

**THE ROLE OF CORTICAL MASTOIDECTOMY IN MYRINGOPLASTY FOR
TREATMENT OF TUBOTYMPANIC CHRONIC OTITIS MEDIA IN ADULTS**

Ahmed Mohamed El-Shiekh*, Mohamed Fathy Ramadan, Mohamed Hussein and Wael Fawzy Esmail

Otorhinolaryngology Department, Al-Azhar Faculty of Medicine.

*Corresponding Author: Ahmed Mohamed El-Shiekh

Otorhinolaryngology Department, Al-Azhar Faculty of Medicine.

Article Received on 18/04/2017

Article Revised on 09/05/2017

Article Accepted on 01/06/2017

ABSTRACT

Background: there is no doubt that, surgical treatment of chronic suppurative otitis media is usually done by myringoplasty. However, the benefit of cortical mastoidectomy associated with myringoplasty remains a subject of debate. **Aim of the work:** to evaluate cortical mastoidectomy associated with myringoplasty in treatment of chronic suppurative otitis media. **Patients and methods:** seventy patients eligible for myringoplasty were randomly allocated to equal two groups: myringoplasty alone (M group) and myringoplasty associated with cortical mastoidectomy (MCM group). All patients were submitted to full history taking and otological examination, operated on dry ear via postauricular approach, temporalis fascia was put using the underlay technique. They were followed up for at least 6 months (the end point of the study). **Results:** both groups were comparable as regard to age, sex distribution, most common presenting symptom, preoperative, postoperative and air bone gap difference. Success of graft uptake was increased in MCM group (91.4%) versus M group (77.1%). But the difference was statistically non-significant. However, the dry ears were significantly increased in MCM group when compared to M group (91.4% vs 71.4% respectively). **Conclusion:** cortical mastoidectomy seems to express benefits when associated with myringoplasty as regard to dryness of ear at short-term follow up (6 months) and regard the rate of graft uptake success (but the difference was not significant). Future research on a wide number of patients with long-term follow up duration may finish the debate regarding cortical mastoidectomy associated with myringoplasty for chronic suppurative otitis media.

KEYWORDS: myringoplasty, tympanostomy, mastoidectomy, otitis media.**INTRODUCTION**

Chronic suppurative otitis media (CSOM) is an important health problem specific to human race. It is an inflammation of middle ear confined to the mucoperiosteal lining of the middle ear cleft (Mohan et al., 2015; Trinidad et al., 2016).

The surgical intervention for treatment of CSOM have changed greatly over time, from gouge and hammer to electric burns then microscopic and endoscopic surgery. However, the main purpose of the surgery is to ensure a dry ear with good hearing. Tympanoplasty with mastoidectomy (tympano-mastoidectomy) have been developed to be an effective treatment of chronic ear infection, but the mastoidectomy in patients without evidence of active infection remains highly debated (Kamath et al., 2013).

A debate between experienced otologists regarding the importance of mastoidectomy in the treatment of chronic non-cholesteatomatous otitis media is continuing. However, the use of mastoidectomy as a means for drainage of a complicated infection of the ear sparks

little controversy. However, the use of mastoidectomy to treat chronic non cholesteatomatous otitis media remains an issue of debate (Sagesh, 2014).

Some authors have advocated mastoidectomy in cases of chronic suppurative otitis media, refractory to maximal antibiotic therapy. They advocated mastoidectomy as they thought that, it is essential for the complete clearance of the disease process (McGrew et al., 2004). On the other hand, others thought that mastoidectomy is not just unnecessary in treating chronic noncholesteatomatous otitis media but also it increases patient risks with little or no significant clinical benefit (Mishiro et al., 2001). The third group of authors proposed that, cortical mastoidectomy is useful for infected ears, but not for dry ears (Mutoh et al., 2007).

The aim of the present study is to evaluate the effect of cortical mastoidectomy when associated with myringoplasty in treatment of non cholesteatomatous chronic suppurative otitis media. The outcome measurements were closure of air-bone gap and graft uptake.

PATIENTS AND METHODS

The present study was carried out at Al-Azhar University Hospitals, during the period from January 2014 to December 2016. It included 70 patients who were divided randomly into two equal groups. The first included 35 patients who underwent myringoplasty alone (M group), and the second included 35 patients who underwent myringoplasty with cortical mastoidectomy (MCM group).

Inclusion criteria: patient who fulfilled the following inclusion criteria was included in the present work: dry perforation for at least 2 months prior to surgery, age > 16 years, central perforation of tympanic membrane with or without conductive deafness.

Exclusion criteria: Patients were excluded from the study if their age ≤ 12 years, had wet ear at time of surgical intervention, had marginal or attic perforation of tympanic membrane, had cholesteatoma, sensorineural hearing loss, had otitis externa associated with otitis media, had previous mastoid surgery or had diabetes mellitus.

All eligible patients were submitted to thorough history taking (e.g., onset, course, disease duration, other symptoms, previous therapy, and past history of operations). Then, all patients were subjected to full physical and ENT examination, and all clinical findings were documented.

An informed consent was obtained after full explanation of the surgical intervention, the right of withdrawal was granted; and an ethical approval was obtained from the local ethics committee of Otorhino-laryngology Department ethical committee.

Preoperatively, pure tone audiometry was done for all participants, routine laboratory investigations were done, antibiotics were given, oral decongestants and nasal drops were given and continued for postoperative one week. Pure tone audiometry, as other outcome measures, was repeated 3 and 6 months postoperatively.

All participants were operated upon on a dry ear. All were operated via postauricular approach, temporalis fascia was put using the underlay technique. All patients were followed for at least 6 months after the operation.

Postoperative management: antibiotics were given for all patients for 10 days postoperatively. The first postoperative visit was on the 10th day, where ear dressing, packing, and skin sutures were removed. The patient was instructed to keep ear dry after removal of the dressing. Soframycin was applied by the patients to the postauricular incision twice a day for 1 week.

The second follow-up visit was one month later. Thereafter, the patient was monitored at 3 and 6 months

postoperatively and the only data at the 6 months was compared to preoperative data.

Good graft uptake was considered if there is no residual perforation seen after the end of follow-up period. Graft uptake and dryness were assessed using microscope and suction if required for cleaning.

Data analysis: collected data were organized, tabulated and statistically analysed by the means of IBM statistical package for social science (SPSS) software computer package, version 22 (IBM®SPSS® Inc., Chicago, USA) running on IBM-compatible personal computer. Data were presented using mean, and standard deviation for numerical variables and frequency and percentage for categorical variables. Comparison between groups was performed using independent sample student (*t*)-test for numerical variables and Chi-square or Fisher's exact test for categorical variable 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.

RESULTS

Patient characteristics and most common presenting symptoms were presented in table (1). The patient age ranged from 19 to 55 years and there was no significant difference between M and MCM groups regarding age (the mean age was 29.54 ± 8.43 in M group and 28.40 ± 8.01 in MCM group, *p* value > 0.05). In addition, the majority of studied subjects in both groups were males; as males represented 65.7% of M group and 57.1% of MCM group with no significant difference. The most common presenting symptoms were otorrhea reported in 82.9% and 74.3% of M and MCM groups respectively and hearing loss reported in 62.9% and 71.4% of M and MCM groups respectively.

In the present work, the preoperative air-bone gap ranged from 14 to 34 and there was no significant difference between M and MCM groups (22.62 ± 4.30 vs 22.80 ± 4.49 respectively). At 6 months postoperatively, the air bone gap ranged from 8 to 23 with no significant difference between M and MCM groups (15.45 ± 3.27 vs 14.22 ± 3.62 respectively), and there was no statistically significant difference of air-bone gap difference (preoperative – postoperative values) in MCM group when compared to M group (8.17 ± 1.59 vs 8.57 ± 2.14 respectively). On the other hand, in each of M and MCM groups, the air bone gap was decreased significantly at 6 months postoperatively when compared to preoperative values (table 2).

As regard to final outcome, the graft uptake was succeeded in 77.1% of M group compared to 91.4% in the MCM group. However, the statistical difference was not significant. On the other hand, dry ear at 6 months was reported in 71.4% of M group compared to 91.4% of MCM group, with statistically significant increase of dry ears in MCM group when compared to M group (table 3).

Table (1): patient characteristics of studied populations.

Variable		M group	MCM group	Test	P value
Age (mean \pm SD)		29.54 \pm 8.43	28.40 \pm 8.01	0.58	0.56(NS)
Minimum-maximum		20-52	19-55		
Sex (n,%)	Male	23(65.7%)	20(57.1%)	0.54	0.46(ns)
	Female	12(34.3%)	15(42.9%)		
Main presenting Symptom	Otorrhea	29(82.9%)	26(74.3%)	0.76	0.38(ns)
	Hearing los	22(62.9%)	25(71.4%)	0.58	0.44(ns)

Table (2): Preoperative and 6 months postoperative air-bone gap in studied populations

Variable		M group	MCM group	Test	P value
Preop. Air bone gap (mean \pm SD)		22.62 \pm 4.30	22.80 \pm 4.49	0.16	0.87(ns)
Minimum-maximum		15-32	14-34		
Postop(6m). Air bone gap (mean \pm SD)		14.45 \pm 3.27	14.22 \pm 3.62	0.27	0.78(ns)
Minimum-maximum		9-21	8-23		
Air bone gap decrease (mean \pm SD)		8.17 \pm 1.59	8.57 \pm 2.14	0.88	0.38(ns)
Minimum-maximum		6-12	3-13		
Paired comparison	Paired (t)	30.22	23.60		
	P value	<0.001*	<0.001*		

Table (3): Outcome success at 6 months postoperatively in studied populations

Variable		M group	MCM group	Test	P value
Graft uptake	Success	27(77.1%)	32(91.4%)	2.69	0.10(ns)
	Failure	8(22.9%)	3(8.6%)		
Dry ear	Dry	25(71.4%)	32(91.4%)	4.62	0.031*
	Wet	10(28.6%)	3(8.6%)		

DISCUSSION

The present work designed to investigate if cortical mastoidectomy play a role when associated with myringoplasty for treatment of chronic non-cholesteatomatous otitis media. Results revealed that, both groups were statistically comparable as regard to patient characteristics, pre- and post-operative air bone gap, air bone gap difference and graft uptake success. However, the group associated with cortical mastoidectomy had an increased rate of dryness at the end of the follow up period.

Mastoidectomy is a surgical procedure which may be used for neuro-otological intervention. Historically, it was first described in 1700s by Louis Petit. The procedure gained wide acceptance at 1958, and then cortical mastoidectomy was popularized by Willim House, in an attempt to avoid problems associated with radical mastoidectomy (Martin, 2008).

Reviewing literature, we can recognize some studies investigating the advantages and disadvantages of cortical mastoidectomy with myringoplasty. For example Mohan et al. (2015) observed that, air-bone gap closure in decibel was 15.1 db in tympanoplasty group, while it was 15.3dB in tympanoplasty with cortical mastoidectomy group. They added that, this air bone gap closure has no relation to the cortical mastoidectomy and was statistically non-significant. Our results are comparable to those reported by Mohan et al. (2015). However, our results revealed superiority of cortical

mastoidectomy in dryness of ear at 6 months postoperatively, the factor not evaluated in their study.

In addition, Abdel Tawab et al. (2014) reported that, their study confirmed the fact that overall satisfactory hearing outcome with adequate air-bone closure can be achieved irrespective of cortical mastoidectomy. These results are supported by the present work. However, they reported that, dryness of ear at 3 months postoperative revealed non-significant difference between both groups, and we found that cortical mastoidectomy was associated with significant increase of dry ear at 6 months postoperative. Good aeration of middle ear with pneumatization of mastoid may explain such results as reported by Jackler and Schindler in 1984 who examined 48 subjects with chronic otitis media with tympanic perforations who were treated by tympanoplasty with mastoidectomy and found that simple mastoidectomy was found to be an effective means of re-pneumatizing the sclerotic mastoid and restoring the hearing. In addition, Sheehy in 1985 recommended the performance of cortical mastoidectomy routinely for all tympanoplasties as it is a "good practice" and because its performance is better to be safe than sorry.

In another study, Albu et al. (2012) presented results of 320 adult patients treated by tympanoplasty with cortical mastoidectomy or tympanoplasty alone and they reported that, cortical mastoidectomy offer no additional benefit when accompany tympanoplasty for patients with persistent or intermittent discharging non-cholesteatoma CSOM. They found a dry period longer than 3 months

prior surgical intervention to be the only predictor of success.

On the other hand, Bhat et al. (2008) found that tympanoplasty with cortical mastoidectomy to be superior than tympanoplasty alone over a short period of follow up (3 and 6 months postoperatively). Our results are partially comparable to their results as regard to dryness of ear at the 6 months postoperatively.

On the other hand, McGrew et al in 2004 retrospectively evaluated 484 patients who underwent tympanoplasty with and without canal wall up mastoidectomy. They found that tympanic membrane repair was equally effective in both groups at 91%. However, they concluded that cortical mastoidectomy was not obligatory for successful restoration of simple tympanic membrane perforations. But, mastoidectomy impacted the clinical outcome in patients by decreasing the number of patients needing future interventions and by reduction of disease progression. This proposed that combining mastoidectomy with tympanoplasty during repair of simple perforations still reasonable option, and may be valuable in reducing the need for future surgery.

In 2001, Mishiro et al. studied 251 of non-cholesteatomatous chronic otitis media, 147 subjects treated by tympano-mastoidectomy and 104 treated by tympanoplasty alone. They reported no significant difference was observed between both groups.

Holmquist and Bergstrom (1978) were the first to propose that, cortical mastoidectomy could improve the successful tympanoplasty for patients with non-cholesteatomatous CSOM. They hypothesized that, creation of an aerated mastoid increases the success in patients with poor tubal function and small mastoid air cells system. Subsequently several other authors supported their theory, but none of them can prove it, and many suggested that, myringoplasty alone is equally beneficial (Jackson et al., 1985; Balyan et al., 1997).

In short, results of the present study revealed that, cortical mastoidectomy gives no statistically significant benefit over simple myringoplasty in the treatment of non-cholesteatomatous CSOM as regards graft success rate. However, it was superior in terms of dryness of the middle ear at 6 months follow up.

One limiting step of the present study is the small number of subjects included in the present study. We propose that, with larger number of subjects included in data analysis, myringoplasty with cortical mastoidectomy may be proved to be superior to simple myringoplasty. Thus, future research with sufficient number of patients is recommended. Such research may stop the continued debate over cortical mastoidectomy with myringoplasty.

REFERENCES

1. Abdel Tawab HM, Gharib FM, Algarf TM, Alsharkawy LS. Myringoplasty with and without Cortical Mastoidectomy in Treatment of Non-cholesteatomatous Chronic Otitis Media: A Comparative Study. *Clinical Medicine Insights: Ear, Nose and Throat*, 2014; 7: 19–23.
2. Albu S, Trabalzini F, Amadori M. Usefulness of cortical mastoidectomy in myringoplasty. *Otol Neurotol*, 2012; 33(4): 604–609.
3. Balyan FR, Celikkanat S, Aslan A, Taibah A, Russo A, Sanna M. Mastoidectomy in non cholesteatomatous chronic suppurative otitis media: is it necessary? *Otolaryngol Head Neck Surg*, 1997; 117: 592–595.
4. Bhat KV, Naseeruddin K, Nagalotimath US, Kumar PR, Hegde JS. Cortical mastoidectomy in quiescent, tubotympanic, chronic otitis media: is it routinely necessary? *J Laryngol Otol*, 2008; 10: 1–8.
5. Jackler RK, Schindler RA. Role of the mastoid in tympanic membrane reconstruction. *Laryngoscope*, 1984; 94(4): 495–500.
6. Jackson CG, Glasscock ME, Nissen AJ, Schwaber MK, Borjab DI. Open mastoid procedures: contemporary indications and surgical technique. *Laryngoscope*, 1985; 95: 1037–43.
7. Kamath MP, Suga S, Raghavendra R, Viny R. Success of tympanoplasty: our experience. *Indian J Otolaryngol Head Neck Surg*, 2013; 65(3): 358–362.
8. Martin MS. Mastoid surgery; chapter 115, In: Myers Otolaryngology Head and Neck Surgery, 2nd edition, Elsevier, 2008; 7–30; ISBN-13” 9781416024453
9. McGrew BM, Jackson G, Glascock ME. Impact of mastoidectomy on simple tympanic membrane perforation repair. *Laryngoscope*, 2004; 114: 506–511.
10. Mishiro Y, Sakagami M, Takahashi Y. Tympanoplasty with and without mastoidectomy for non-cholesteatomatous chronic otitis media. *Eur Arch Otorhinolaryngol*, 2001; 258: 13–15.
11. Mutoh T, Adachi O, Tsuji K. Efficacy of mastoidectomy on MRSA-infected chronic otitis media with tympanic membrane perforation. *Auris Nasus Larynx*, 2007; 34: 9–13.
12. Sagesh M. Evaluation of outcomes of tympanoplasties with and without cortical mastoidectomy. *Indian Journal of Otology*, 2014; 20(4): 178–182.
13. Sheehy JL. Surgery of chronic otitis media. In: English G ed. *Otolaryngology*, Revised ed. Vol 1. Philadelphia: Harper and Row, 1985; 1–86.
14. Trinidad A, Page JC, Dornhoffer JL. Therapeutic Mastoidectomy in the Management of Noncholesteatomatous Chronic Otitis Media: Literature Review and Cost Analysis. *Otolaryngol Head Neck Surg*, 2016; 155(6): 914–922.