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A COMPARATIVE STUDY OF TYMPANOPLASTY WITH OR WITHOUT CORTICAL MASTOIDECTOMY IN THE SURGICAL MANAGEMENT OF INACTIVE MUCOSAL TYPE OF CHRONIC OTITIS MEDIA : A PROSPECTIVE OBSERVATIONAL STUDY

DR. PALUKURI TEJASWINI, DR. SONALI BABU NAIK, DR. DIVYA KIRAN

Assistant Professor, Department of Otorhinolaryngology, Ballari Medical College and Research Centre, Ballari-583101, Karnataka, India. ORCID ID: 0009-0005-3929-547X
Junior resident, Department of Otorhinolaryngology, Ballari Medical College and Research Centre, Ballari-583101, Karnataka, India. ORCID ID: 0009-0000-2111-6633
Junior resident, Department of Otorhinolaryngology, Ballari Medical College and Research Centre, Ballari-583101, Karnataka, India. ORCID ID: 0009-0005-1135-7413
Name and address for correspondence: Dr. PALUKURI TEJASWINI
Assistant Professor, Department of Otorhinolaryngology,
Ballari Medical College and Research Centre, Ballari-583101
Email: tejupubba@yahoo.in
ORCID ID: 0009-0005-3929-547X

ABSTRACT

Chronic otitis media is a long-standing inflammatory condition of the middle ear cleft, commonly associated with tympanic membrane perforation and conductive hearing loss. It remains highly prevalent in developing countries and contributes significantly to morbidity. Tympanoplasty is the standard surgical treatment for inactive mucosal COM; however, the role of adding cortical mastoidectomy in such cases remains controversial. To analyse and compare the surgical outcomes of tympanic membrane repair in terms of graft uptake and hearing improvement in patients undergoing: Type I tympanoplasty alone, Type I tympanoplasty with cortical mastoidectomy. This prospective observational study was conducted in the Department of ENT at Ballari Medical College and Research Center. A total of 64 patients aged 18–50 years with inactive mucosal COM were included and divided into two equal groups:

- Group A: Type I tympanoplasty alone (n=32)
- Group B: Type I tympanoplasty with cortical mastoidectomy (n=32)

All patients underwent preoperative and postoperative otoscopic evaluation and pure tone audiometry. Follow-up was done at 1, 3, and 6 months. Outcomes assessed included graft uptake and hearing improvement. Statistical analysis was performed

using appropriate tests, with $p<0.05$ considered significant. At 6 months follow-up, graft uptake was 90.6% in the tympanoplasty-alone group and 93.7% in the combined group, with no statistically significant difference ($p>0.05$). Hearing improvement was observed in both groups, with mean hearing gains of 12.50 dB in Group A and 13.38 dB in Group B, which was not statistically significant ($p=0.279$). The addition of cortical mastoidectomy to Type I tympanoplasty does not provide a significant advantage in terms of graft uptake or hearing improvement in patients with inactive mucosal chronic otitis media. Tympanoplasty alone remains an effective and sufficient surgical option in appropriately selected cases.

Keywords: Chronic otitis media, tympanoplasty, cortical mastoidectomy, graft uptake, hearing improvement

LIST OF ABBREVIATIONS USED

ABBREVIATIONS	EXPLAINATIONS
AC	Air Conduction
BC	Bone Conduction
COM	Chronic Otitis Media
CP+	Central Perforation present
dB	Decibel
ENT	Ear, Nose and Throat
OPD	Outpatient Department
PTA	Pure Tone Audiometry
HL	Hearing Level

Statements and Declarations

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Ethical Approval–Ethical approval was waived by the Institutional Research Committee BMCRC in view of prospective nature of study and all procedures being performed were part of routine care.

Code Availability- Not Applicable

Author Contributions-All authors contributed to the study conception and design. Material preparation and analysis were performed by Dr. PALUKURI TEJASWINI and Dr. SONALI BABU NAIK. Data collection was done by Dr. PALUKURI TEJASWINI and Dr. DIVYA KIRAN. The first draft of manuscript was done by Dr. SONALI BABU NAIK and Dr. PALUKURI TEJASWINI and other author commented on previous version of manuscript. All authors read and approved the final manuscript.

INTRODUCTION

Chronic otitis media (COM) is defined as a long-standing, slowly progressive condition that frequently leads to significant structural damage in the middle ear. It is clinically characterized by persistent hearing loss and ear discharge lasting more than three months.(1) COM has been recognized as a major middle ear pathology since ancient times and remains one of the most prevalent ear diseases in developing nations. Factors such as substandard living conditions, overcrowding, inadequate hygiene, and poor nutrition are widely regarded as key contributors to its high incidence in these regions.(2)

The condition is marked by recurrent or continuous purulent ear discharge (otorrhoea) lasting 2 to 6 weeks, occurring through a perforation in the tympanic membrane. COM is broadly divided into two main types: mucosal (tubotympanic) and squamosal (atticoantral).[3]

The mastoid air cell system plays a crucial role in ventilating the middle ear and maintaining pressure equilibrium. There is a longstanding clinical belief that failure to perform a mastoid aeration procedure (such as cortical mastoidectomy) during initial tympanoplasty may contribute significantly to surgical failure in cases of chronic non-cholesteatomatous otitis media.[4] As a result, combining cortical mastoidectomy with tympanoplasty has traditionally been viewed as the preferred surgical approach.

Tympanoplasty is defined as a surgical procedure aimed at eliminating disease from the middle ear while reconstructing the hearing apparatus, with or without grafting of the tympanic membrane. Cortical mastoidectomy involves the removal of diseased tissue from the mastoid antrum, air cells, aditus, and antrum while preserving the bony external auditory canal wall and leaving the existing middle ear structures undisturbed.[5,6]

It is generally accepted that the primary goals of surgery are to achieve a permanently dry ear and to successfully close the tympanic membrane perforation. Tympanoplasty combined with mastoidectomy is considered an effective treatment for chronic ear infections that do not respond to medical (antibiotic) therapy.[7] However, the value of adding mastoidectomy in cases without active infection remains controversial and lacks definitive evidence.[8]

Hence present study was done to compare the outcomes of tympanoplasty with or without cortical mastoidectomy in surgical management of inactive mucosal of chronic otitis media.

AIMS AND OBJECTIVES

1. To assess the rate of graft uptake following Type I tympanoplasty alone and Type

1 Tympanoplasty with cortical mastoidectomy.

2. To evaluate the degree of hearing improvement in both surgical groups using pure tone audiometry.
3. To compare the overall surgical outcomes between the two procedures.

To determine whether the addition of cortical mastoidectomy provides any significant advantage over tympanoplasty alone in inactive mucosal chronic otitis media.

METHODOLGY

Study site: This study was conducted in the Department of ENT, Ballari Medical College and Research Center, Bellary.

Study population: Patients of both gender attending OPD of Department of ENT, Ballari Medical College and Research Center, Bellary with inactive chronic otitis media

Study design: The current study was a hospital based prospective observational study.

Sampling method: All the suitable patients were enlisted into the study successively by convenient sampling till the sample size was attained and allotted into two groups

Group A- Type I Tympanopalsty alone – 32 patients

Group B- Type I Tympanoplasty and cortical mastoidectomy – 32 patients

Study duration: The present study was conducted during the period from February 2024 to August 2025.

Inclusion criteria:

1. Patients aged 18 to 50 years with chronic otitis media inactive mucosal type
2. Patients of both sexes
3. Dry perforation for atleast 6 months
4. Conductive hearing loss
5. Normal cochlear function
6. Both unilateral and bilateral diseases

Exclusion criteria:

1. Active mucosal chronic otitis media
2. All chronic media of squamous type
3. Recurrent cases after surgery

Ethical consideration:

Study was approved by institutional human ethics committee. Informed written consent was obtained from all the study participants and only those participants willing to sign the informed consent were included in the study. The risks and benefits involved in the study and voluntary nature of participation were explained to the participants before obtaining consent. Confidentiality of the study participants was maintained.

Methodology:

Written informed consent was obtained from all patients included in the study. A detailed history was taken, and a thorough clinical examination was performed for each participant. Clinical otoscopic examination and pure tone audiometry of the ears were conducted in both preoperative and postoperative states. Culture and sensitivity testing of ear discharge (including biofilms where applicable) was performed. Other relevant radiological, hematological, and urine microscopy investigations were carried out to evaluate the patients' general health status and to rule out any underlying systemic disorders. All assessments and observations were carefully recorded. The collected data were entered into a specially designed case record proforma.

Statistical methods:

Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency and proportion for categorical variables. Data was also represented using appropriate diagrams like bar diagram, pie diagram and box plots.

Statistical analysis was made with IBM SPSS 21.0 software and P value of <0.05 was considered significant.t test, Chi square test and fisher exact test was used.

SAMPLE SIZE ESTIMATION

Sample size shall always be 10% more than the calculated size Sample Size = [(z1)^2{P(1-P)}]/d^2 n = sample size

Z= level of confidence {(1-a) = 0.95} according to the standard normal distribution

(for a level of confidence of 95%, z= 1.96)

P= estimated proportion of the population that presents the characteristic (p=0.88)[77] d= absolute precision (value <p)

Minimum sample size needed to conduct this study [n]=64

32 cases will be selected in each group for this study.

64 cases will be selected and allocated them into two groups on random sampling method.

RESULTS

Table 1: Distribution of Study Subjects based on Groups

Groups	Frequency	Percentage
Type 1 Tympanoplasty Alone	32	50.0
Cortical Mastoidectomy+ Type 1 Tympanoplasty	32	50.0
Total	64	100.0

Above table shows, the study included a total of 64 patients, equally divided into two surgical groups with 32 patients (50.0%) in each. One group underwent Type 1 Tympanoplasty alone, while the other group received Cortical Mastoidectomy combined with Type 1 Tympanoplasty.

Chart 1: Pie chart illustrating distribution of study subjects based on groups:

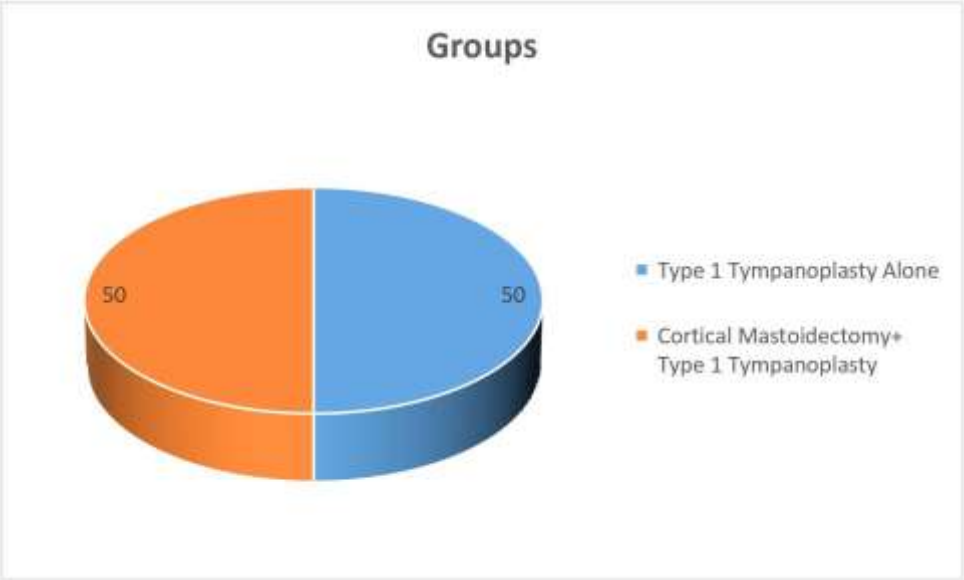


Table 2: Association of Age and Groups

Age (years)	**Type 1 Tympanoplasty Alone**		**Cortical Mastoidectomy+ Type 1 Tympanoplasty**		**Total**	
	N	**%**	**N**	**%**	**N**	**%**
<=20	3	9.4	0	0	3	4.7
21-30	11	34.4	12	37.5	23	35.9
31-40	10	31.3	15	46.9	25	39.1
41-50	8	25.0	5	15.6	13	20.3
Total	32	100.0	32	100.0	64	100.0
Mean Age	32.2±9.4		32.8±7.0		32.5±8.3	
Fisher's Exact value = 4.74 , P value = 0.19 , Inference : Is Not Statistically Significant						

Above table shows, the age distribution showed that most patients were in the

21–40 years range, accounting for approximately 75% of the total sample (35.9% in 21–30 years and 39.1% in 31–40 years). The Type 1 Tympanoplasty alone group had a mean age of 32.2 ± 9.4 years, while the Cortical Mastoidectomy + Type 1 Tympanoplasty group had a slightly higher mean age of 32.8 ± 7.0 years (overall mean 32.5 ± 8.3 years). The association between age and surgical group was tested using Fisher's Exact test, yielding a value of 4.74 with a p-value of 0.19, indicating no statistically significant difference in age distribution between the two groups.

Chart 2: Cluster bar chart illustrating association of Age and Groups:

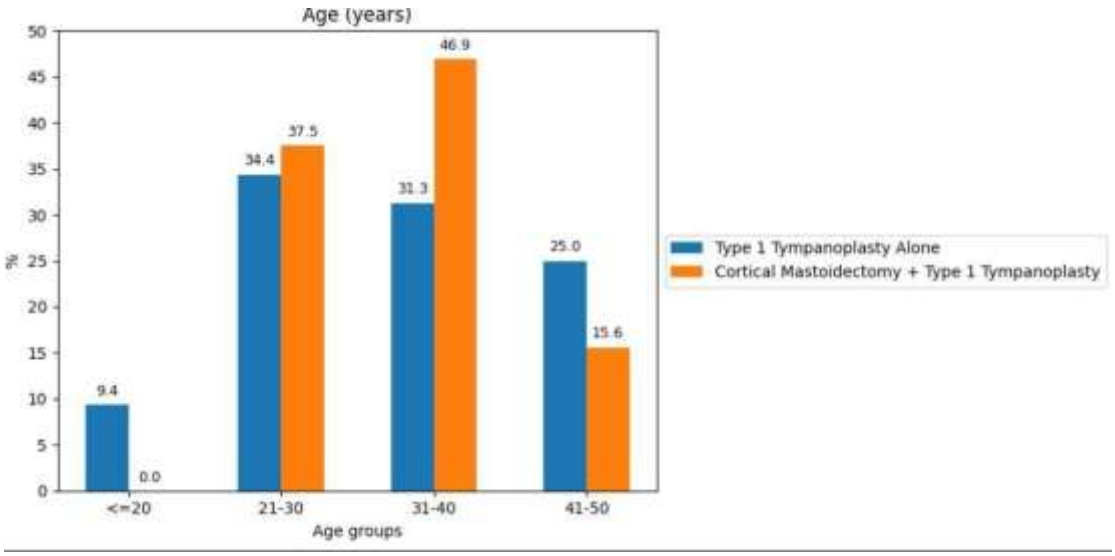


Table 3: Association of Gender and Groups

Gender	**Type 1 Tympanoplasty Alone**		**Cortical Mastoidectomy+ Type 1 Tympanoplasty**		**Total**	
	N	**%**	**N**	**%**	**N**	**%**
Female	15	46.9	16	50.0	31	48.4

Male	17	53.1	16	50.0	33	51.6
Total	32	100.0	32	100.0	64	100.0
Chi-Square value = 0.06 , P value = 1 , Inference : Is Not Statistically Significant						

Above table shows, the study population consisted of nearly equal numbers of males (33, 51.6%) and females (31, 48.4%). In the Type 1 Tympanoplasty alone group, males slightly outnumbered females (53.1% vs. 46.9%), while the combined surgery group showed an almost perfect 50:50 gender split. The Chi-Square test resulted in a value of 0.06 with a p-value of 1, confirming no statistically significant association between gender and the type of surgical procedure performed.

Chart 3: Cluster bar chart illustrating Association of Gender and Groups:

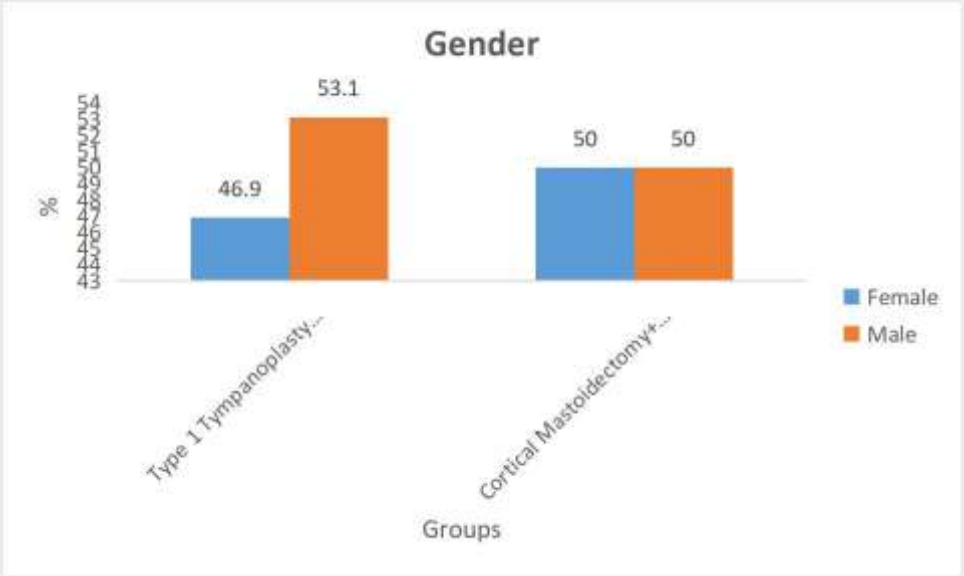


Table 4: Distribution of Study Subjects based on history of ear discharge

(Inactive since ≥ 6months)

Ear Discharge		Type 1 Tympanoplasty Alone	Cortical Mastoidectomy+ Type 1 Tympanoplasty	Total	ChiSquare Value	p Value
Right	**Absent**	16(50.0)	15(46.9)	31	0.06	1
	Present	16(50.0)	17(53.1)	33		
Left	**Absent**	17(53.1)	16(50.0)	33	0.06	1
	Present	15(46.9)	16(50.0)	31		

Above table shows, history of ear discharge (Inactive since ≥ 6months) was similarly distributed between the two groups for both ears. For the right ear, discharge was present in 50.0% of the Type 1 alone group and 53.1% of the combined group (absent in 50.0% and 46.9%, respectively). For the left ear, discharge was present in 46.9% vs. 50.0% (absent in 53.1% vs. 50.0%). Chi-Square values were 0.06 for both ears with p-values of 1, indicating no statistically significant difference in the history of prolonged ear discharge between the two surgical groups.

Chart 4: Cluster bar chart illustrating Distribution of Study Subjects based on history of ear Discharge more than 6months back:

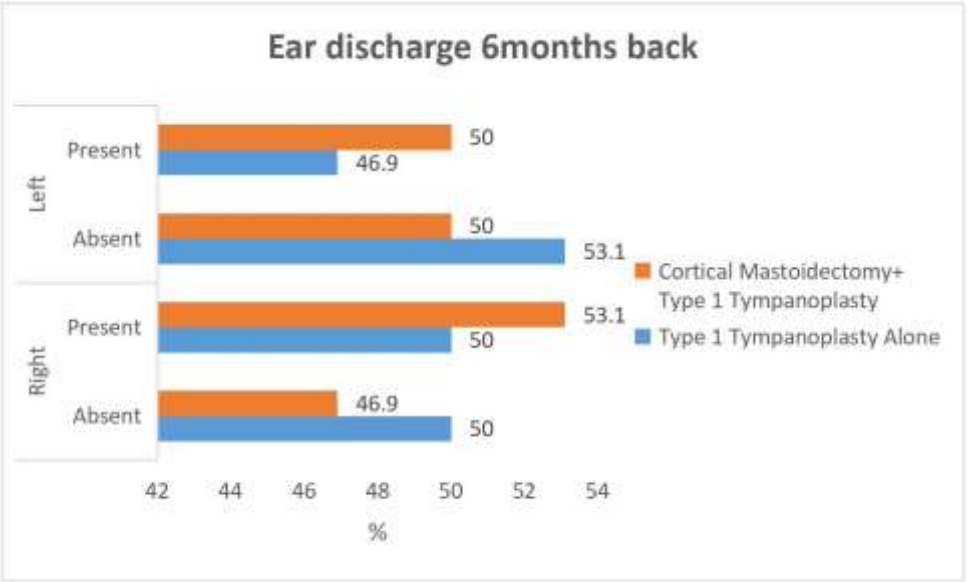


Table 5: Distribution of Study Subjects based on Hard of Hearing

Hard of Hearing		Type 1 Tympanoplasty Alone	Cortical Mastoidectomy+ Type 1 Tympanoplasty	Total	ChiSquare Value	p Value
Right	**Absent**	11(34.4)	12(37.5)	23	0.07	1
	Present	21(65.6)	20(62.5)	41		
Left	**Absent**	13(40.6)	14(43.8)	27	2.15	0.8
	Present	19(59.4)	18(56.2)	36		

Above table shows, hard of hearing was reported more frequently than not in both ears across groups. For the right ear, it was present in 65.6% of the Type 1 alone group and 62.5% of the combined group (absent in 34.4% and 37.5%). For the left ear, prevalence was 59.4% vs. 56.2% (absent in 40.6% and 43.8%). Chi-Square values were low (0.07 for right ear, 2.15 for left ear) with p-values of 1 and 0.8, respectively, showing no statistically significant difference in the distribution of hard of hearing complaints between the groups.

Chart 5: Cluster bar chart illustrating Distribution of Study Subjects based on Hard of Hearing:

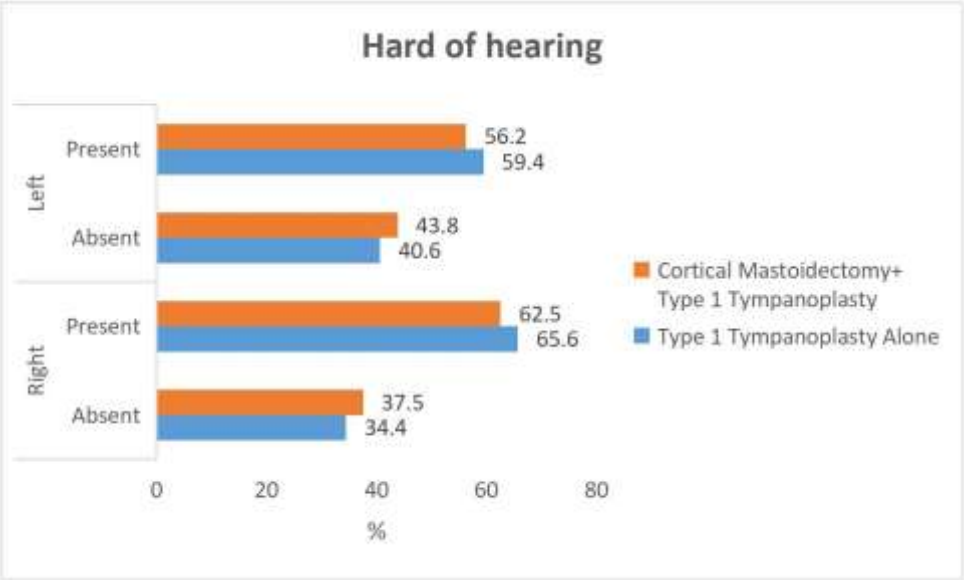
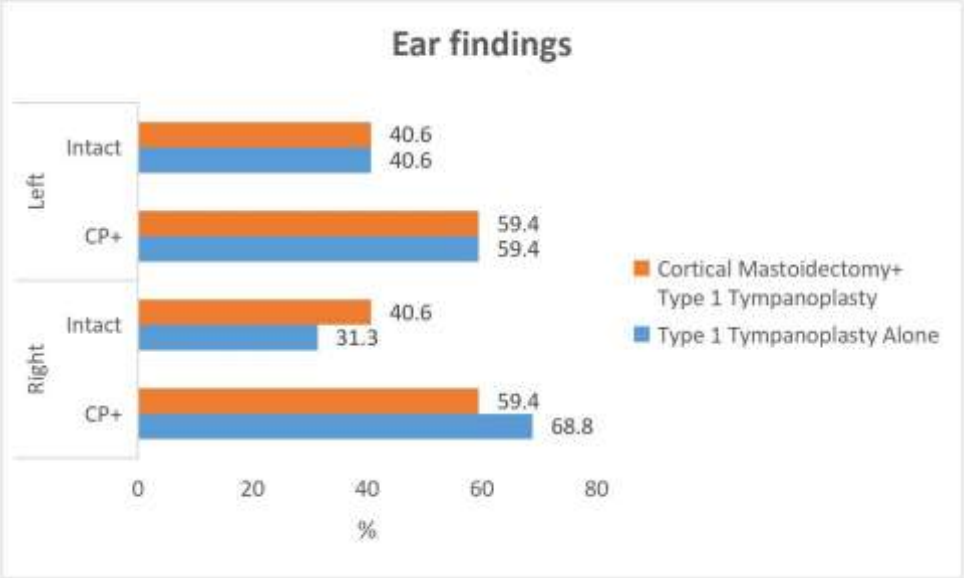


Table 6: Distribution of Study Subjects based on Ear Findings

Ear Findings		Type 1 Tympanoplasty Alone	Cortical Mastoidectomy+ Type 1 Tympanoplasty	Total	ChiSquare Value	p Value
Right	**CP+**	22(68.8)	19(59.4)	41	0.61	0.6
	Intact	10(31.3)	13(40.6)	23		
Left	**CP+**	19(59.4)	19(59.4)	38	0	1
	Intact	13(40.6)	13(40.6)	26		

Chart 6: Cluster bar chart illustrating Distribution of Study Subjects based on Ear Findings:



Above table shows, otoscopic findings revealed central perforation (CP+) as the most common observation. In the right ear, CP+ was seen in 68.8% of the Type 1 alone group and 59.4% of the combined group (intact in 31.3% and 40.6%). In the left ear, CP+ was equally prevalent at 59.4% in both groups (intact in 40.6% each). ChiSquare values were 0.61 (p=0.6) for the right ear and 0 (p=1) for the left ear, indicating no statistically significant difference in preoperative ear findings between the two surgical groups.

Table 7: Comparison of Pre - Operative PTA findings in Groups

Preoperative PTA findings	**Type 1 Tympanoplasty Alone**		**Cortical Mastoidectomy+ Type 1 Tympanoplasty**		**t-test**	**P value**
	Mean	**SD**	**Mean**	**SD**		

dB	37.31	6.24	42.97	5.77	-3.76	0.0002

Above table shows, preoperative Pure Tone Audiometry (PTA) showed a statistically significant difference between groups. The Type 1 Tympanoplasty alone group had a mean PTA of 37.31 ± 6.24 dB, while the Cortical Mastoidectomy + Type 1 Tympanoplasty group had a higher mean of 42.97 ± 5.77 dB. The t-test value was 3.76 with a p-value of 0.0002, confirming that the combined surgery group had significantly worse preoperative hearing levels.

Chart 7: Bar chart illustrating Comparison of Pre - Operative PTA findings in Groups:

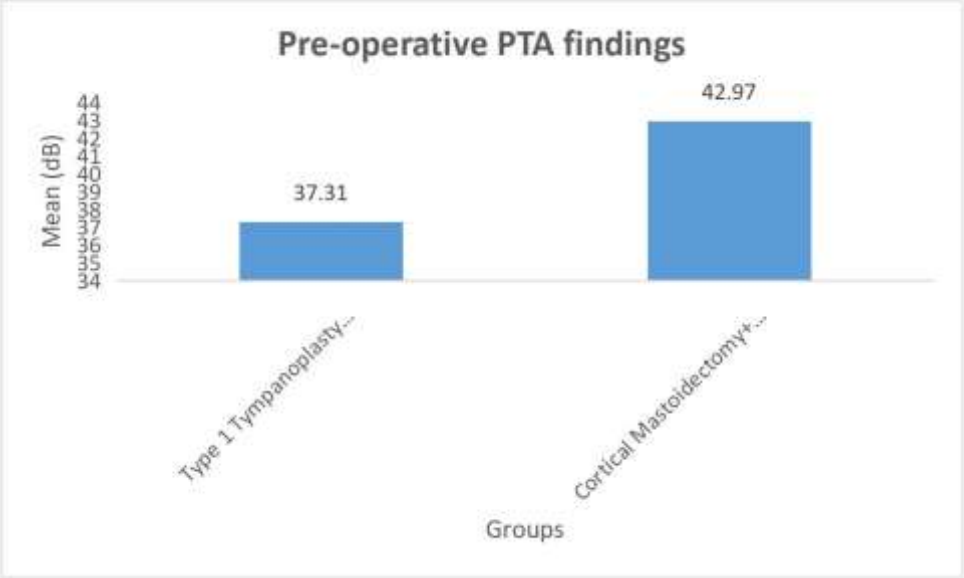


Table 8: Comparison of Post Operative PTA findings after 3months in Groups

Postoperative PTA findings	**Type 1 Tympanoplasty Alone**	**Cortical Mastoidectomy+ Type 1 Tympanoplasty**	**t-test**	**P value**

	Mean	SD	Mean	SD		
dB	24.81	5.34	29.59	6.08	-3.34	0.0001

Above table shows, at 3 months postoperatively, the mean PTA improved in both groups but remained significantly different. The Type 1 alone group achieved 24.81 ± 5.34 dB, compared to 29.59 ± 6.08 dB in the combined group. The t-test value was -3.34 with a p-value of 0.0001, indicating that the Type 1 Tympanoplasty alone group had significantly better hearing outcomes at 3 months.

Chart 8: Bar chart illustrating Comparison of Post Operative PTA findings after

3months in Groups:

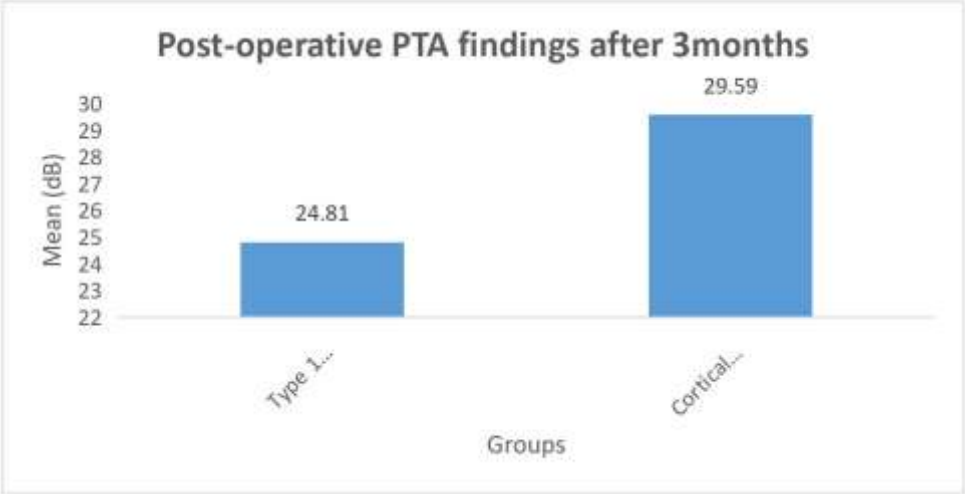


Table 9: Comparison of hearing gain in groups:

Hearing gain	Type 1 Tympanoplasty Alone	Cortical Mastoidectomy+ Type Tympanoplasty 1	t-test	P value

	Mean	SD	Mean	SD		
dB	12.50	6.16	13.38	5.74	-0.59	0.279

Above table shows, hearing gain (preoperative PTA minus postoperative PTA) was comparable between groups. The Type 1 alone group gained 12.50 ± 6.16 dB on average, while the combined group gained 13.38 ± 5.74 dB. The t-test value was -0.59 with a p-value of 0.279, showing no statistically significant difference in the amount of hearing improvement achieved between the two surgical approaches.

Chart 9: Bar chart illustrating Comparison of hearing gain in groups:

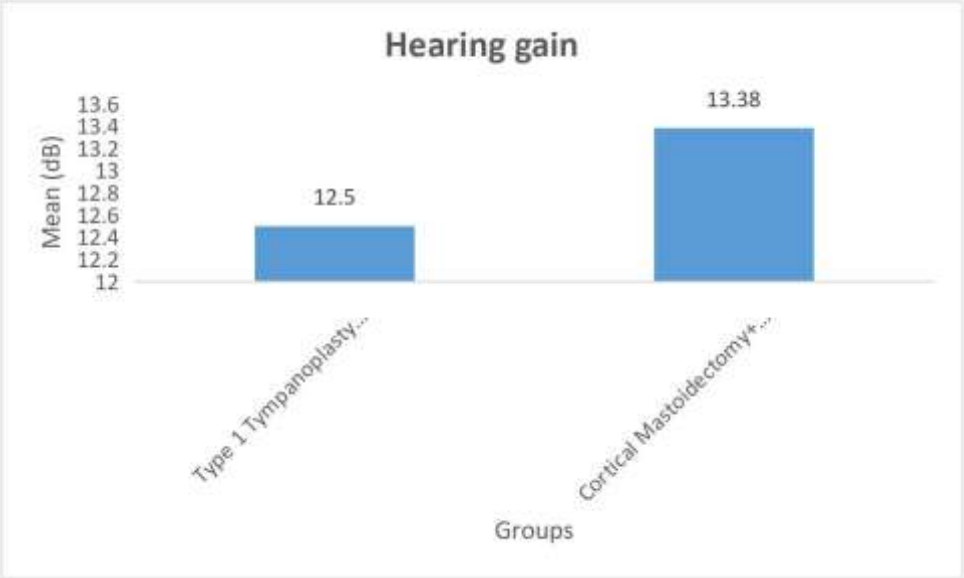


Table 10: Distribution of study participants based on Graft status at 1 months

Graft Uptake of 1 month Followup	**Type 1 Tympanoplasty Alone**		**Cortical Mastoidectomy+ Type 1 Tympanoplasty**		**Total**	
	N	**%**	**N**	**%**	**N**	**%**

Graft Insitu	32	100.0	32	100.0	64	100.0
Total	32	100.0	32	100.0	64	100.0

Above table shows, at the 1-month follow-up, graft uptake was 100% successful in both groups, with all 32 patients in each group showing the graft in situ.

Table 11: Distribution of study participants based on Graft status at 3 Months.

Graft Uptake of 3months Followup	**Type 1 Tympanoplasty Alone**		**Cortical Mastoidectomy+ Type 1 Tympanoplasty**		**Total**	
	N	**%**	**N**	**%**	**N**	**%**
Intact	30	93.8	31	96.9	61	95.3
Reperforation+	2	6.3	1	3.1	3	4.7
Total	32	100.0	32	100.0	64	100.0
Fisher's Exact value = 0.58 , P value = 1 , Inference : Is Not Statistically Significant						

Above table shows, by 3 months, graft integrity remained high overall (95.3% intact). In the Type 1 alone group, 93.8% (30/32) were intact with 2 reperforations

(6.3%). In the combined group, 96.9% (31/32) were intact with only 1 reperforation (3.1%). Fisher's Exact test gave a value of 0.58 with p=1, indicating no statistically significant difference in graft uptake rates at 3 months.

Chart 10: Cluster bar chart illustrating Association of Graft Uptake of 3 Months Follow up and Groups:

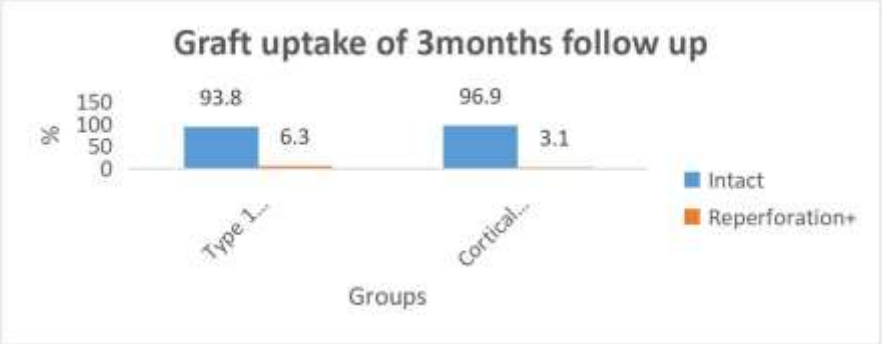


Table 12: Distribution of study participants based on Graft status at 6Months.

Graft Uptake of 6months Followup	Type 1 Tympanoplasty Alone		Cortical Mastoidectomy+ Type 1 Tympanoplasty		Total	
	N	%	N	%	N	%
Intact	29	90.6	30	93.7	59	92.2
Reperforation+	3	9.4	2	6.3	5	7.8
Total	32	100.0	32	100.0	64	100.0

Fisher's Exact value = 0.69 , P value = 1 , Inference : Is Not Statistically Significant

Above table shows, at the 6-month follow-up, overall graft integrity was 92.2%. The Type 1 alone group had 90.6% (29/32) intact grafts and 3 reperforations (9.4%), while the combined group had 93.7% (30/32) intact and 2 reperforations (6.3%). Fisher's Exact test yielded a value of 0.69 with p=1, confirming no statistically significant difference in long-term graft success between the groups.

Chart 11: Cluster bar chart illustrating Association of Graft Uptake of 6 Months Follow up and Groups:

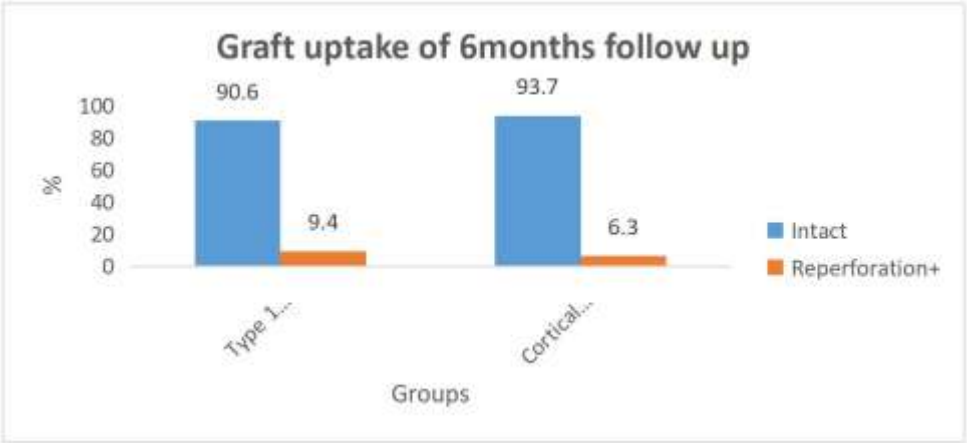


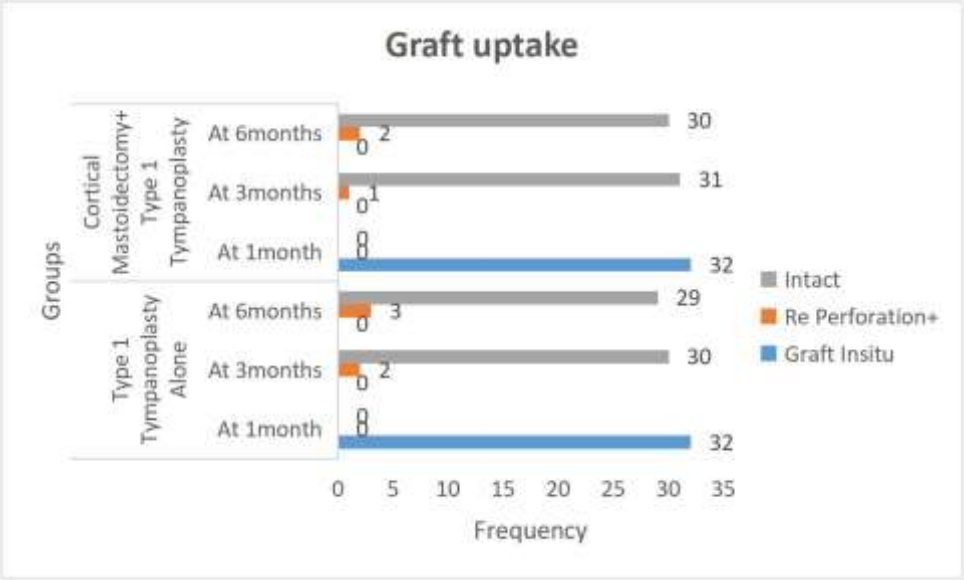
Table 13: Graft Uptake of 1Month, 3Months, 6Months follow up in Groups

Graft Uptake	Type 1 Tympanoplasty Alone			Cortical Mastoidectomy+ Type 1 Tympanoplasty		
	At 1month	At 3months	At 6months	At 1month	At 3months	At 6months
Graft Insitu	32	-	-	32	-	-
Re Perforation+	-	2	3	-	1	2

Intact	-	30	29	-	31	30

Above table summarizes the pattern of graft status. At 1 month, all grafts were in situ in both groups (32/32 each). By 3 months, 2 reperforations appeared in the Type 1 alone group (30 intact) and 1 in the combined group (31 intact). By 6 months, an additional reperforation occurred in each group, resulting in 29 intact in the Type 1 alone group and 30 intact in the combined group.

Chart 12: Cluster bar chart illustrating Graft Uptake of 1Month, 3Months, 6Months follow up in Groups:



DISCUSSION

Chronic otitis media (COM) is a persistent inflammatory disorder affecting the middle ear cleft, marked by a lasting perforation of the tympanic membrane, with or without ongoing ear discharge (otorrhea) for more than three months.[9]

It continues to pose a major public health challenge, especially in developing nations, where factors such as overcrowding, low socioeconomic status, restricted healthcare access, and repeated upper respiratory infections contribute to its high prevalence.[10] As a leading preventable cause of hearing impairment—particularly

among children, young adults, and middle-aged individuals—COM can seriously impair communication, learning outcomes, overall quality of life, and even mental well-being.[2]

COM is generally divided into two main categories: the mucosal (also called tubotympanic or "safe") type and the squamosal (atticoantral or "unsafe") type. The tubotympanic form primarily affects the pars tensa of the tympanic membrane and is typically linked to central perforations, milder clinical features, and a reduced likelihood of serious complications compared to the atticoantral variety.[11] Even though it is labeled "safe," untreated or chronic tubotympanic COM can still result in substantial conductive hearing loss and repeated infections.[12]

The standard surgical approach for tubotympanic COM is tympanoplasty, which seeks to clear any disease, repair the tympanic membrane, and improve hearing function.[13] Numerous methods and graft materials exist, but temporalis fascia remains the preferred choice because of its straightforward harvesting and excellent integration success rates.[14] Tympanoplasty by itself is commonly regarded as sufficient for inactive (dry) cases.

The inclusion of a concurrent cortical mastoidectomy continues to spark debate. Proponents suggest that excenteration of diseased mastoid air cells enhances middle ear ventilation, clears hidden infection, lowers the chance of graft rejection—especially when Eustachian tube function is compromised—and transforms a poorly aerated mastoid into a functional air reservoir, potentially leading to better long-term results.[15,16]

On the other hand, multiple investigations have shown no clear benefit from routinely performing mastoidectomy in inactive tubotympanic COM, with similar rates of graft success and auditory recovery observed when using tympanoplasty alone. Adding mastoidectomy routinely extends surgery duration, raises expenses, and increases potential complications, making it hard to justify in every patient—particularly in settings with limited resources.([17,18,19]

In light of the ongoing disagreement in the medical literature, decisions about whether to include mastoidectomy should be individualized, taking into account specific patient factors rather than applying a one-size-fits-all approach.

A prospective observational study was done among 64 patients with clinical diagnosis of inactive mucosal type of chronic otitis media satisfying inclusion and exclusion criteria attending OPD of department of ENT, BMCRC, Ballari during the study period of February 2024 to August 2025 after obtaining informed consent.

Patients were randomly allotted into two study groups according to the surgery performed:

Group A: Type I Tympanopalsty alone – 32 patients

Group B: Type I Tympanoplasty and cortical mastoidectomy – 32 patients

Age:

The age distribution showed that most patients were in the 21–40 years range, accounting for approximately 75% of the total sample (35.9% in 21–30 years and 39.1% in 31–40 years). The Type 1 Tympanoplasty alone group had a mean age of 32.2 ± 9.4 years, while the Cortical Mastoidectomy + Type 1 Tympanoplasty group had a slightly higher mean age of 32.8 ± 7.0 years (overall mean 32.5 ± 8.3 years). The association between age and surgical group was tested using Fisher's Exact test, yielding a value of 4.74 with a p-value of 0.19, indicating no statistically significant difference in age distribution between the two groups.

In a study done by Poohar Barua et al[20] showed that the mean age of patients in group tympanoplasty alone was 33.9years (SD 10.2) whereas in combined surgery group was 34.6years (SD 9.8).

In a study done by Rakesh Kumar Verma et al[21] showed that the mean age of patients in group tympanoplasty alone was 31.87years (SD 8.11) whereas in combined surgery group was 33.23years (SD 9.56).

In a study done by Shilpa Shrivastava et al[22] showed that the mean age of patients in group tympanoplasty alone was 27.34years (SD 2.1) whereas in combined surgery group was 26.34years (SD 1.6).

In a study done by Divya Aggarwal et al[23] showed that the mean age of patients in group tympanoplasty alone was 32.2years (SD 11.68) whereas in combined 33.07years (SD 10.13) with statistical significance (P value 0.76).

Gender:

The study population consisted of nearly equal numbers of males (33, 51.6%) and females (31, 48.4%). In the Type 1 Tympanoplasty alone group, males slightly outnumbered females (53.1% vs. 46.9%), while the combined surgery group showed an almost perfect 50:50 gender split. The Chi-Square test resulted in a value of 0.06 with a p-value of 1, confirming no statistically significant association between gender and the type of surgical procedure performed.

In a study done by Poohar Barua et al[20] showed that in group thympanoplasty, 59.4% were males and 40.6% were females whereas in combined surgery group, 56.3% were males and 43.7% were females.

In a study done by Shilpa Shrivastava et al[22] showed that in group thyrmpanoplasty, 53.3% were males and 46.7% were females whereas in combined surgery group, 40% were males and 60% were females.

In a study done by Divya Aggarwal et al[23] showed that in group thympanoplasty, 40% were males and 60% were females whereas in combined surgery group, 43% were males and 57% were females with no statistical significance (P value 0.793).

History of ear discharge more than 6months back:

History of ear discharge, more than 6 months back was similarly distributed between the two groups for both ears. For the right ear, history of discharge was present

in 50.0% of the Type 1 alone group and 53.1% of the combined group (absent in 50.0% and 46.9%, respectively). For the left ear, history of discharge was present in 46.9% vs. 50.0% (absent in 53.1% vs. 50.0%). Chi-Square values were 0.06 for both ears with p-values of 1, indicating no statistically significant difference in the history of ear discharge between the two surgical groups.

Hard of hearing:

Hard of hearing was reported more frequently than not in both ears across groups. For the right ear, it was present in 65.6% of the Type 1 alone group and 62.5% of the combined group (absent in 34.4% and 37.5%). For the left ear, prevalence was 59.4% vs. 56.2% (absent in 40.6% and 43.8%). Chi-Square values were low (0.07 for right ear, 2.15 for left ear) with p-values of 1 and 0.8, respectively, showing no statistically significant difference in the distribution of hard of hearing complaints between the groups.

Ear findings:

Otoscopic findings revealed central perforation (CP+) as the most common observation. In the right ear, CP+ was seen in 68.8% of the Type 1 alone group and 59.4% of the combined group (intact in 31.3% and 40.6%). In the left ear, CP+ was equally prevalent at 59.4% in both groups (intact in 40.6% each). Chi-Square values were 0.61 (p=0.6) for the right ear and 0 (p=1) for the left ear, indicating no statistically significant difference in preoperative ear findings between the two surgical groups.

In a study done by Poohar Barua et al[20] showed that in tympanoplasty group, 50% had right ear involvement and 50% had left ear involvement whereas in combined surgery group, 53.1% had right ear involvement and 46.9% had left ear involvement.

In a study done by Divya Aggarwal et al[23] showed that in tympanoplasty group, 40% had right ear involvement and 60% had left ear involvement whereas in combined surgery group, 37% had right ear involvement and 63% had left ear involvement with no statistical significance (P value 0.791).

Pure tone audiometry findings:

Pre-operative:

The Type 1 Tympanoplasty alone group had a mean PTA of 37.31 ± 6.24 dB, while the Cortical Mastoidectomy + Type 1 Tympanoplasty group had a higher mean of 42.97 ± 5.77 dB. The t-test value was -3.76 with a p-value of 0.0002, confirming that the combined surgery group had significantly worse preoperative hearing levels.

In a study done by Poohar Barua et al[20] showed that the mean PTA in group tympanoplasty alone was 27.9 dB (SD 6.4) whereas in combined surgery group was 28.4dB (SD 6.1) with no statistical significance (P value >0.05).

In a study done by Madhuri S More et al[24] showed that the mean PTA in group tympanoplasty alone was 27.66 dB (SD 13.04) whereas in combined surgery group was 30.41dB (SD 9.85).

In a study done by Rakesh Kumar Verma et al[21] showed that the mean PTA in group tympanoplasty alone was 29.33 dB (SD 8.08) whereas in combined surgery group was 31.07dB (SD 9.07) with no statistical significance (P value 0.438).

In a study done by Shilpa Shrivastava et al[22] showed that the mean PTA in group tympanoplasty alone was 31.07 dB (SD 9.07) whereas in combined surgery group was 29.33dB (SD 8.08).

In a study done by Divya Aggarwal et al[23] showed that the mean PTA in group tympanoplasty alone was 34 dB (SD 6.49) whereas in combined surgery group was 32.83dB (SD 5.36).

Post-operative:

At 3 months postoperatively, the mean PTA improved in both groups but remained significantly different. The Type 1 alone group achieved 24.81 ± 5.34 dB, compared to 29.59 ± 6.08 dB in the combined group. The t-test value was -3.34 with a

p-value of 0.0001, indicating that the Type 1 Tympanoplasty alone group had significantly better hearing outcomes at 3 months.

In a study done by Poohar Barua et al[20] showed that the mean PTA in tympanoplasty group was 14.8dB (SD 5.1) whereas in combined surgery group was 14.2dB (SD 4.8) with no statistical significance (P value >0.05).

In a study done by Madhuri S More et al[24] showed that the mean PTA in tympanoplasty group was 15.2dB (SD 8.46) whereas in combined surgery group was 10.87dB (SD 5.65).

In a study done by Rakesh Kumar Verma et al[21] showed that the mean PTA in tympanoplasty group was 24.68dB (SD 8.88) whereas in combined surgery group was 25.7dB (SD 9.16) with no statistical significance (P value 0.696).

In a study done by Shilpa Shrivastava et al[22] showed that the mean PTA in tympanoplasty group was 25.7dB (SD 9.16) whereas in combined surgery group was 24.68dB (SD 8.88).

In a study done by Divya Aggarwal et al[23] showed that the mean PTA in tympanoplasty group was 19.67dB (SD 5.4) whereas in combined surgery group was 19.33dB (SD 6.40).

Hearing gain:

The Type 1 alone group gained 12.50 ± 6.16 dB on average, while the combined group gained 13.38 ± 5.74 dB. The t-test value was -0.59 with a p-value of 0.279, showing no statistically significant difference in the amount of hearing improvement achieved between the two surgical approaches.

In a study done by Poohar Barua et al[20] showed that the mean hearing gain in patients of tympanoplasty group was 13.1dB whereas in combined surgery group was 14.2dB with no statistical significance (P value >0.05).

In a study done by Palak Chaudhary et al[25] showed that the mean hearing gain in patients of tympanoplasty group was 11.5dB (SD 6.84) whereas in combined surgery group was 16.17dB (SD 7.93) with statistical significance (P value 0.01).

In a study done by Madhuri S More et al[23] showed that the mean hearing gain in patients of tympanoplasty group was 12.46dB (SD 4.58) whereas in combined surgery group was 19.54dB (SD 4.20).

In a study done by Rakesh Kumar Verma et al[21] showed that the mean hearing gain in patients of tympanoplasty group was 10.19dB (SD 5.89) whereas in combined surgery group was 10.9dB (SD 6.77) with no statistical significance (P value 0.661). hearing

gain in patients of tympanoplasty group was 10.9dB (SD 6.77) whereas in combined surgery group was 10.19dB (SD 5.89).

In a study done by Divya Aggarwal et al[23] showed that the mean hearing gain in patients of tympanoplasty group was 13.5dB (SD 5.89) whereas in combined surgery group was 14.33dB (SD 6.12).

Graft uptake at 1month:

At the 1-month follow-up, graft uptake was 100% successful in both groups, with all 32 patients in each group showing the graft in situ.

Graft uptake after 3months:

By 3 months, graft integrity remained high overall (95.3% intact). In the Type 1 alone group, 93.8% (30/32) were intact with 2 reperforations (6.3%). In the combined group, 96.9% (31/32) were intact with only 1 reperforation (3.1%). Fisher's Exact test gave a value of 0.58 with p=1, indicating no statistically significant difference in graft uptake rates at 3 months.

Graft uptake after 6months:

At the 6-month follow-up, overall graft integrity was 92.2%. The Type 1 alone group had 90.6% (29/32) intact grafts and 3 reperforations (9.4%), while the combined group had 93.7% (30/32) intact and 2 reperforations (6.3%). Fisher's Exact test yielded a value of 0.69 with p=1, confirming no statistically significant difference in long-term graft success between the groups.

In a study done by Poohar Barua et al[20] showed that in patients of tympanoplasty alone group, 9.4% reperforation occurred whereas in combined surgery group, 6.2% reperforation occurred with no statistical significance (P value >0.05).

In a study done by Palak Chaudhary et al[25] showed that in patients of tympanoplasty alone group, 23.3% reperforation occurred whereas in combined surgery group, 3.3% reperforation occurred with statistical significance (P value 0.023).

In a study done by Madhuri S More et al[24] showed that in patients of tympanoplasty alone group, 20% reperforation occurred whereas in combined surgery group, 5% reperforation occurred.

In a study done by Rakesh Kumar Verma et al[21] showed that in patients of tympanoplasty alone group, 8% reperforation occurred whereas in combined surgery group, 4% reperforation occurred with no statistical significance (P value 1.00).

In a study done by Shilpa Shrivastava et al[22] showed that in patients of tympanoplasty alone group, 10% reperforation occurred whereas in combined surgery group, 13.3% reperforation occurred with no statistical significance (P value >0.05).

In a study done by Divya Aggarwal et al[23] showed that in patients of tympanoplasty alone group, 13% reperforation occurred whereas in combined surgery group, 10% reperforation occurred with no statistical significance (P value >0.05).

CONCLUSION

In patients with inactive mucosal-type chronic otitis media (also referred to as tubotympanic or “safe” COM with a dry ear), tympanoplasty performed alone produces anatomical success (graft uptake) and functional outcomes (hearing improvement) that are statistically comparable to those achieved when cortical mastoidectomy is added to the procedure. Therefore, routine inclusion of cortical mastoidectomy does not provide a significant additional benefit in most such cases.

It can be concluded that cortical mastoidectomy serves as a valuable supplementary step only in selected patients with inactive mucosal chronic suppurative otitis media. The decision to perform mastoidectomy should be individualized and guided by the operating

surgeon following a thorough preoperative assessment. This evaluation should include detailed otoscopy, microscopic examination of the middle ear (either in the clinic or under anesthesia), and imaging of the mastoids (typically plain X-ray mastoids in Schüller's view or, when available, high-resolution CT temporal bone) to detect any evidence of mastoid pathology, poor pneumatization, or other factors that might compromise long-term success.

Consequently, for the large majority of patients who present with healthy middle ear mucosa and a consistently dry ear, tympanoplasty as a standalone operation remains sufficient, effective, and preferable, avoiding the unnecessary increase in operative time, potential complications, and resource use associated with routine mastoidectomy.

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