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Original Research Article

Tragal perichondrium as graft material in tympanoplasty: our experience

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ABSTRACT

Background: It has been defined as a permanent abnormality of pars tensa or flaccida, as a result of acute otitis media, negative middle ear pressure or otitis media with effusion. It manifests clinically as ear discharge and decreased hearing and may lead to numerous changes in the tympanic membrane, middle ear cleft, and mastoid air cell system. It has been classified into two types: mucosal and squamosal types. Chronic otitis media (COM) is a very common condition in developing countries in both adult and paediatric age groups. This study has been conducted to determine the outcome and graft uptake of tragal perichondrium in type 1 tympanoplasty.
Methods: The prospective analytical study was conducted department of otorhinolaryngology, School of Medical Sciences and Research, Greater Noida, Uttar Pradesh, India over a period of 12months from 01 January 2019 to 31 December 2019. 30 patients according to inclusion criterion underwent tympanolpasty using tragal perichondrium were included in study. The data obtained was analyzed using statistical package for the social sciences (SPSS), version 21.0. P value less than 0.05 was taken as statically significant.
Results: Preoperative mean hearing loss was 38.45±7.01 dB, mean air bone gap was 20.20±3.75 dB, and postoperative air bone gap was reduced to an average of 10.86±3.82 dB. 8.51 dB of hearing gain was achieved and an air bone gap réduction of 8.51 dB was observed.
Conclusions: Our study concluded tragal perichondrium is a suitable graft material is n mucosal type of COM.

Keywords: Chronic otitis media, Tymapnoplasty, Tragal perichondrium

INTRODUCTION

Chronic otitis media (COM) is a common pathology in developing world in different age groups. The World Health Organization (WHO) has estimated that about 65–330 million people worldwide are affected by CSOM, of whom 50% suffer from hearing impairment and approximately 28000 deaths per annum are attributable to the complications of COM.[1] COM has been defined as a permanent abnormality of pars tensa or flaccida manifest clinically as ear discharge and decreased hearing.[1,2]

COM has been classified mucosal and squamosal type. Mucosal type of chronic otitis media in its inactive stage generally presents with a permanent tympanic membrane defect and conductive hearing loss. Tympanic membrane perforations are most commonly caused by infections of the middle ear and some times in the external auditory canal. The majority of perforations due to infection heal spontaneously; recurrent infections may cause a permanent perforation. Tympanoplasty has been the mainstay of treatment for permanent tympanic membrane defects. Tympanoplasty involves reconstruction of the tympanic membrane and also addresses the pathology

within the middle ear cleft and the ossicular chain integrity. This study has been conducted to determine hearing outcome and graft uptake of tragal perichondrium in type 1 tympanoplasty.

METHODS

This prospective analytical study was conducted in the patients attending outpatient and inpatient department of Otorhinolaryngology, School of Medical Sciences and Research, Greater Noida, Uttar Pradesh, India over a period of 12 months from 01 January 2019 to 31 December 2019, after approval by the institutional ethical committee and informed consent was obtained from patients.

30 patients underwent tympanoplasty using tragal perichondrium. Patients with safe chronic suppurative otitis media, age between 14-50 years, both sexes, central perforation, conductive hearing loss, ear dry for at least 4 weeks, eustachian tube function normal, unilateral or bilateral ear disease were included in the study. Patients excluded from the study were with external ear pathology, sensorineural hearing loss, active discharge, patients with ossicular chain disruption, Eustachian tube dysfunction, and previous ear surgery on same ear, active infection of nose, throat and nasopharynx.

Preoperatively all patients who fulfilled the inclusion criteria were selected. Patients were evaluated based on detailed history, clinical and audiological examination, supplemented with suitable radiological investigations. Pre anesthetic checkup done and patients were then taken up for tympanoplasty. Otoscopy and examination under microscope was done in every case to determine site and size of the perforation. Pre and postoperative pure tone audiometry (PTA) was done of all the cases. Routine laboratory investigations were done and an informed consent was taken after full explanation of the surgical intervention. The data obtained was analyzed using statistical package for the social sciences (SPSS) version 21.0. P value less than 0.05 was taken as statistically significant.

Operative procedure

All patients were operated via post auricular approach. Patient intubated and then local anesthesia 2% xylocain with (1:1,00.000) was infiltrated behind the ear and in external auditory canal, a separate incision was given to procure tragal perichondrium besides Sir Willliam Wilde's post-auricular incision. Meatotomy was done. Perforation identified under microscope. Margins of perforation were freshened. Tympanomeatal flap elevated. Ossicular mobility was checked. Graft reposited by underlay technique, tympanomeatal flap reposited, gel foam applied in external auditory canal, suturing done in 3 layers, dressing done. All patients were followed up for at least 6 months after the procedure, on follow up in every patient examination under microscope done confirm graft uptake and PTA done to know the outcome of surgery.

Postoperative management

Antibiotics (amoxicillin and potassium clavulanate), oral decongestants and nasal drops were given to all patients for 10 days postoperatively. The first postoperative visit was on the 7th day, when ear dressing, packing and skin sutures were removed. The patients were instructed to keep ear dry after removal of the dressing and apply Soframycin to the post auricular incision twice a day for 1 week. All patients were advised to avoid head wash and upper respiratory tract care. The second follow-up visit was one month postoperatively. Thereafter, the patients were followed up at 2, 3 and 6 months.

At 2nd and 3rd and 4th and 5th visit operated ear was microscopically examined and checked for graft status and discharge. At 5th postoperative visit (6 months after surgery). Operated ear was microscopically examined for graft status and discharge and PTA done to assess postoperative hearing.

RESULTS

A total of 30 patients were included in the study 13 (43.34%) were males and 17 (56.67 %) were females (Table 1).

Table 1: Gender distribution of the patients.

Gender distribution	No. of cases	% of cases	P value
Female	17	56.67	1.000
Male	13	43.34	

14 (46.6%) had left and 16 (53.3%) had right ear disease (Table 2).

Table 2: Frequency distribution of the diseased ear in group A and group B.

Frequency distribution	No. of cases	% of cases	P value
Right	16	53.3	1.000
Left	14	46.6	
Total	30	100	

Preoperative mean hearing loss was 38.45±7.01 dB. Postoperative mean hearing loss was 33.61±6.72 (Table 3).

Table 3: Comparison of pre-operative and post-operative hearing loss in group A and group B.

Comparison	Hearing loss (mean±S.D.) (dB)
Pre-operative	38.45±7.01
Post-operative	33.61±6.72

Preoperative air bone gap 20.20±3.75dB and postoperative air bone gap 16.81±4.69 dB (Table 4).

Table 4: Pre-operative and post-operative air-bone gap.

Parameter	Air–bone gap (dB)	P value
Pre-operative	20.20±3.75	
Post-operative	16.81±4.69	<0.0001

Postoperative status graft uptake status

At 3 months, graft taken up in 21 patients, 9 patients had residual perforation that corresponds to success rate - 70%. At 6 months, total 17 patients had graft uptake, while 13 patients had residual perforation which corresponds to success rate of 56.6% % for graft uptake (Table 5).

Table 5: Post-operative graft uptake status at 3 and 6 months.

Postoperative follow up graft status	Frequency	%	P value
3 months			
No	9	30.0	0.209
Yes	21	70.0	
6 months			
No	13	43.3	0.020
Yes	17	56.6	

Discharge status

At 3 months, 19 patients had no discharge and 11 patients had discharge at the end of 3 months. Success rate – 63.3%. At 6 months, 17 patients, out of 30 patients had persistent discharge. Success rate - 0.56.6% (Table 6).

Table 6: Post-operative discharge status.

Postoperative follow up discharge	Frequency	%	P value
3 months			
No	11	36.6	0.143
Yes	19	63.3	
6 months			
No	13	43.3	<0.001
Yes	17	56.6	

DISCUSSION

Marcus Banzer in 1640 attempted first procedure to hearing in a patient of COM using prosthesis made of pig's bladder. This is followed by use of 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.[3-5] The most widely used and accepted method for tympanoplasty is the underlay graft of temporalis fascia or sometimes perichondrium. Cartilage has also become increasingly popular as a graft material. In fact, cartilage-perichondrium composite grafts are considered to be one of the best materials for tympanoplasty especially in cases of large perforation more than 50% of tympanic membrane area, anteriorly placed perforations. Many different surgical approaches and graft materials have been advocated for this procedure in recent times.[3,6] The post-operative outcome in patients, who underwent tympanoplasty with tragal perichondrium were determined on basis of hearing status, graft uptake and discharge status post-operatively. Hearing loss got reduced to 33.61.20 dB, from the preoperative hearing loss of 38.45 dB. So the hearing gain achieved is 4.84 dB. Air bone gap reduction 3.39 dB.

Graft uptake success rate was 70% at 3 months, and 56.6% at 6 months. Statistically the difference in the outcome was found to be significant (p=0.02).

Discharge status – 63.3% patients has no discharge at end of 3 months and at 6 months follow up, 56.6% patients had no discharge. So statistically, again the difference between these procedures was found to be highly significant (p<0.001). Results of our study are comparable to that conducted by Bongale et al in and Zingade et al but differed from the results of Dabholkar, Swaminathan, Majeed and Santhakrishnan et al where they found no significant difference between temporalis fascia graft and tragal perichondrium in terms of the post-operative outcome in patients. In 2007 Dabholkar et al 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. In this study surgical success was evaluated in terms of intact drum membrane during the follow up period and closure of A–B gap within 10 dB. 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. The rates are comparable with no statistical significance of the difference between them.[6]

In 2017 Swaminathan et al had a success rate of 90% in temporalis fascia group. There was 77.77% success rate in the tragal perichondrium group. They had graft failure rate of 22.22% in tragal perichondrium group and dry ear was achieved in about 90% and 77.77% for the temporalis fascia group and tragal perichondrium group respectively. They had an overall success rate of 84.21% in which an average of auditory gain of 10 to 15 dB, they also had similar percentage of 84.21% of dry ear giving no significant statistics difference between the graft materials used for surgery in terms of graft take up, dry ear and auditory gain.[7]

In 2016 Majeed et al conducted a study and came to result that the patients who underwent temporalis fascia grafting, 86.73% had a gain of 15 dB while 13.7% had a gain of >15 dB. Of the patients underwent tragal perichondrium grafting 50% had a gain of 15 dB while 10% had a gain of >15 dB. The graft uptake rate was 85.7% for both

temporalis fascia as well as tragal perichondrium. 4% of the patients of the temporalis fascia group had seroma and 4% had persistent pain.[8]

In 2017 Bongale et al conducted a study in which graft up take was better with temporalis fascia (92.5%) when compared with tragal perichondrium (87.5%). Hearing improvement when compared to other studies was better in temporalis fascia (80%) patients and in tragal perichondrium it is 75%.[9]

In 2018 Santhakrishnan et al conducted a study on patients with COM, mucosal type, with conductive hearing loss of <40 dB. 23 patients underwent type 1 tympanoplasty by underlay technique using temporalis fascia, 19 patients using tragal perichondrium. There was no significant difference in total hearing gain at 3rd month and graft uptake between temporalis fascia and tragal perichondrium.[10]

Limitations

Our study comprise of 168 participants over a period of two years, more studies are required of longer duration in future.

CONCLUSION

We concluded that tympanoplastyusing tragal perichondrium in mucosal type of COM with regards to graft success rate, disease eradication and hearing gain is a good alternative to temporalis fascia as graft material.

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

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