

Myringoplasty with and without Cortical Mastoidectomy in Treatment of Non-cholesteatomatous Chronic Otitis Media: A Comparative Study

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ABSTRACT

OBJECTIVE: To compare the outcome and success of repair of uncomplicated tympanic membrane perforations with myringoplasty alone and when combined with mastoidectomy.

METHODS: A prospective study where 40 patients with non-cholesteatomatous chronic suppurative otitis media (CSOM) were recruited during the period of June 2013 to December 2013 from the outpatient clinic of Otorhinolaryngology department, Faculty of medicine, Cairo University. Patients were managed medically and after dryness of their perforations they were operated upon. Twenty patients underwent simple myringoplasty alone and 20 patients underwent myringoplasty with cortical mastoidectomy. Underlay technique with temporalis fascia was done for all patients. Follow-up period was at least 3 months.

RESULTS: Hearing improvement was comparable in both groups. There was no significant difference in graft uptake between the myringoplasty alone group (70%) and cortical mastoidectomy group (80%) ($P = 0.7$). There was no significant difference in ear dryness between the myringoplasty alone group (75%) and cortical mastoidectomy group (90%) ($P = 0.4$).

CONCLUSION: Mastoidectomy performed in non-cholesteatomatous CSOM in this study gives no statistically significant benefit over simple myringoplasty as regards graft success rate and dryness of the middle ear with comparable hearing outcome.

KEYWORDS: non-cholesteatomatous, myringoplasty, cortical mastoidectomy

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Introduction

Chronic suppurative otitis media (CSOM) is an inflammatory process of the mucoperiosteal lining of the middle ear space and mastoid. Infection of the middle ear has been a problem encountered in the human race, and is as old as humanity itself.¹

The surgical treatment of CSOM is still controversial. It is well accepted that the main purpose of operation is to obtain a permanently dry ear and close the perforation. Myringoplasty with mastoidectomy has been identified as an effective method of treatment of chronic ear infection resistant to

antibiotic therapy, but the effect of mastoidectomy on patients without evidence of active infectious disease remains highly debated and unproven.²

There are three opinions in this issue. The first is that mastoidectomy is useful for both infected and dry ears.³ The second is that mastoidectomy is useful for infected ears, but not for dry ears.⁴ The third is that mastoidectomy is not useful for either infected or dry ears.⁵

This study was done to compare myringoplasty alone with myringoplasty and cortical mastoidectomy in terms of



air–bone gap, graft uptake, and ear dryness in cases of non-cholesteatomatous CSOM.

Methods

This is a prospective randomized study carried out on 40 non-pediatric patients who attended the outpatient clinic of Otorhinolaryngology department, Faculty of medicine, Cairo University during the period of July 2013 till December 2013.

Patients were randomly divided into two equal groups; group 1 included 20 patients who underwent myringoplasty alone, whereas group 2 included 20 patients who underwent myringoplasty with cortical mastoidectomy.

Method of randomization: Each patient was asked to draw a paper from a box in which the number of the group was written.

Informed consent had been taken from every patient with explanation of the aim of the study. Also, ethical approval had been granted for the whole study.

Inclusion criteria.

1. More than 12-years old.
2. Dry perforation for 1 month at least “dry and quiescent ears.”
3. Central perforation.
4. Tubotympanic disease.

Exclusion criteria.

1. Less than 12 years.
2. Wet ear.
3. Marginal or attic perforation.
4. Cholesteatomatous ear.
5. Associated Otitis externa (OE).
6. Previous mastoid operation.
7. Diabetes mellitus.

All the patients were subjected to full history taking including onset, course, and duration of the disease, associated symptoms, previous medications, and operations or trauma. Patients were subjected to full otological examination to exclude scar of previous operation, condition of the tympanic membrane, condition of the middle ear mucosa, tuning fork tests, and also nasal and oral examination to exclude predisposing factors as allergy or causes of recurrence of the condition.

All patients were subjected to preoperative pure tone audiometry and it was repeated 3 months postoperatively. Routine preoperative labs were done for all patients. All patients received the initial antibiotic therapy in the form of amoxicillin clavulanic acid tablet 1 g every 12 hours and ciprofloxacin drops topically for 10 days and ears were not considered dry except after a period of 1 month at least after a condition of no ear discharge. Resistant cases to this antibiotic regimen were subjected to bacteriological examination. They were only three cases and were given ciprofloxacin tablet 500 mg every 12 hours for 10 days and ciprofloxacin drops topically according to the results of the culture and sensitivity.

Patients were operated upon after dryness of their perforations for at least 1 month. All the patients had near the same size of their ear drum perforation. All the patients were operated via postauricular approach, temporalis fascia was put using the under lay technique. Patients were operated upon by the same surgeon and all patients were followed for at least 3 months after the operation.

Postoperative management. Amoxicillin clavulanic acid tablet 1 g every 12 hours was given for all patients for 10 days except the three cases who were resistant to it prior to surgery. These three cases received ciprofloxacin tablet 500 mg every 12 hours for the same period. The first postoperative visit was on the 10th day, during which the ear dressing, packing, and skin sutures were removed. After removal of the dressing, the patient was instructed to keep the ear dry. Bacitracin was applied by the patients to the postauricular incision twice a day for 1 week.

The second follow-up visit was 3–4 weeks later. Thereafter, the patient was monitored 3 months postoperative until the graft uptake could be judged to allow a comparative postoperative audiogram.

Assessment of graft uptake and dryness was done by one of the authors other than the surgeon using the microscope and suction tools if needed for aural cleaning in all the visits of the patients. Good graft uptake was considered if there is no residual perforation seen after the end of follow-up period.

Collection of data and statistical analysis. All collected clinical sheets from the patients were revised for completeness and consistency. Data were entered on the computer using “Microsoft Office Excel Software” program (2010) for windows. Data were then transferred to the Statistical Package of Social Science Software program, version 21 (SPSS) to be statistically analyzed.

Data were summarized using mean, and standard deviation for quantitative variables and frequency and percentage for qualitative ones. Comparison between groups was performed using independent sample *t*-test for quantitative variables and Chi-square or Fisher’s exact test for qualitative ones.

Paired *t*-test was conducted to signify the changes in the related quantitative measurements (air–bone gap [A–B gap]). *P* values less than 0.05 were considered statistically significant, and less than 0.01 were considered highly significant. Graphs were used to illustrate some information.

Results

The study included 40 patients who were divided randomly into two groups; group 1 (myringoplasty alone) included 20 patients where 12 were males and 8 were females. Group 2 (myringoplasty with cortical mastoidectomy) also included 20 patients where 12 were males and 8 were females (Table 1). Most of the patients were in the age group of 20–29 years. The youngest patient was found to be 12-years old and the oldest 60 years (Table 1).

Table 1. Age and sex distribution in the study.

	GROUP 1 (n = 20)		GROUP 2 (n = 20)		P VALUE
	N	%	N	%	
Sex					
Male	12	60.0	12	60.0	1.0
Female	8	40.0	8	40.0	NS
Age (years)	27.0 ± 8.8		28.3 ± 8.4		0.6
Mean ± SD					NS

The most common presenting symptoms of these patients were otorrhea and hearing loss.

Air–bone gap. Average A-B gap preoperative was 22.3 ± 8.2 in group 1, whereas it was 22.5 ± 8.5 in group 2. Average A-B gap 3 months postoperative in group 1 was 18.3 ± 10.0 , whereas it was 20.0 ± 8.3 in group 2. There was no statistically significant difference between group 1 and group 2 regarding A-B gap difference pre- and postoperative (Table 2).

Graft uptake. Graft success rates were 70% in group 1, 80% in group 2 with *P* value 0.7 (Fig. 1). There was no statistically significant difference between group 1 and group 2 (Table 3).

Ear dryness. Dry ears—3 months postoperatively—were 75% in patients of group 1 with myringoplasty alone and 90% in group 2 with myringoplasty and mastoidectomy with *P* value 0.4.

No significant difference between both groups (Fig. 2 and Table 3).

Association of good graft uptake with dryness within group 1 only. All patients with successful graft uptake had dry middle ear mucosa, while 83.3% of patients with graft uptake failure had discharging ear (*P* = 0.001) (Table 4).

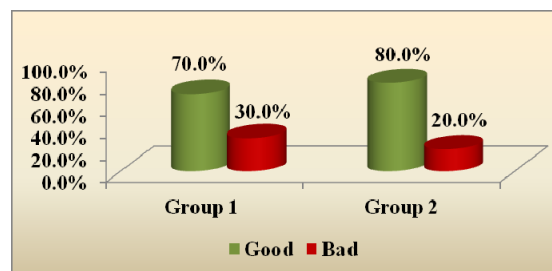
Association of good graft uptake with dryness within group 2 only. All patients with successful graft uptake had dry ears, while 50% of graft uptake failure had discharging ears (*P* = 0.03) (Table 5).

Discussion

Mastoidectomy is one of the most common otological operations performed today. Indications for mastoidectomy range from eradication of chronic infection to approaches for various neurotological procedures. Mastoidectomy was first described by Louis Petit in the 1700s, although the concept did not gain wider acceptance until 1958, the cortical mastoidectomy was

Table 2. Air-bone gap in dB pre and postoperatively.

	GROUP 1 (n = 20)		GROUP 2 (n = 20)		P VALUE
	N	%	N	%	
Preoperative A-B gap	22.3 ± 8.2		22.5 ± 8.5		0.9 NS
Postoperative A-B gap	18.3 ± 10.0		20.0 ± 8.3		0.5 NS
A-B gap difference	-4.0 ± 9.8		-2.5 ± 6.8		0.4 NS


Figure 1. Graft uptake in both groups.

popularized by William House. This procedure attempted to avoid the common problems with radical mastoidectomy.⁶

Myringoplasty is an operative procedure, in which the reconstructive procedure is limited to repair of tympanic membrane perforation. Implicit in the definition is that the ossicular chain is intact and mobile, and the middle ear is disease free. There are a number of studies in the literature highlighting the advantages and disadvantages of performing mastoidectomy in the surgical treatment of mucosal type of chronic otitis media.

Our study emphasizes the fact that overall satisfactory hearing outcome with adequate air–bone closure can be achieved irrespective of cortical mastoidectomy. We found that A-B gap in decibel in group 1 was 22.3 ± 8.2 preoperative and 18.3 ± 10.0 postoperative with -4.0 ± 9.8 difference, while it was 22.5 ± 8.5 preoperative in group 2 and 20.0 ± 8.3 postoperative with -2.5 ± 6.8 difference.

Along with our results, Balyan et al in 1997 did a retrospective study of 323 patients to evaluate the role of mastoidectomy in non-cholesteatomatous CSOM. They observed no statistically significant difference in hearing outcome when mastoidectomy was done.⁷

Mishiro et al in 2001 reviewed 251 cases of non-cholesteatomatous chronic otitis media, to determine whether mastoidectomy is helpful when combined with tympanoplasty for these conditions. A total of 147 patients were treated by tympanoplasty with mastoidectomy and 104 were operated on without mastoidectomy. There was no statistically significant difference between the two groups.⁵

Table 3. Graft uptake and ear dryness in both groups.

	GROUP 1 (n = 20)		GROUP 2 (n = 20)		P VALUE
	N	%	N	%	
Graft uptake					
Successful	14	70.0	16	80.0	0.7
Failed	6	30.0	4	20.0	NS
Dryness					
Dry ears	15	75.0	18	90.0	0.4
Discharging ears	5	25.0	2	10.0	NS

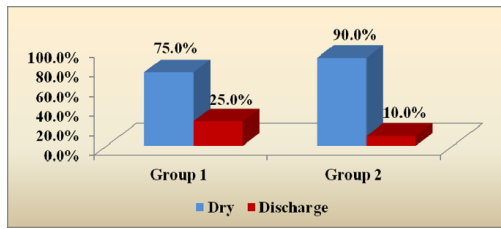


Figure 2. Ear dryness in both groups.

Bhat et al in 2008 compared outcomes for mastoidotomy-tympanoplasty and for tympanoplasty alone in cases of quiescent, tubotympanic CSOM. There were no statistically significant differences in hearing improvement.⁸ In 2012, Albu et al found that cortical mastoidectomy offers no additional benefit regarding hearing gain over myringoplasty.⁹

In contrast to our study, Jackler and Schindler in 1984 studied 48 patients with chronic otitis media with tympanic perforations who underwent myringoplasty with mastoidectomy. In their study, it was found that simple mastoidectomy was found to be an effective means of re-pneumatizing the sclerotic mastoid and restoring the hearing.¹⁰

Our study revealed that graft success rates were 70% in group 1 and 80% in group 2. There was no statistically significant difference between the two groups. Dry ears—3 months postoperative—were 75% in patients with myringoplasty and 90% in the group with myringoplasty and mastoidectomy without significant difference between both groups.

Along with our results, Sheehy in 1985 recommended performing simple cortical mastoidectomy routinely for all tympanoplasties because it is “good practice” and because “it’s better to be safe than sorry.”¹¹

Jackler and Schindler in 1984 found that simple mastoidectomy was found to be an effective means of re-pneumatizing the sclerotic mastoid and eradicating mastoid sources of infection. The study concluded that simple mastoidectomy is a safe and useful adjunct to myringoplasty.¹⁰

McGrew et al in 2004 conducted a retrospective study of patients at a tertiary referral center, where 484 patients who underwent surgical repair of simple tympanic membrane perforations were identified and reviewed. Surgical outcome and clinical course were assessed to compare results of tympanic

Table 4. Graft uptake with dryness of ears within group 1.

GROUP 1	GRAFT UPTAKE				P VALUE
	GOOD		BAD		
	N	%	N	%	
Dryness					
Dry	14	100.0	1	16.7	<0.001
Discharge	0	0.0	5	83.3	HS

Table 5. Graft uptake with dryness of ears within group 2.

GROUP 2	GRAFT UPTAKE				P VALUE
	GOOD		BAD		
	N	%	N	%	
Dryness					
Dry	16	100.0	2	50.0	0.03
Discharge	0	0.0	2	50.0	S

membrane perforation repair, with and without canal wall up mastoidectomy. They found that tympanic membrane repair was equally effective in both groups at 91%.³

Development of persistent ipsilateral otological disease requiring a subsequent ipsilateral procedure was approximately twice as common in the tympanoplasty group. They concluded that mastoidectomy was not necessary for successful repair of simple tympanic membrane perforations. However, mastoidectomy impacted the clinical course in patients by reducing the number of patients requiring future procedures and by decreasing disease progression. This suggests that combining mastoidectomy with tympanoplasty during repair of simple perforations in patients with no active evidence of infection remains an appropriate option, and may be valuable in reducing the need for future surgery.³

On the contrary, Bhat et al in 2008 concluded that there were no statistically significant differences in tympanic perforation closure, graft uptake, or disease eradication, comparing the two groups at 3 and 6 months postoperatively. Mastoido-tympanoplasty was not found to be superior to tympanoplasty alone over a short-term follow-up period.⁸

Albu et al in 2012 presented a paper of 320 consecutive adult patients treated by either myringoplasty with cortical mastoidectomy or myringoplasty only. They found that three factors were significant in predicting success rate, that is, healthy opposite ear, a long dry period preceding the operation, and non-smoker status. The only factor attaining significance in the multivariate analysis was a dry period longer than 3 months. They concluded that cortical mastoidectomy offers no additional benefit in myringoplasty performed on patients with persistent or intermittent discharging CSOM and no evidence of cholesteatoma or mucosal blockage within the antrum.⁹

Role of mastoidectomy in the repair of tympanic membrane perforation has long been debated. Mastoidectomy was regarded as a means of surgically creating an air reservoir and eradicating sequestered mastoid disease. Yet, there is no scientific data indicating that tympanoplasty with mastoidectomy yields better results.

Conclusion

Mastoidectomy gives no statistically significant benefit over simple myringoplasty in the treatment of non-cholesteatomatous



CSOM as regards graft success rate and dryness of the middle ear.

Our study emphasizes the fact that overall satisfactory hearing outcome with adequate air–bone closure can be achieved irrespective of cortical mastoidectomy in the surgical treatment of tubotympanic disease.

When considering the addition of a mastoidectomy to a myringoplasty, the performing surgeon should consider not only the potential added benefit but also potential risks and costs to the patient.

Author Contributions

Conceived and designed the experiments: LSE. Wrote the first draft of the manuscript: HMAT, FMG. Contributed to the writing of the manuscript: TMA. Agree with manuscript results and conclusions: LSE, HMAT, FMG. Jointly developed the structure and arguments for the paper: LSE, HMAT. Made critical revisions and approved final version: LSE, HMAT, FMG. All authors reviewed and approved of the final manuscript.

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