

# Comparison of Different Graft Materials Used in Closure of Tympanic Membrane Perforation- A Prospective Study

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## ABSTRACT

**Introduction:** The aim of present study was to evaluate the post-operative graft take up and hearing improvement in tympanic membrane perforation cases. Present study also compares the results of various graft materials used for the repair of the tympanic membrane defect.

**Material and methods:** Present study was carried out in tertiary care hospital of Banda city on Thirty Five patients attending ENT OPD from April 2019 to March 2020. Otoscopy and otomicroscopic examinations were carried out for selection of patients. Audiometry and radiological examinations were also done. Type I tympanoplasty was done by underlay technique using autograft. Graft materials used were Temporalis fascia, Tragal perichondrium graft, Fascia lata graft and Vein graft.

**Results:** Most common graft material used was temporalis fascia (45.7%) followed by tragal perichondrium(25.7%). Temporalis fascia showed best (93.7%) closure rate followed by tragal perichondrium (88.8%). Majority of cases (81.2%) showed satisfactory level of hearing improvement after temporalis fascia graft

**Conclusions:** Temporalis fascia is used as most popular grafting material in primary tympanoplasty. The success rate of grafting depends on technique used by surgeon, thickness of graft, anterior tucking of graft and blunting of to anterior recess angle.

**Keywords:** Chronic Suppurative Otitis Media, Graft Materials, Temporalis Fascia, Tympanoplasty

shown better functional improvement of hearing but has poor dimensional stability.<sup>11</sup> Fascia lata had reported better dimensional stability and better outcome. While anterior tympanotomy technique was introduced to reduce anterior blunting associated with the underlay technique.<sup>12</sup>The aim of present study was to evaluate the post-operative graft take up and hearing improvement in tympanic membrane perforation cases. Present study also compares the results of various graft materials used for the repair of the tympanic membrane defect.

## Material & Methods:

Present study was carried out in tertiary care hospital of Banda city on Thirty Five patients attending ENT OPD between April 2019 to March 2020. Otoscopy and otomicroscopic examinations were carried out for selection of patients. Audiometry and radiological examinations were also done. Type I tympanoplasty was done by underlay technique using autograft. Graft materials used were Temporalis fascia, Tragal perichondrium graft, Fascia lata graft and Vein graft.

## Inclusion Criteria

1. Age > 10 years and < 50 years.
2. CSOM with dry ear at least 4 weeks before surgery.

## Exclusion Criteria

1. Patients having active discharge.
2. Patients having any ossicular dysfunction.
3. Patients having unsafe or attic-antral disease.
4. Routine investigations such as random blood sugar, BT, CT, CBC and routine examination of urine were done in all case.

## RESULTS

Table 1 show that maximum number of subjects (37.1%) were from 31-40 years age group followed by age group 11-20 years (25.7%). Minimum cases (17.1%) were from 41-50

## INTRODUCTION

In developing countries, Chronic suppurative otitis media (CSOM) is considered as major public health problem in children and adults.<sup>1,2</sup> Maxillo-facial and ENT injuries has become more important due to rising number of trauma cases throughout the world.<sup>3</sup> Various risk factors such as malnutrition, substandard hygiene, frequent upper respiratory tract infections etc aggravates the problem.<sup>4</sup> Hearing loss and recurrent infection & discharge are the common consequence of CSOM. Prevalence of hearing loss following CSOM is reported in 9–83% cases.<sup>5</sup>

Tympanoplasty is indicated to prevent recurrent otorrhea and to restore hearing ability. The various surgical approaches to Tympanoplasty are endo-meatal, end-aural and post-auricular routes and have different effect on surgical outcome.<sup>6</sup> In underlay technique, graft is placed entirely medial to the remaining drum and malleus and it is widely used.<sup>6,7</sup>

Various graft materials like temporalis fascia, perichondrium, palisade cartilage, fascia lata etc. for tympanoplasty were described by various authors.<sup>8-10</sup> Temporalis fascia has

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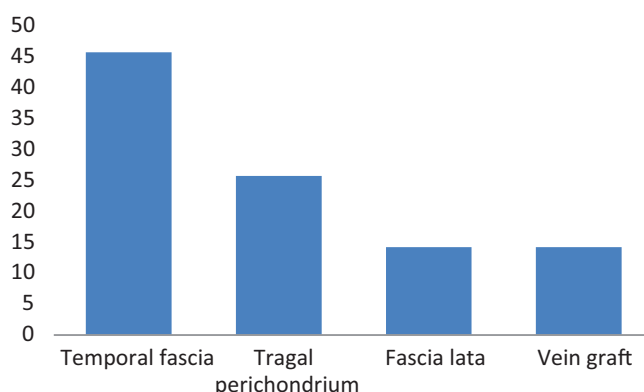
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Age group (In years)	Cases	
	No.	%
11-20	9	25.7
21-30	13	37.1
31-40	7	20.0
41-50	6	17.1

**Table-1:** Age distribution of Cases



**Figure-1:** Various Graft Materials used for Tympanoplasty

Graft Material	No. of Cases (%)	Graft successful (%)	Graft Failure (%)
Temporal fascia	16 (45.7)	15 (93.7)	1 (6.3)
Tragal perichondrium	9 (25.7)	8 (88.8)	1 (11.2)
Fascia lata	5 (14.2)	4 (80.0)	1 (20.0)
Vein graft	5 (14.2)	4 (80.0)	1 (20.0)
Total	35 (100)	31 (88.5)	4 (11.4)

**Table-2:** Comparison of take up rate of different grafts

Graft Material	Functional Improvement of hearing			Total
	Excellent (%)	Good (%)	Unsatisfactory (%)	
Temporal fascia	4 (25)	9 (56.2)	3 (18.7)	16 (45.7)
Tragal perichondrium	3 (33.3)	4(44.4)	2 (22.2)	9 (25.7)
Fascia lata	1 (20)	3 (60)	1 (20)	5 (14.2)
Vein graft	1 (20)	3 (60)	1 (20)	5 (14.2)

**Table-3:** Comparison of functional improvement in different grafts

years age group.

Figure 1 shows that in present study, most common graft material used temporal fascia (45.7%) followed by tragal perichondrium in 25.7% cases. Fascia lata and vein graft material was used in 14.2% cases in present study.

Table 2 compares the success rate of tympanic membrane closure with different graft material. Temporalis fascia showed best (93.7%) closure rate followed by tragal perichondrium (88.8% closure rate). Fascia lata graft and vein graft each showed closure rate of 80%.

Majority of cases (81.2%) showed satisfactory level of hearing improvement after temporalis fascia graft followed by improvement in tragal perichondrium graft (77.7%). (Table 3)

**DISCUSSION**

In present study, four different graft materials (temporalis fascia, tragal perichondrium, fascia lata and vein graft) were used for closure of tympanic membrane perforation.

Present study shows that maximum number of subjects (37.1%) was from 31-40 years age group followed by age group 11-20 years (25.7%). Minimum cases (17.1%) were from 41-50 years age group. Studies done by various authors (Singh et al.<sup>13</sup> & Loy et al.<sup>14</sup>) also observed the similar results (mean age 28.9 years). Marriage and employment compel the younger generation for reconstructive surgery of tympanic membrane perforation. Therefore present study shows higher involvement of younger generation in comparison of elder. Males (57.1%) outnumbered females (42.9%) in present study which coincides with the results of studies done by

Dornhoffer et al.<sup>15</sup> and Strahan et al.<sup>16</sup> Reason for this may be that male is bread earner of the family and he should be fit for the job. Study done by Singh et al.<sup>13</sup> showed opposite results where female (57.2%) outnumbered male (42.8%).

In present study, eighteen cases (51.4%) have medial sized central perforation followed by 9 cases (25.7%) having large central perforation. Eight cases (22.8%) had small central perforation. For size of perforation, similar criteria were followed as in study done by Indorewala et al.<sup>11</sup>

In present study compares the success rate of tympanic membrane closure with different graft material. Temporalis fascia showed best (93.7%) closure rate which is comparable to study done by various authors [Herman MK et al.<sup>17</sup>(95.3%), Mathai J et al.<sup>18</sup>(95%) and Gupta P et al.<sup>19</sup>(95%)]. Majority of cases (81.2%) showed satisfactory level of hearing improvement after temporalis fascia graft (air bone gap closure up to 20 db) which was comparable to study done by Strahan et al.<sup>16</sup> and Dabholkar et al.<sup>20</sup>

The success rate of tragal perichondrium graft in present study was 88.8% which was comparable with studies done by various authors [Sperm et al. (92%), Dornhoffer et al.<sup>15</sup> (85%) and Dabholkar et al.<sup>20</sup>(80%)]. The overall functional improvement to desired level was seen in 77.7% cases which is more than Singh et al.<sup>13</sup> (55.5%) and less than Strahan et al.<sup>16</sup>(90%).

In present study, success rate of vein graft was 80% which is similar to study done by Shea JJ et al.<sup>21</sup> Success rate of Fascia lata graft was also 80% which is comparable with study done by Patil et al.<sup>22</sup>. Functional improvement of satisfactory level was seen in 80% cases of fascia lata and vein graft in present

study which coincides with the results of Mishra et al.<sup>7</sup> and Gupta et al.<sup>23</sup>

## CONCLUSION

Most of the patients were from younger age groups and male outnumbered females. There is relation between graft material used and success rate in myringoplasty. The success rate of grafting depends on technique used by surgeon, thickness of graft, anterior tucking of graft and blunting of to anterior recess angle. Due to high success rate and hearing restoration, low metabolic rate, easy availability and resistant to infection, temporalis fascia is used as most popular grafting material in primary tympanoplasty. Tragal perichondrium was more successful in large perforation cases and revision tympanoplasty. Vein graft was more effective in small perforations of tympanic membrane.

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