Success of Myringoplasty: Our Experience

M. Panduranga Kamath · Suja Sreedharan ·
A. Raghavendra Rao · Vinay Raj · Krishnam Raju

Received: 23 February 2013 / Accepted: 26 March 2013 / Published online: 14 April 2013
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Abstract The purpose of this study is to compare the efficacy of myringoplasty with or without cortical mastoidectomy in terms of freedom from discharge, graft take up and improvement in hearing. This is a Clinical prospective study of 120 patients from among a group of patients with chronic suppurative otitis media. A detailed history and examination was conducted including pure tone audiogram. Patients were randomly divided into two groups; group A would undergo myringoplasty only and group B would undergo cortical mastoidectomy with myringoplasty. Patients were reviewed after 3 weeks for inspection of the operated ear. Second post-operative review was at 3 months for clinicoaudiological assessment. Group B was found to have slightly more improvement as compared to the other group. No significant difference in the success rates of graft take-up in patients with unilateral or bilateral disease was found. Higher take up rates were seen in large (91.83 %) and medium perforations (90.69 %). In all our failed cases, post-operative ear discharge continued to be a persistent and troubling problem. The average audiological gain was 12.88 dB in group B, whereas it was 12.40 dB in group A. The reduction of air bone gap within each group was found to be significant. There is no statistical significant data indicating that tympanoplasty with mastoidectomy yields better results. When considering the addition of a mastoidectomy to a Tympanoplasty, the performing surgeon should consider not only the potential added benefit but also potential risks and costs to the patient.

Keywords Cortical mastoidectomy · Myringoplasty · Temporalis fascia · Pure tone audiogram

Introduction

Chronic otitis media is an inflammatory process of the mucoperiosteal lining of the middle ear space and mastoid. The mucus membrane may be thickened by edema, sub mucosal fibrosis, and infiltration with chronic inflammatory cells. Infection of the middle ear has been a problem encountered in the human race, and is as old as humanity itself. Chronic middle ear disease is a major problem in India especially in the rural areas. It is estimated that 6 % of Indian population suffers from chronic ear disease [1]. This is significantly higher than the incidence reported in Western countries which is about 1.8 %. To complicate matters, in India, there is general lack of awareness of the disease per se and also regarding the complications of the disease. CSOM is a sequel of acute or unresolved otitis media, particularly in children with poor socioeconomic conditions, and usually presents within the first 5 years of life. In the presence of a preexisting perforation or ventilation tube dysfunction, infection may develop secondary to contamination from ear canal organisms or with an upper respiratory tract infection.

The surgical treatment of chronic suppurative otitis media is still controversial. It is well accepted that the main purpose of operation is to obtain a permanently dry ear and close the perforation. Traditionally, 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. The purpose of this study is

M. P. Kamath (✉) · S. Sreedharan · A. R. Rao · V. Raj · K. Raju
Department of ENT and Head & Neck Surgery, Kasturba Medical College, Manipal University, Mangalore, India
e-mail: kamathmp@yahoo.co.in

to compare the efficacy of myringoplasty with and without cortical mastoidectomy in terms of freedom from discharge, graft take up and improvement in hearing.

Materials and Methods

This was a randomised, controlled study undertaken in a tertiary referral, teaching hospital. It comprised a prospective study of two surgical procedures. The total study period was 4 years, from May 2008 to September 2012. One hundred and twenty patients who fulfilled the eligibility criteria were recruited into the study and randomly allocated into two groups. In group A, 60 ears underwent type one tympanoplasty only. In group B, 60 ears underwent cortical mastoidectomy together with type one tympanoplasty.

The inclusion criteria comprised (1) Patients of age group 10–60 years with chronic suppurative otitis media of the safe type; (2) Patients who had only conductive hearing loss. The intactness of the ossicular chain was confirmed by otoendoscopy and pure tone audiometry.

The exclusion criteria comprised the presence of the following: (1) Active discharge; (2) Patients with sensorineural hearing loss; (3) Immunocompromised status; (4) Ossicular discontinuity; (5) Patient with long standing history of allergy; (6) Presence of Cholesteatoma.

A detailed proforma was filled for each patient with regard to history, complete general physical, systemic and ENT examination. In all the patients a routine blood examination, X-ray mastoid, examination under microscope and pure tone audiometry were done. Eustachian tube function was assessed clinically.

Those patients with a predisposing focus of infection in the Nose and Para Nasal Sinuses were subjected to septal correction, endoscopic sinus surgeries and tonsillectomy to eliminate the foci of infection. Preoperatively all the patients who had CSOM-TTD had a discharge free period of 4 weeks.

All the cases were operated by senior consultants. 120 consecutive cases of chronic suppurative otitis media meeting the inclusion criteria were taken for the study, and the patients were randomly divided into each group. Group-A patients were treated with myringoplasty alone, whereas those in group-B were treated by cortical mastoidectomy with myringoplasty (Fig. 1). A mastoid dressing was applied and was kept for 1 week post operatively. Local antibiotic drops and antihistaminics were advised in all cases. Patients were reviewed after 15 days and 1 month, for inspection of the operated ear. Third post-operative review was done at 3 months for a clinico-audiological assessment of the operated ear to evaluate the graft status (Fig. 2) and hearing improvement. Post-operative audiogram was recorded on third visit.

Results

Only uncomplicated chronic suppurative otitis media with safe central perforation were included in our study. 120 patients completed this study. A total of 60 ears were considered in each group for the study. In group A (myringoplasty without mastoidectomy) there were 29 males and 31 females where as in group B (myringoplasty with mastoidectomy) there were 30 males and 30 females. Both the groups thus matched for the sex. 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.

The effect of unilateral or bilateral CSOM on graft take up rate was evaluated. A total of 72 unilateral cases and 48 bilateral cases were included in the study. The number of cases in each group are summarized in Table 1. The success rate for unilateral disease was found to be 84.72 %, whereas for bilateral disease it was 83.33 %. However, there was no statistically significant difference for the success rate based on laterality. Presence of bilateral ear disease at the time of myringoplasty did not seem to have an influence on the graft take up. The effect of perforation size on graft uptake was also evaluated. Patients with chronic suppurative otitis media tubotympanic disease, with large and medium perforations had better graft uptake, when compared with the remaining, as seen in Table 2. However there was no statistically significant difference in the graft take up rate.

Graft success rates were 80 % in group A and 88.33 % in group B. There was no statistically significant difference between group A and group B. There were totally 19 cases of graft failure, most of which presented after the second visit with complaints of ear discharge.

Table 1 Comparison of features between group A (myringoplasty) and group B (cortical mastoidectomy with myringoplasty)

Characteristics	Group A	Group B
Involved side (unilateral/bilateral)	35/25	37/23
Graft take up (%)	80	88.33

Table 2 Relationship between perforation size and graft take up

Size of perforation	No. of cases	Graft take up	Failures	Take up rate (%)
Small	7	5	2	71.4
Medium	43	39	4	90.69
Large	49	45	4	91.83
Subtotal	20	12	8	60
Total	1	0	1	0

Fig. 1 Mastoid cavity created

Fig. 2 Post operative graft in place

Table 3 Audiological benefits seen in the two groups

Audiological assessment	Myringoplasty	Cortical mastoidectomy with myringoplasty
Pre op hearing loss	34.69 ± 11.6	36.019 ± 11.87
Pure tone threshold 3rd month	23.82 ± 10.39	24.06 ± 11.02
Benefits in decibel	11.45 ± 5.53	11.83 ± 5.93
<i>P</i> value for comparison within the group	<0.001	<0.001

There was a mean reduction of air conduction threshold from 34.69 ± 11.6 to 23.82 ± 10.39 dB in group A and from 36.019 ± 11.87 to 24.06 ± 11.02 dB in group B. The reduction of air conduction thresholds in each group was significant. ($P < 0.001$). However, there was no significant difference in the air conduction thresholds achieved post-operatively between the two groups as seen in Table 3.

Discussion

Myringoplasty or type I tympanoplasty 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. The primary argument in favor of mastoidectomy has been an improvement in the middle ear and mastoid environment through clearance of diseased secretory mucosa, and the ventilator mechanisms of an open mastoid system. The mastoid air cell system is thought to function, at least in part, as a buffer to changes in pressure within the middle ear. According to Boyle's law, an increase in the volume available to middle ear space through a surgically opened mastoid would be protective for the tympanic membrane in response to middle ear pressure changes. Thus failure to create a pneumatized air cell system in a patient with non cholesteatomatous chronic otitis media may very well increase the chance of surgical failure.

Wehrs and Tulsa [2] in 1981 observed that, in order to achieve a good hearing result following tympanoplasty, it is necessary to maintain an aerated middle ear space. Poor Eustachian tube function is most commonly blamed in cases of failure to obtain an aerated middle ear following tympanoplasty. Although this may be true in some cases, middle ear adhesions, loss of support of the posterior canal wall and inadvertent blockage of the Eustachian tube orifice by graft material may be contributing factors. Aeration of the mastoidectomy cavity is also important to prevent collapse of the posterior canal wall, retraction pockets and ensure an adequate air reserve.

Jackler and Schindler [3] 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 eradicating mastoid sources of infection. The study concluded that simple mastoidectomy is a safe and useful adjunct to myringoplasty, in selected cases.

Literature is also replete with studies in favour of tympanoplasty without mastoidectomy. In 1997, Balyan et al. [4] did a retrospective study of 323 patients to evaluate role of mastoidectomy in non cholesteatomatous chronic suppurative otitis media. They observed no statistically significant difference in terms of graft success rates, or hearing outcome when mastoidectomy was done. They also concluded that success rates were similar for both dry and discharging ears. They concluded that mastoidectomy does

not give a better chance for graft success rate and functional hearing results, but it adds extra effort and risk.

Mishiro et al. [5] in 2001 reviewed 251 cases of non-cholesteatomatous chronic otitis media, to determine whether mastoidectomy is helpful when combined with tympanoplasty for these conditions. 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. There was no statistically significant difference between graft success rate in discharging ears and dry ears. They concluded that mastoidectomy is not helpful in tympanoplasty for non-cholesteatomatous CSOM, even if the ear is discharging.

Pignataro et al. [6] in 2001 conducted a retrospective study to assess the results of myringoplasty in children, and determine the factors influencing post-operative results. 41 myringoplasty in children was performed, considering only the cases of uncomplicated perforation that did not require ossiculoplasty or mastoidectomy. There was a significant statistical association between the presence of a dry ear at the time of surgery and good surgical results. Surgical outcome was not affected by the patient's age, the site and size of the perforation, previous adenoidectomy, surgical technique (overlay vs. underlay), or the status of the contralateral ear. They concluded that myringoplasty is a valid procedure in the pediatric population that gives good anatomical and functional results. Also it was found that the status of the middle ear, significantly improves surgical outcome.

McGrew et al. [7] in 2004 conducted a retrospective study of patients at a tertiary referral centre, where four hundred and eighty-four 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 membrane perforation repair, with and without canal wall up mastoidectomy. They found that tympanic membrane repair was equally effective in both groups at 91 %. Hearing results were comparable. 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.

A single-blinded, randomized, controlled study within a tertiary referral hospital was conducted by Bhat et al. [8] in 2008, to compare outcomes for mastoidotympanoplasty and for tympanoplasty alone in cases of quiescent, tubotympanic, chronic, suppurative otitis media. There were no statistically significant differences in hearing improvement, tympanic perforation closure, graft uptake or disease eradication, comparing the two groups at 3 and 6 months post-operatively. Mastoidotympanoplasty was not found to be superior to tympanoplasty alone over a short-term follow-up period.

In 2012 Albu et al. [9] presented a paper of three hundred twenty consecutive adult patients treated by either myringoplasty with cortical mastoidectomy or myringoplasty only. He found that three factors were significant in predicting success rate i.e. healthy opposite ear, a long dry period preceding the operation and nonsmoker 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.

There has been little controversy over the importance of non mastoid factors like eustachian tube dysfunction, general debility, in tympanic membrane reconstruction. But the 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. 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 tympanoplasty, the performing surgeon should consider not only the potential added benefit but also potential risks and costs to the patient. This study gives evidence that mastoidectomy performed in noncholesteatomatous CSOM does not give a better chance for graft success rate and functional hearing results, and is beneficial only in case of hidden mastoid infection.

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