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Outcome of conchal cartilage shield type I tympanoplasty: a prospective study of 70 patients

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ABSTRACT

Background: Tympanoplasty is a surgical procedure performed to reconstruct hearing mechanism with or without reconstruction of tympanic membrane perforation. Cartilage shield tympanoplasty was first reported in literature by Duckert et al in 1995. The purpose of the present study was to prepare the cartilage shield graft and to evaluate its effect on the success rate of tympanoplasty.
Methods: In this study 70 patients who presented to ENT OPD of Aarupadai Veedu medical college, Puducherry, with chronic otitis media (COM) mucosal type, who were treated during the period between December 2016 to April 2018 were enrolled. Patients with COM mucosal type, with mild to moderate conductive hearing loss, dry or moist ear were included in the study. Detailed history was taken in the selected patients including a thorough otological examination and blood investigations required for surgery.
Results: In the present study male to female ratio was 1.6:1. 30% patients were in the age group between 20-24years. In our study 33% patients had pre-operative airbone gap in the range of 31-40 dB and post-operative improvement in airbone gap was in the range of 0-10 dB in 49% patients.
Conclusions: Conchal cartilage shield tympanoplasty is an effective technique in tympanic membrane reconstruction and shows no detrimental effect to the hearing outcome. Conchal cartilage is preferred graft as it can be harvested from same incision. The graft uptake rates are excellent with this technique.

Keywords: Cartilage shield tympanoplasty, Conchal cartilage

INTRODUCTION

Tympanoplasty is a surgical procedure performed to reconstruct hearing mechanism with or without reconstruction of tympanic membrane perforation. Several graft materials have been successfully used to reconstruct the tympanic membrane, the most popular being temporalis fascia graft.

The main advocate of cartilage tympanoplasty, however, was Heermann, who used cartilage palisade technique since 1960.[1] Cartilage shield tympanoplasty was first reported in literature by Duckert et al in 1995.[2] It has since been popularised by Cavaliere and Aidonis.[3,4]

The ultimate benefit of cartilage as grafting material has been believed to be its extremely low metabolic rate.[5] It receives its' nutrients via diffusion.[6,7] It is, also, tremendously easy to operate with due to its' pliability and ability to resist deformation caused by pressure variations.[1,5] Additionally, it incorporates well within the layers of the TM.[5-7] The purpose of the present study was to prepare the cartilage shield graft and to evaluate its effect on the success rate of tympanoplasty.

METHODS

In this study 70 patients with chronic otitis media (COM) mucosal type, who were treated during the period between December 2016 to April 2018 were enrolled.

The patients presented to ENT OPD of Aarupadai Veedu medical college, Puducherry.

Inclusion criteria: Patients with COM mucosal type, with mild to moderate conductive hearing loss, dry or moist ear were included in the study.

Exclusion criteria: Revision cases, cases with marginal tympanic membrane perforations, patients with COM squamosal type, patients with mixed or pure sensorineural hearing loss, patients with severe conductive hearing loss, patients having multiple TM perforations/other ear diseases, medical contraindications to undergo surgery and COM with complications.

Detailed history was taken in the selected patients including a thorough otological examination and blood investigations required for surgery.

Figure 1: Harvested Conchal cartilage.

Surgical technique

All patients underwent procedure under local anaesthesia and intravenous sedation. Postauricular Wilde's incision was made and temporalis fascia graft was harvested. A circular piece of conchal cartilage was harvested. Cartilage was sliced, perichondrium kept intact on one side. Due to the inherent curvature of the conchal cartilage manoeuvring it needed expertise. Slicing was necessary to make the cartilage pliable. Conchal cartilage was preferred as the graft material was available with the same incision. The edges of the perforation were freshened. A cut was made on the cartilage graft to accommodate the manubrium of the malleus. Temporalis fascia graft was placed by underlay technique and the cartilage graft was placed beneath it without touching any surrounding bone and perichondrial side facing promontory. The post-auricular incision was closed in three layers and a mastoid dressing is applied for 24 hours. The patients were followed up at 2 weeks, 1 and 3 months and audiological evaluation was done at 3 months. Surgery was performed by a single surgeon in all patients to avoid bias.

RESULTS

There were 43 (61%) males and 27 (39%) females out of the 70 considered for the study. Male to female ratio was 1.6:1.

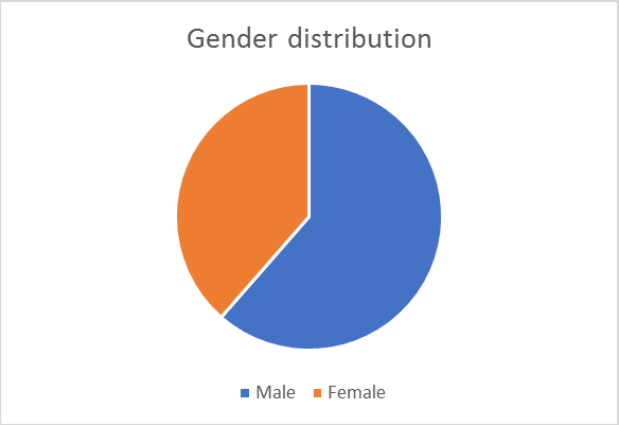

Figure 2: Gender distribution.

In the present study most of the patients 21 (30%) were in the age group between 20-24 years. 3 patients (4%) were in the age group between 15-19 years. In the age group between 25-29 and 30-34 there were 13 (19%) and 10 (14%) patients respectively. 11 patients (16%) and 12 patients (17%) belonged to age group of 35-39 and 40-45 years respectively.

Out of 70 patients, 10 patients (14%) presented with small central perforation, 16 patients (23%) presented with moderate size perforations, 22 patients (31%) presented with large central perforation, 22 patients (31%) presented with subtotal perforations.

Table 1: Size of perforation.

Size of perforation	Percentage of patients
Small central perforation	14
Moderate central perforation	23
Large central perforation	31
Subtotal perforation	31

Maximum number of patients that is 23 patients (33%). Pre-operative Airbone gap had hearing loss in the range of 31-40 dB, 17 patients (24%) had hearing loss in the range of 11-20 dB and 21-30 dB. 13 patients (18%) had hearing loss in the range of 41-50 dB.
There were no immediate post-operative complications like wound infection, facial nerve palsy and sensorineural hearing loss.

While assessing the graft, 1 month post-operative, graft was intact in 67 patients (96%) and 3 patients (4%) had graft medialisation which was treated successfully with valsalva manoeuvre.

At 3 month post post-operative follow up all the 70 patients had successful graft uptake.

Post-operative improvement in airbone gap (ABG) was in the range of 0-10 dB in 34 patients (49%), hearing gain in the range of 11-20 dB in 31 patients (44%), 5 patients (7%) had hearing improvement in the range of 21-30 dB.

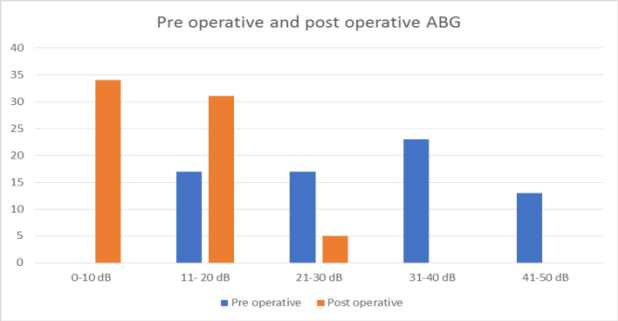

Figure 3: Pre and postoperative airbone gap.

DISCUSSION

In our study out of 70 patients 61% males and 39% females. In a similar study conducted by Patadai et al 42 males and 27 females were included in the study.[8] In comparison to our study in a study conducted by Kyrodimos et al, 36 patients were males and 25 females.[9] In our study commonest age group that is 21 patients was found to be in the age group of 20-24 years. In a similar study conducted by Patadai et al mean age was 26.3 years. In contrast to our study in another study conducted by Kyrodimos et al the mean age was found to be 41 years.[9,8]

Table 2: Comparison of graft uptake with other studies.

Study	Graft success rate	Average hearing results
Current study	100%	Closure of ABG within: 10 dB in 49%
Duckert et al[2]	97%	Closure of ABG within: 10 dB in 82% of type I
Cavaliere et al[3]	99.35%	Type I pre/postoperative ABG: 36.80/6.40
Kyrodimos et al[9]	100%	pre and post-operative PTA-ABG was 52.2±17.7 dB and 35.4±17.9 dB
Iacovou et al[11]	97.2%	Type I pre/post-operative ABG: 31.26/16.68
Vadiya et al[12]	97.5%	pre-op/post-op ABG: 37/18.6

In our study the cartilage shield graft uptake was 100% and comparable results were found in studies where take rates reported varied from 97%, 98.4% to 99.35%.[2-4] Uslu et al had lower success rates in comparison, which he attributed to low patients' socioeconomical status, poor postoperative nursing and hygiene, and repeated upper air way infections.[10]

In our study, on pre-operative hearing assessment 33% had hearing loss in the range of 31-40 dB. 49 % patients showed post-operative ABG in the range of 0-10 dB.

In comparison to our study in a study conducted by Emilia et al.[11] the average gain in ABG was about 15 dB for type I tympanoplasty with conchal cartilage.

In a similar study conducted by Vadiya et al 60 cases (92.30%) had less than 20 dB ABG at 6 months post-operative.[12]

In a study conducted by Kyrodimos et al the pre and post-operative PTA-ABG was 52.2±17.7 dB and 35.4±17.9 dB, respectively, an overall improvement of 16.8 dB (p\0.001). An overall post-operative PTA-ABG of 25 dB or less was achieved in 39 (75 %) patients (p/0.001).[9]

CONCLUSION

Conchal Cartilage shield tympanoplasty is an effective technique in tympanic membrane reconstruction and shows no detrimental effect to the hearing outcome. Conchal cartilage is preferred graft as it can be harvested from same incision. The graft uptake rates are excellent with this technique.

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

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