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A COMPERATIVE STUDY BETWEEN TYMPANOPLASTY WITH CORTICAL MASTOIDECTOMY VERSUS TYMPANOPLASTY IN THE MANAGEMENT OF MUCOSAL VARIETY OF CHRONIC OTITIS MEDIA

ENT

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ABSTRACT

Introduction: Chronic suppurative otitis media (COM), mucosal variety is defined as a chronic inflammation of the middle ear and mastoid cavity, which presents with recurrent ear discharges or otorrhoea through a tympanic perforation.

Aims: To find out the incidence of chronic otitis media with respect to age and sex in the study population and to compare the graft up-take rate, the graft failure rate, the rate of residual perforation and the degree of hearing improvement between the two modalities of treatment of type 1 tympanoplasty with cortical mastoidectomy and type 1 tympanoplasty aloone.

Methods: The 80 patients were randomly divided into two equal groups with 40 patients undergoing type 1 tympanoplasty with cortical mastoidectomy (group A) and 40 patients undergoing type 1 tympanoplasty (Group B). Post operatively all the patients were followed up for a total of 6 months with weakly intervals on 1st month; bi weekly on 2nd month; monthly on 3rd and 6th month. Post operatively all the study patients were assessed for the status of the graft; mobility, rejection or residual perforation of the graft and the hearing improvement.

Conclusion In successful graft take up, results of hearing improvement is better in Tympanoplasty with cortical mastoidectomy than with Tympanoplasty alone. Possibility of finding mastoid antral pathology is more in patients having Chronic otitis media (mucosal) with sub total perforation as observed in this study.

KEYWORDS

Chronic suppurative otitis media, tympanoplasty, cortical mastoidectomy.

INTRODUCTION

Chronic suppurative otitis media (COM) is a chronic inflammation of the middle ear and mastoid cavity that is characterised by discharge from the middle ear through a perforated tympanic membrane for at least 6 weeks. COM occurs following an upper respiratory tract infection that has led to acute otitis media. This progresses to a prolonged inflammatory response causing mucosal (middle ear) oedema, ulceration and perforation. The middle ear attempts to resolve this ulceration by production of granulation tissue and polyp formation. There may be enough pus that it drains to the outside of the ear (otorrhea), or the pus may be minimal enough to be seen only on examination with an otoscope or binocular microscope. Hearing impairment often accompanies this disease. [1-5]

People are at increased risk of developing COM when they have poor eustachian tube function, a history of multiple episodes of acute otitis media and living in crowded conditions. Those with craniofacial malformations such as cleft lip and palate, Down syndrome, and microcephaly are at higher risk. The disease usually begins in childhood[1] . as a spontaneous tympanic perforation due to an acute infection of the middle ear, known as acute otitis media (AOM), or as a sequel of less severe forms of otitis media (e.g. secretory OM).The infection may occur during the first 6 years of a child's life, with a peak around 2 years[2]. The point in time when AOM becomes COM is still controversial. Generally, patients with tympanic perforations which continue to discharge mucoid material for periods of from 6 weeks to 3 months, despite medical treatment, are recognized as COM cases. The WHO definition requires only 2 weeks of otorrhoea,but otolaryngologists tend to adopt a longer duration,e.g. more than 3 months of active disease. The ultimate fate of the tympanic perforation is still largely undocumented. Thus, both the start and the end of the disease process are difficult to define. Although healing is often observed over prolonged periods, there are more patients who develop either recurrent bouts of otorrhoea (active COM) or a dry but permanent tympanic perforation (inactive COM).Inactive otitis media refers to a previously discharging ear that has apparently ceased discharging without probability of resumption in the near future. [6-10] Often, the perforation heals imperfectly with areas of retraction and scarring in the eardrum which do not vibrate in response to sound, as well as normal areas. The episodes of otorrhoea are often provoked by upper respiratory infections. This is particularly common in children. Soiling of the middle ear from swimming or bathing also leads to intermittent and unpleasant discharges. A decidedly smaller group of patients, particularly those who have not been treated, develop life-threatening complications.[11,12]

Worldwide approximately 11% of the human population is affected by AOM every year, or 709 million cases. About 4.4% of the population develops COM.The incidence of COM across the world varies dramatically where high income countries have a relatively low prevalence while in low income countries the prevalence may be up to three times as great.Each year 21,000 people worldwide die due to complications of COM. [13]

AIMS AND OBJECTIVES

1. Determine age and sex wise occurrence of chronic otitis media in the study population
2. Pre operative progression of hearing loss and its severity .
3. Comparison between graft up-take rate between two group.
4. Comparison between graft failure rate between two group.
5. Comparison between residual perforation rate between two group..
6. Comparison between degree of hearing improvement between two group.

MATERIALS AND METHODS

This prospective, randomized, single blinded interventional study was conducted on 80 patients of either sex, age between 18 to 45 years, in the Ear, Nose and Throat Out Patient Department, over a period of 1year 6 months from February 2016 to August 2017.Ethical clearance was obtained from the institutional ethical board and informed consent was obtained from the patients before the start of the study. All patients with dry and quiescent ears were included in the study. Chronic otitis media squamous type, traumatic perforations, previous ear surgeries and patients having sensorineural hearing loss were all excluded. The 80 patients were randomly divided into two equal groups with40 patients undergoing type 1 tympanoplasty with cortical mastoidectomy (Group A) and 40patients undergoing type 1 tympanoplasty (Group B).Post operatively all the patients were followed up for a total of 6 months with weakly intervals on

1st month;bi weakly on 2nd month;monthly on 3rd and 6th month.
Post operatively all the study patients were assessed for the status of the graft; mobility,rejection or residual perforation of the graft and the hearing improvement. Pure tone audiogram was done for all the patients at the end of 3 months to assess the level of hearing improvement. For statistical analysis data were entered into a Microsoft excel spreadsheet and then analyzed by SPSS 24.0. and Graph Pad Prism version 5.

RESULTS AND ANALYSIS

The type of perforation taken in this study was central perforation (Small,Moderate and Large or Subtotal).In the Cortical mastoidectomy with tympanoplasty(Group A),out of 40 patient 24 has large central or subtotal perforation,10 has moderate central perforation and 6 had small central perforation. In the Tympanoplasty (GroupB), 15 had large central or subtotal perforation 15 had moderate perforation and 15 had small central perforation. The P value calculated was 0.1320 and chi-square test 4.0679 which was statistically significant.

GRAFT UPTAKE RATE:

Out of 40 patients in Gr A 38 patient had shown graft uptake and 2 cases were failed. In Group B 35 patients were shown graft uptake and 5 cases were failed.P value is 0.0.2352 and chi-squre test is 1.4090 which is within statistically significant range.

GRAFT FAILURE RATE:

It is divided into two sub group 1.Complete Graft Rejection Rate and 2.Residual Perforation rate. In complete Graft rejection subgroup GROUP A has shown only one case and GROUP B has shown 3 cases with p value 0.3049 and chi-squre test value 1.0526 which is statistically insignificant. .In residual perforation subgroup GROUP A has shown only one case and GROUP B has shown 2 cases, p value is 0.5562 and chi-square test is 0.3463,statisticallyinsignificant.

Post Operative Hearing Improvement In Graft Up Take Caes:

Excellent Postoperative hearing with AB gap between 5-10 db shown majority of cases;31 cases in GROUP A and 19 cases in GROUP B. Very good hearing with AB gap10-15 db seen 4 cases in GROUP A and 5 cases in GROUP B. Good hearing with AB gap between 15-20 db seen 5 in GROUP A and 11 in GROUP B.

However there was no significant difference in mean P value, which was 0.60 and was insignificant. The mean post op pure tone average value and standard deviation in the 2 groups were 30.4 +/- 5.8 and 29.6 +/- 8.7. The p value calculated was 0.60 and 0.71 pre and post operatively and was statistically insignificant.

Table I: Distribution of mean age in two groups.

	Number	Mean	SD	Minimum	Maximum	Median	p-value
Group-A	40	31.9750	6.8593	20.0000	45.0000	31.0000	0.1666
Group-B	40	29.9000	6.4243	19.0000	45.0000	29.5000	

The sex distribution in group A was 24 female and 16 male; whereas in group B it was25 and 15. Association between sex in two groups was not statistically significant (p=0.8184). Thus sex was matched in this study.

Table: Association between amount of discharge, consistency of discharge and colour in two groups.

		Group-A	Group-B	TOTAL	Chi-square value	p-value
Amount	**Profuse**	24	17	41	2.4515	0.1174
	Row %	58.5	41.5	100.0		
	Col %	60.0	42.5	51.3		
	Scanty	16	23	39		
	Row %	41.0	59.0	100.0		
	Col %	40.0	57.5	48.8		
	TOTAL	40	40	80		
	Row %	50.0	50.0	100.0		
	Col %	100.0	100.0	100.0		
Consistency	**Mucoid**	11	15	26	0.9117	0.3396
	Row %	42.3	57.7	100.0		
	Col %	27.5	37.5	32.5		
	Purulent	29	25	54		
	Row %	53.7	46.3	100.0		
	Col %	72.5	62.5	67.5		
	TOTAL	40	40	80		
	Row %	50.0	50.0	100.0		
	Col %	100.0	100.0	100.0		
Colour	**Whitish**	11	15	26	0.9117	0.3396
	Row %	42.3	57.7	100.0		
	Col %	27.5	37.5	32.5		
	Yellowish	29	25	54		
	Row %	53.7	46.3	100.0		
	Col %	72.5	62.5	67.5		
	TOTAL	40	40	80		
	Row %	50.0	50.0	100.0		
	Col %	100.0	100.0	100.0		

Association between amount in two groups was not statistically significant (p=0.1174). Association between consistency in two groups was not statistically significant (p=0.3396).

Association between colour in two groups was not statistically significant (p=0.3396).

Table: Association between Hearing Loss Severity in two groups.

Hearing Loss Severity	Group-A	Group-B	TOTAL
Mild	14	18	32
Row %	43.8	56.3	100.0
Col %	35.0	45.0	40.0
Moderate	26	22	48
Row %	54.2	45.8	100.0
Col %	65.0	55.0	60.0
TOTAL	40	40	80
Row %	50.0	50.0	100.0
Col %	100.0	100.0	100.0

Chi-square value: 0.8333; **p-value:** 0.3613

Association between hearing loss severity in two groups was not statistically significant (p=0.3613).

Table: Association between Audiometry Test in two groups.

	GROUP		
Audiometry Test	**Group-A**	**Group-B**	**TOTAL**
Mild Conductive Hearing Loss	12	19	31
Row %	38.7	61.3	100.0
Col %	30.0	47.5	38.8

Moderate Conductive Hearing Loss	28	21	49
Row %	57.1	42.9	100.0
Col %	70.0	52.5	61.3
TOTAL	40	40	80
Row %	50.0	50.0	100.0
Col %	100.0	100.0	100.0

Chi-square value: 2.5806**; p-value:** 0.1081

Association between preoperativeAudiometry Test in two groups was not statistically significant (p=0.1081)

Table: Association between Graft take up rate in two groups

Graft take up rate	Group-A	Group-B	TOTAL
NO	2	5	7
Row %	28.6	71.4	100.0
Col %	5.0	12.5	8.8
YES	38	35	73
Row %	52.1	47.9	100.0
Col %	95.0	87.5	91.3
TOTAL	40	40	80
Row %	50.0	50.0	100.0
Col %	100.0	100.0	100.0

Chi-square value: 1.4090**; p-value:** 0.2352Association between Graft take up rate in two groups was not statistically significant (p=0.2352).

Table: Association between Graft faliure rate Complete Rejection in two groups

	GROUP		
Graft faliure rate Complete Rejezection	**Group-A**	**Group-B**	**TOTAL**
NO	39	37	76
Row %	51.3	48.7	100.0
Col %	97.5	92.5	95.0
YES	1	3	4
Row %	25.0	75.0	100.0
Col %	2.5	7.5	5.0
TOTAL	40	40	80
Row %	50.0	50.0	100.0
Col %	100.0	100.0	100.0

Chi-square value: 1.0526**; p-value:** 0.3049

Association between Graft faliure rate Complete Rejection in two groups was not statistically significant (p=0.3049).

Table: Association between Post OperativeHearing_Improvement in two groups

Hearing Improvement	Group-A	Group-B	TOTAL
1	31	19	50
Row %	62.0	38.0	100.0
Col %	79.5	54.3	67.6
2	4	5	9
Row %	44.4	55.6	100.0
Col %	10.3	14.3	12.2
3	4	11	15
Row %	26.7	73.3	100.0
Col %	10.3	31.4	20.3
TOTAL	39	35	74
Row %	52.7	47.3	100.0
Col %	100.0	100.0	100.0

Chi-square value: 6.0593**; p-value:** 0.0483

Association between Hearing Improvement in two groups was statistically significant (p=0.0483).

DISCUSSION

In the cortical mastoidectomy group 16 patients had polypoidal tissue per operatively in the middle ear, 12 patients had antral disease blocking the patency of the aditus ad antrum, 5 patients had adhesions and 3 patients had glue in the antrum.

In a study conducted by Mutoh t et al comparing the results efficacy of mastoidectomy in methicillin resistant staph aureus and methicillin susceptible staph aureus infected otitis media, mastoidectomy had significantly better results considering postoperative complications in discharging ears with MRSA infected chronic otitis media.

In a separate study by Rickers J, Petersen CG[12] comparing the long term follow up evaluation of mastoidectomy in children with non cholesteatoma chronic otitis media they concluded that mastoidectomy in these patients should be kept as a last resort when intensive conservative treatment and myringoplasty.

In another similar study Balyan FR[13] et al compared the graft success rate and the final functional hearing outcome and found tympanoplasty without mastoidectomy as preferable treatment modality in non cholesteatoma ears ($p > 0.05$).6 Vijayendra et al[14] advocated the opening of the antrum to prevent the graft failure in 2-3 % of patients.

In their retrospective analysis of 251 cases of non cholesteatoma cases of chronic otitis media by Y. Mishiroet al[16] who underwent tympanoplasty with and without mastoidectomy, graft success rates were 90.5 % in group A and 93.3% in group B. The rates of the post-operative air bone gap within 20db were 81.6% in Group A and 90.4% in Group B, without a statistically significant difference.8

Glasscock had reported a 96% success rate with underlay technique. 86% graft uptake by underlay technique was foundby Rizer.Smyth and Patterson[10] in their report of 153 patients showed it to be 78 % with a longer follow up.11 In our study graft take up rate in patients who underwent only tympanoplasty was 80% and those with tympanomastoidectomy was 72%.

Our study was with limited patients and time bound so shows limited advantage of cortical mastoidectomy over type 1 tympanoplasty alone. Longer duration and large sample size will definitely show a statistically significant better result with cortical mastoidectomy than Type I tympanoplasty.Vijayendraet al[14] advocated the opening of the antrum to prevent the graft failure in 2-3 % of The study by Anita Krishnan et al[15] concluded the need for opening the mastoid antrum and air cells if the middle ear mucosa is unhealthy. Z. Benjamin et al studied impact of mastoidectomy and simple tympanic membrane perforation repair. According to them mastoidectomy was not necessary for successful repair of simple tympanic membrane perforation. However mastoidectomy impacted the clinical course in patients by reducing the number of patients requiring future procedure and by decreasing disease progress. Another retrospective study by Zensak et al concluded that for patients with noncholesteatomatous chronic otitis media who had failed prior Tympanoplasty reconstruction, an aerating mastoidectomy may be indicated and may improve the success rate of the surgery . [16]

CONCLUSION

Cortical Mastoidectomy is recommended in patients of Chronic Otitis media (Mucosal) with subtotal perforations. The graft uptake rate is nearly similar in both the groups in patients with small central perforation involving one or two quadrants.But in cases of moderate and large perforation GRAFT TAKE UP RATE is higher in Tympanoplasty with cortical mastoidectomy i with overall rate is 94%;compared to Tympanoplasty alone 86%. Graft rejection and residual perforation is 3% each in Group A.In Group B Graft rejection is higher 7.5% and residual perforation is 5%.

In successful graft take up, results of hearing improvement is better in Tympanoplasty with cortical mastoidectomy than with Tympanoplasty alone. Possibility of finding mastoid antral pathology is more in patients having Chronic otitis media (mucosal) with sub total perforation as observed in this study

COMPLIANCE WITH ETHICAL STANDARDS

Conflict of interest: The authors declare that there is no conflict of interest.

Ethical Approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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