned. A round incision in the temporalis fascia is performed with scalpel blade no.15. The fascia elevated with forceps, and its undersurface is again cleaned of remaining muscle fibers. Perichondrium via retroauricular incisions in the retroauricular fold incision and posterosuperior incision running close to the auricle, the skin and the subcutis are elevated with a pair of blunt scissors. The attachment of the posterior auricular muscle to the auricle is freed, and the muscle is pushed posteriorly. A curved incision through the perichondrium is performed with scalpel blade no.15 the perichondrium is elevated from the cartilage using a freer ruginer and a larger piece is resected with a pair of scissors. If the perichondrium is desired separately, it is worthwhile elevating it from the cartilage with a freer's ruginer before removing the cartilage, since this type of elevation is easier. The cartilage and perichondrium can be removed separately. After harvesting the graft the external ear canal is cleaned of any debris and infiltration is given in all the four quadrants of the external auditory canal. A curvilinear incision is then made in the posterior canal wall from 6'o'clock position to 12'o'clock position (vascular strip) and elevated laterally. A postauricular incision is made. Hemostasis should be achieved prior to graft placement with gel foam packed into the middle ear space while the graft is being trimmed. The dried graft trimmed to size (approximately 2.5×1.5 cm). A slit is made in the superior aspect of the graft to accommodate placement medial to the manubrium. The middle ear space is filled with gel foam. Packing should start at the Eustachian tube region and proceed posteriorly. With 22-gauge suction in one hand and a drum elevator in the other, the graft is slid medial to the manubrium and onto the lateral attic wall. The graft is sucked out through the anterior window for support. The remaining graft is draped along the posterior canal wall and the tympanomeatal flap with attached annulus is repositioned over the graft. The entire perforation edges are rechecked for any defect not covered by graft and corrected with the drum elevator.

Postoperatively the patients were given broad spectrum antibiotics, analgesics and antihistaminics.

Follow up

Any postoperative complication was noted. Stitches were removed after 7 days and EAC pack removed after 10-14 days. Patients were observed for graft uptake and any complications after 4 weeks and 12 weeks.

PTA was done every month for 3 months after surgery to assess the hearing level and third month PTA was compared to preoperative audiogram.

RESULTS

The present study was carried out in 100 patient's up to the age of 50 years who presented with dry safe perforation. They were divided into two groups each comprising 50 patients each in which different graft materials were used-temporalis fascia (Group 1) and conchal perichondrium (Group 2).

Age distribution of patients

The youngest patient in our study was 10 years old while the oldest was 50 years old. The overall average age of incidence was 24 years. The average incidence was 25 years for temporalis fascia group and 21 years for conchal perichondrium group.82% patients were of age less than 30 years (Figure 1).

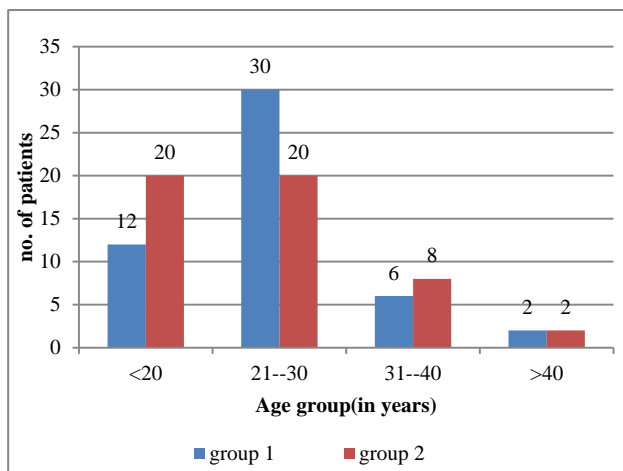


Figure 1: Age distribution of patients.

Sex distribution of patients

Overall male: female ratio was 1.3:1. Among the patients undergoing temporalis fascia grafting 64% were males and 36% females. Among the patients undergoing conchal perichondrium grafting 60% were males and 40% were females (Table 1).

Preoperative air bone gap

32% patients had preoperative air bone gap between <20 db. In patients who underwent temporalis fascia grafting

72% had AB gap between 21-40 db, whereas the other group had only 32% patients in this range. The average preoperative air bone gap was 28 db (Figure 2).

Table 1: Sex distribution of patients.

Sex	Group 1 Temporalis fascia (n=50)	Group 2 Conchal perichondrium (n=50)	Total (n=100)
	N (%)	N (%)	N (%)
Male	32 (64)	30 (60)	56 (56)
Female	18 (36)	20 (40)	44 (44)
Total	50 (100)	50 (100)	100 (100)

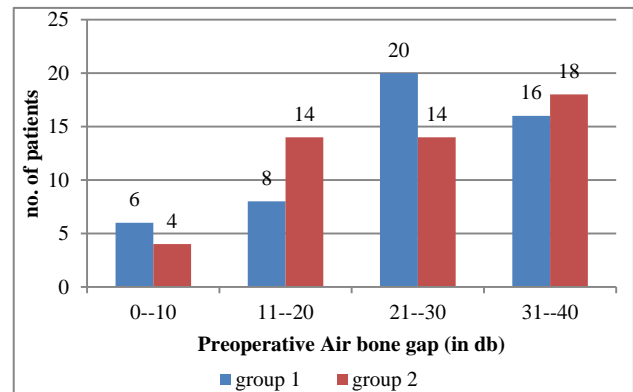


Figure 2: Preoperative airbone gap.

Postoperative AB gap closure

The patients who underwent temporalis fascia grafting, 76% had a gain of 15 db while 12% had gain of >15 db. Of the patients who underwent conchal perichondrium grafting, 72% had gain of 15 db while 8% had gain of >15 db (Table 2).

Table 2: Postoperative AB gap closure.

AB gap closure (in db)	Group 1 Temporalis fascia (n=50)	Group 2 Conchal perichondrium (n=50)	Total (n=100)
	N (%)	N (%)	N (%)
<10	28 (56)	30 (60)	58 (58)
10-15	10 (20)	6 (12)	16 (16)
>15	6 (12)	4 (8)	10 (10)
Total	44 (88)	40 (80)	84 (84)

Postoperative graft status

The graft was intact in 84% for both temporalis fascia and conchal perichondrium. 12% patients of temporalis fascia grafting showed residual perforation whereas it was 20% in cases of conchal perichondrium grafting. The graft uptake rate was more with temporalis fascia grafting

when compared to conchal perichondrium grafting (Figure 3).

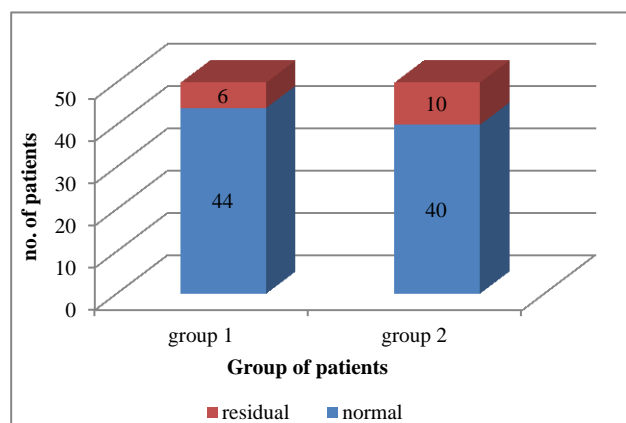


Figure 3: Postoperative graft status.

DISCUSSION

The overall average age of incidence was 24 years. The average incidence was 25 years for temporalis fascia group and 21 years for conchal perichondrium group. 82% patients were of age less than 30 years.

All of these patients had complaints of discharging ear of varied duration. Dry ear for at least 4 weeks and varied degree of hearing loss was the major criteria for inclusion of the patients in the present study.

At the end of 12 weeks following surgery successful closure of perforation was 86%. 12% patients of temporalis fascia grafting showed residual perforation whereas it was 16% in cases of conchal perichondrium grafting. AB gap closure alone could not be taken as an indicator of improvement audiometrically because closing of AB gap might still leave the patient with a postoperative hearing loss where bone conduction may be worse than preoperative level. In our series, all the patients who had successful graft uptake had normal bone conduction level and subjective hearing improvement. In our study, closure of AB gap was significant when pre- and post-operative AB gap comparison was made for each group. The patients who underwent temporalis fascia grafting, 76% had a gain of 15 db while 12% had gain of >15 db. Of the patients who underwent conchal perichondrium grafting, 72% had gain of 15 db while 8% had gain of >15 db. The graft was intact in 84% for both temporalis fascia and conchal perichondrium. 12% patients of temporalis fascia grafting showed residual perforation whereas it was 20% in cases of conchal perichondrium grafting. The graft uptake rate was more with temporalis fascia grafting when compared to conchal perichondrium grafting.

To check whether there was any significant difference between the mean hearing gain in the group receiving temporalis fascia and conchal perichondrium the student

t-test for independent samples was applied. The t value was calculated as 4.432. The p value was calculated as 0.000 thus the t test implies that there was significant difference between the mean hearing gain in the both groups. The t test in comparing between mean hearing gain in successful graft take-up and failed graft take-up showed that there was significant difference between the mean hearing gain in the groups successful graft take up and groups failed graft take-up and difference obtained is not due to any chance. The gain in A-B gap, graft used and graft take-up the F values was calculated as 19.653 using ANOVA. This showed that the gain in A-B gap and graft take up was better in the group receiving temporalis fascia as graft material than the group receiving conchal perichondrium as the graft material.

Several literatures are available regarding the study of different graft materials. In a study conducted by Gibb and Chang et al in 365 patients who underwent type 1 tympanoplasty using temporalis fascia showed a take-up of 87.5%.¹¹ Another study conducted by Dabholkar et al in 50 patients showed 84% of take-up by temporalis fascia and 80% with tragal perichondrium.¹² In a study conducted by Onal et al, among 80 patients showed a success rate of 65.9% in fascia group and 92.3% in cartilage group.¹³ Our study showed almost similar results. A study with palisade cartilage graft by Kazikdas et al found a 95.7% graft take-up when compared with a 75% take-up with temporalis fascia graft.¹⁴

CONCLUSION

According to our experience the temporalis fascia graft is better than conchal perichondrial graft for closure of perforations in inactive mucosal type of chronic otitis media with central perforation. The study showed the maximum hearing improvement and minimal the failure rate in group receiving temporalis fascia graft.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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