

Evaluating Success of Surgery in Mucosal and Squamosal Chronic Otitis Media: A Retrospective Study

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ABSTRACT

Introduction

This study attempted to document success of surgery postoperatively, be it type I tympanoplasty or type III tympanoplasty with or without modified radical mastoidectomy.

Materials and Methods

This retrospective study involved 90 patients of Chronic Otitis Media who underwent surgery in the Department of Otorhinolaryngology in a tertiary care centre in the state of Uttar Pradesh.

Results

At 3 week postoperatively, 83 patients (92.22%) had successful uptake of graft. Overall successful graft uptake was reduced to 87.78% (79 patients) after 3 months. Postoperatively, after 3 months, 90% of the patients (n=81) reported improvement in hearing. Preoperatively, 89.71 % patients of mucosal disease and 63.64% of squamosal disease had 21-40 dB hearing loss. Postoperatively, 88.24% patients with mucosal disease and 63.64% of squamosal disease had no conductive hearing loss. There was statistically significant gain in air conduction postoperatively. Average improvement in AB gap was also notably significant postoperatively in both subgroups.

Conclusion

Both type I and type III tympanoplasty give excellent response in term of graft uptake and postoperative hearing.

Abbreviations: COM-Chronic Otitis Media, AC-Air Conduction, AB-Air Bone, TP-Tympanoplasty, MRM-Modified Radical Mastoidectomy

Keywords

Tympanoplasty, Mastoidectomy, Hearing; Retrospective Studies

Chronic otitis media (COM) is one of the most common ear diseases in the developing countries. In India incidence of COM ranges up to 30%, with a prevalence rate of 16/1000 population in urban and 46/1000 in rural areas.^{1,2} It can cause conductive hearing loss up to 60 db, which may pose to be a serious disability.³ It may be further classified as mucosal (tubotympanic) and squamosal (atticoantral) disease.

Tympanoplasty is defined as a procedure to eradicate disease in the middle ear and to reconstruct hearing mechanism with or without tympanic membrane grafting. The most common technique of grafting is underlay (medial). Temporalis fascia and tragal perichondrium are the most popular materials as a graft.⁴ As far as active squamosal disease is concerned, primary aim of surgery is eradication of cholesteatoma.

Biocompatible materials are being used for restoration of hearing but have limited success.⁵ Furthermore, in developing countries using biocompatible materials for ossiculoplasty is financially not attractive.

This study was undertaken to study the clinical profile of COM patients being admitted in ENT IPD for surgery. An attempt was made to document success of surgery postoperatively, be it type I tympanoplasty or type III tympanoplasty with or without MRM.

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Materials and Methods

This was a retrospective study involving patients who underwent tympanoplasty with or without mastoidectomy by the authors in the Department of Otorhinolaryngology in a tertiary care centre in the state of Uttar Pradesh. The period of study was from September 2014 to August 2017. A total of 90 patients whose complete records and proper post operative follow up were available, were included in this study.

Patients aged more than 08 years, diagnosed with COM (mucosal or squamosal) and posted for middle ear surgery were included. Patients who had malignancy of middle ear, otitis externa or previous history of ear surgery were excluded.

A proforma was designed to collect the following data from case sheet records: bio-data, symptom history, examination findings, pre-operative and post-operative audiograms and details of their surgical procedure. Patients were followed at regular intervals i.e. at 3 weeks, 6 weeks and 3 months post-operatively. Status of the graft, along with any evidence of complications was noted. Hearing assessment was made with tuning forks and confirmed with pure tone audiometry and compared with the pre-operative state at 3 months.

The postoperative success in terms of graft uptake and hearing gain was compared statistically in mucosal and squamosal disease. Chi square test was used to evaluate the level of significance and the P value <0.05 was considered as significant.

Results

Of all patients, 68 had mucosal disease (64 - inactive mucosal and 4 - active mucosal) and 22 patients were of squamosal variety (5 - inactive disease and 17-active disease). The male : female ratio was 1:1.14.

About 38.89 % patients had bilateral disease accounting for the largest group, followed by left ear involvement (33.33%); only right ear was diseased in least number of patients. In atticointral or active squamosal variety, maximum number of patients had their left ear diseased (47.06%).

Most of the patients of mucosal disease (95.58%),

and all of active mucosal disease had undergone type I tympanoplasty. Three of five patients of inactive squamosal disease had type I TP, rest two had type III TP. Amongst active squamosal disease, only one patient had type I TP. Total 19 patients (21.11%) had undergone type III TP as the operative procedure.

Total 19 patients had undergone type III TP, out of which graft enforced with cartilage was kept over stapes footplate in 7 patients. Sculptured malleus was used in 2 patients (1- inactive mucosal disease, 1- active squamosal disease). Sculptured incus was used in 1 patient with active squamosal disease, in remaining 9 patients umbrella cartilage graft was used (2 - inactive mucosal disease, 2 - inactive squamosal disease, 5 - active squamosal disease).

At 3 week postoperatively, 83 patients (92.22%) had successful uptake of graft. Partial failure that is residual perforation was seen in 5 patients (3 - inactive mucosal and 2 - active mucosal disease). Complete rejection of graft was present in 2 patients, both with inactive mucosal disease (Table I).

On 3rd month follow-up, 2 more patients with inactive mucosal disease and 1 with active squamosal disease revealed residual perforation; accounting for total 8 patients with partial failure. Total number of patients with complete failure also increased by one (Table II). Thus, overall successful graft uptake was reduced to 87.78% (79 patients) after 3 months. Postoperatively, after 3 months, 90% of the patients (n=81) reported improvement in hearing.

Most of the patients with mucosal disease had 21 to 40 dB hearing loss (89.71%). Postoperatively, majority (88.24%) fell in 0 to 20 dB AB gap. Patients with squamosal disease mostly had moderate hearing loss (63.64%), followed by severe loss in 36.36%. Postoperatively, the majority (63.64%) was shifted in 0 to 20 dB AB gap (Table III).

Postoperatively, 50 % of mucosal disease patients gained 11 to 20 dB, followed by about 31% with 21-30 dB gain. About 41 % of squamosal disease patients received hearing gain of 11-20 dB postoperatively. A good no. of patients (n=27) gained upto 30 dB (Table IV).

On applying chi square test on mean preoperative

Table I: Post-operative graft uptake at 3 weeks

	SUCCESSFUL	%	PARTIAL FAILURE	%	COMPLETE FAILURE	%
Inactive mucosal	59	92.19	3	4.69	2	3.13
Active mucosal	2	50	2	50	0	0
Inactive squamosal	5	100	0	0	0	0
Active squamosal	17	100	0	0	0	0
Total	83	92.22	5	5.56	2	2.22

Table II: Post-operative graft uptake at 3 months

	SUCCESSFUL	%	PARTIAL FAILURE	%	COMPLETE FAILURE	%
Inactive mucosal	56	87.5	5	7.81	3	4.69
Active mucosal	2	50	2	50	0	0
Inactive squamosal	5	100	0	0	0	0
Active squamosal	16	94.12	1	5.88	0	0
Total	79	87.78	8	8.89	3	3.33

Table III: Comparison of preoperative and post-op AB gap

AB GAP (DB)	MUCOSAL DISEASE		SQUAMOSAL DISEASE	
	PRE OP	POST OP	PRE OP	POST OP
0-20	04 (5.88%)	60 (88.24%)	0	14 (63.64%)
21-40	61 (89.71%)	08 (11.76%)	14 (63.64%)	07 (31.82%)
41-60	03 (4.41%)	0	08 (36.36%)	01 (4.54%)

Table IV: Hearing gain in post-op patients

SL. NO.	HEARING GAIN (DB)	MUCOSAL DISEASE	SQUAMOSAL DISEASE
1	<10	12 (17.65%)	5 (22.73%)
2	11-20	34 (50%)	9 (40.91%)
3	21-30	21 (30.88%)	6 (27.27%)
4	>30	01 (1.47%)	2 (9.09%)
Total		68	22

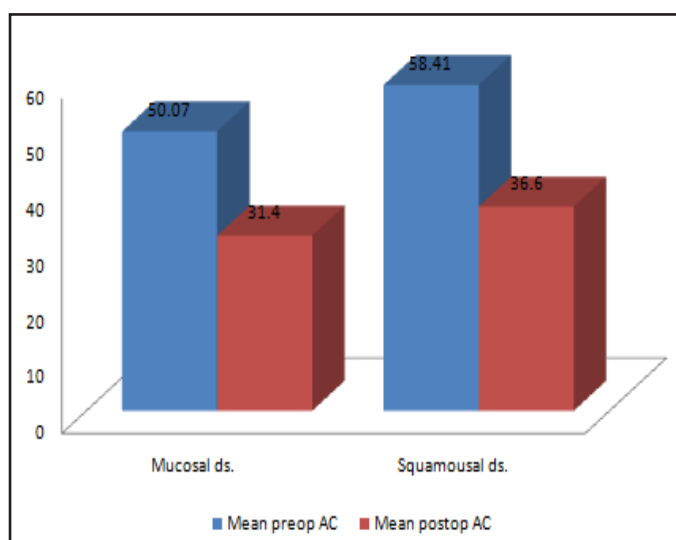


Fig.1. Comparison of mean preoperative and postoperative AC

and postoperative AC in patient with mucosal disease, $p=0.038$; which is significant. The difference between preop and postop AC in squamousal disease subgroup was statistically significant ($p=0.025$). (Fig. 1)

Average improvement in AB gap in mucosal disease patients postoperatively was 18.82 dB, which was highly significant ($p=0.005$).

Notably significant improvement i.e; 20.45 dB was seen in average AB gap in patients with squamousal disease postoperatively ($p=0.008$). (Fig. 2)

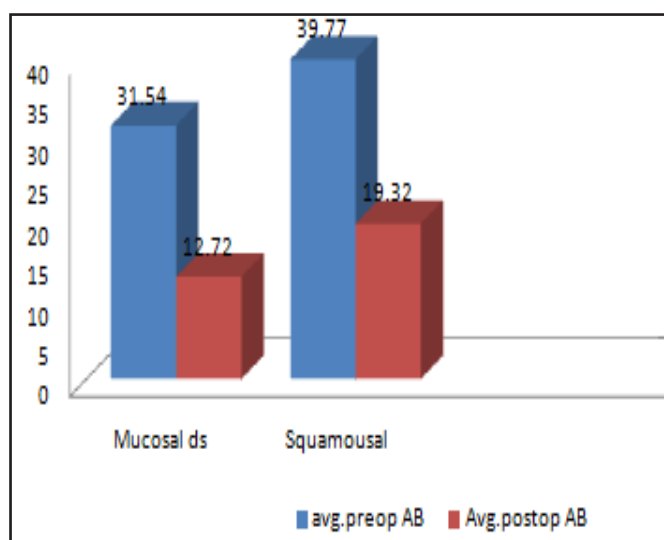


Fig.2. Comparison of average preoperative and postoperative AB gap

Discussion

This study included patients of COM, who were admitted and operated under the authors. Their case sheet records were retrieved and required details noted. Later they were followed postoperatively and their graft uptake, cavity healing and hearing were accessed on OPD visits at 3 weeks and 3 months.

The study comprised of total 90 patients, of whom 68 had mucosal disease (64 - inactive mucosal and 4 active mucosal) and 22 belonged to squamousal category (5 - inactive and 17 - active squamousal). The

male:female ratio was 1.00:1.14. Similar findings have been reported by several other authors where females have outnumbered males.⁶⁻⁹

Most of the patients had bilateral disease (38.89%), followed by left ear as the only diseased ear. Bilateral affection may be due to the fact that the etiology or risk factors of COM are likely to affect both ears.

Postoperative assessment at 3 weeks revealed overall successful uptake of graft in 92.22% (n=83), partial failure in 5 patients (3-inactive mucosal and 2 active mucosal). Complete failure was seen in 2 patients, both of inactive mucosal disease. After 3 months, total 87.78% (n=79) were documented with successful graft. Partial rejection of graft is seen in 8 patients (5-inactive mucosal, 2-active mucosal and 1-active squamosal). Complete rejection of graft was evident in total 3 patients, all of inactive mucosal disease. Batni et al documented 88% success rate of type I tympanoplasty, Bhatia et al claimed it to be 82%, for Onal et al it was 71%.^{8,10,11} Callioglu et al reported 89.5% successful graft uptake in their study.¹² The rate of surgical success- integration of the graft - was 93.3% as stated by Naderpour et al.⁶ Kamath et al documented successful uptake of graft post type I tympanoplasty to be 80%.¹³ Similarly, some researchers have reported success rates in excess of 80 to 90%.¹⁴

Subjective improvement in hearing was documented by 90% patients at 3 month follow up. Preoperatively, 89.71% patients of mucosal disease and 63.64% of squamosal disease had 21 to 40 dB hearing loss. Postoperatively, 88.24% patients with mucosal disease and 63.64% of squamosal disease had no conductive hearing loss. Thus, after surgery 74 patients (82.22%) had AB gap less than 20 dB as opposed to only 4.44% with normal hearing preoperatively. Shrestha et al noted closure of AB gap post type I tympanoplasty in 84%.¹⁵ Majority of patients had AB gap improvement of 20 dB (26 patients) followed by 25 dB (17 patients) and 15 dB gain (17 patients). Malhotra reported hearing improvement in 77.3 % post umbrella graft tympanoplasty.¹⁶ Asma et al reported post canal wall down mastoidectomy improvement in AB gap in 25% patients.¹⁷

About 55.56% patients achieved air conduction

gain of 20 to 30 dB postoperatively. Half of mucosal disease patients gained 11 to 20 dB, followed by about 31% with 21 to 30 dB gain. About 41 % of squamosal disease patients received hearing gain of 11 to 20 dB postoperatively. 6 patients had a hearing gain up to 30dB.

Mean AC gain in mucosal disease patients was 18.67 dB. Ramalingam et al reported post type I tympanoplasty mean average gain of 12.19 dB.¹⁸ In a study by Dawood et al, it was 22.37 dB.¹⁹ In squamosal group, mean AC gain was 21.81 dB. Mourya et al also documented AC gain post MRM with type III tympanoplasty quite close to ours, i.e; 21.24 dB.²⁰ According to Shetty et al there was a gain of 18.8 dB in type I, 26.46 dB in type II and 20.27 dB gain type III tympanoplasty, which is in accordance with our study.⁷

Kabdwal et al reported average gain of 7.8 dB post type I TP and 6.61 dB gain post canal wall down mastoidectomy with tympanoplasty.^{20]} Jalisatgi et al documented gain of 10.47 dB in patients with type III TP with CWD mastoidectomy with intact stapes and 12.19 dB for those with use of long collumella.²¹ On applying chi square test on mean preop and postop AC in patient with mucosal disease, p=0.038; which is significant. The difference between preoperative and postoperative AC in squamosal disease subgroup was also statistically significant (p=0.025).

Average improvement in AB gap in mucosal disease patients postoperatively was 18.82 dB, which was highly significant (p=0.005). According to Sangavi et al, average AB improvement was 23.12dB.²² Dawood et al reported mean AB gap reduction to be 20.73 dB after myringoplasty.¹⁹ Our results were better than Goyal et al and Ramalingam et al (11.94 dB and 12.92 dB respectively) but less than Dawood et al and Sangavi et al.^{8,18,19,22} Notably significant improvement, i.e; 20.45 db, was seen in average AB gap in patients with squamosal disease postoperatively (p=0.008). This improvement was again superior to several studies.^{20,23}

Conclusion

In this study we found that the overall successful graft uptake was 87.78% (79 patients) after 3 months.

Postoperatively, 88.24% patients with mucosal disease and 63.64% with squamosal disease had no conductive hearing loss (AB gap closure to within 20 dB).

Average improvement in AB gap in mucosal disease patients postoperatively was 18.82 dB, which was highly significant ($p=0.005$). Similarly, quite significant improvement i.e; 20.45 db was seen in average AB gap in patients with squamosal disease postoperatively ($p=0.008$).

The use of autologous cartilage in ossiculoplasty does not add to the cost of surgery. It can be harvested easily while performing meatoplasty and the hearing gain achieved is excellent.

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