Comparative Study of Outcome of Endoscopic Myringoplasty in Active and Inactive Mucosal Chronic Otitis Media Patients

Mohd. Tasleem¹ · A. Rahman¹ · M. Aslam¹

Received: 18 November 2016 / Accepted: 4 April 2017 / Published online: 6 April 2017
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Abstract The objective of this study was to compare graft uptake and hearing improvement in active and inactive mucosal chronic otitis media patients after endoscopic myringoplasty. This is prospective study conducted at a government medical college and hospital from February 2014 to August 2015. A total of 40 active (wet) ears with mucoid discharge and 40 inactive (dry) ears (at least 6 weeks dry before surgery) with mucosal chronic otitis media were operated on by endoscopic myringoplasty by transcanal approach. Graft uptake and hearing gain rates 3 months after surgery were compared for both groups. Endoscopic myringoplasty using temporal fascia graft via transcanal approach was used. The graft take rate was 77.5% for the active ear group and 85% for the inactive ear group. The hearing gain rate was 82.5% for the inactive ear group and 72.5% for the active ear group. Differences were found to be statistically insignificant for both graft uptake and hearing gain. The success of endoscopic myringoplasty is not adversely affected by the presence of mucoid ear discharge at the time of surgery, and outcomes are comparable to those of the operation done for inactive ear.

Keywords Myringoplasty · Otitis media · Tympanic membrane · Chronic otitis media

Introduction

Chronic otitis media (COM) is a very common ear disease for which patients attend otolaryngology clinic. Most of these patients present with actively discharging ear. In this situation the surgeon is in dilemma to operate the patient or not as previously it was thought that the success rate of myringoplasty in actively discharging ear is much lower than that of inactive dry ear.

COM is an inflammatory process in the middle-ear space that results in long-term, or more often, permanent changes in the tympanic membrane including atelectasis, dimer (formerly “monomer”) formation, perforation, tympanosclerosis, retraction pocket development or cholesteatoma. Primary symptom of COM is conductive hearing impairment, but patients may also present with otorrhea, aural fullness, pulsatile tinnitus, and otalgia [1].

Myringoplasty is a common otological procedure indicated in mucosal chronic otitis media [2]. Myringoplasty was first introduced by Berthold [3] in 1878, who used a thick skin graft, while Wullstein [4] and Zollner [5] further developed the procedure and used a split skin graft. By the 1980s, most otologists were convinced that a graft of mesodermal origin, such as perichondrium, fat tissue, fascia, or vein was advantageous in myringoplasty [6].

Endoscopy in middle ear surgery has been described since several years, and endoscopes have been used for surgery of chronic otitis media since more than two and half decades [6–8]. Transcanal tympanoplasty can be performed with both microscope and endoscope, but postaural approach is traditionally used with microscopic ear surgery. Controversy exists about the condition of the middle ear as a prognostic factor in myringoplasty. The aim of this study is to compare the outcome of endoscopic myringoplasty in active and inactive ears.

✉ A. Rahman
abdurrahman6034@gmail.com

¹ Department of Otorhinolaryngology, JNMCH AMU, Aligarh, India

Materials and Methods

The study was a prospective, randomized comparative study carried out from February 2014 to August 2015. The patients were selected from the ENT OPD and ENT WARD after proper history and examination.

The study included 80 patients in which 40 had inactive ear (dry for last 6 weeks prior to surgery) and 40 had actively discharging ears with mucosal chronic otitis media, who underwent endoscopic myringoplasty.

Only the patients with central perforation, patent Eustachian tube, adequate cochlear reserve and mild to moderate hearing loss between 15 and 45 years of age were included in the study.

The patients with sensorineural deafness and those having systemic disease such as hypertension, diabetes mellitus, tuberculosis, bronchial asthma were excluded from the study. Pregnant female and patients having evidence of active infection in nose, throat and paranasal sinuses were also excluded.

These selected patients were subjected to clinical, audiological, radiological and laboratorial investigations. After detailed history of the patient general and systemic examination was done including examination of nose throat and paranasal sinuses to rule out any chronic infection or allergy.

Clinical otological examination included otoscopy, examination under microscope and hearing evaluation by tuning fork tests and pure tone audiogram with proper masking. Radiological examination like X-ray mastoids, X-ray paranasal sinuses and X-ray chest was advised wherever required. Rest routine blood investigations were also done preoperatively.

Myringoplasty was done in all patients using 0° and 30° 2.7 mm rigid endoscopes and exclusive transcanal approach with temporalis fascia harvested from a separate supra-auricular hairline incision. The endoscope was held in the left hand and instruments in the right. No endoscope holder was used. Cases in which X-ray mastoid showed sclerotic or partially sclerotic pneumatization, cortical mastoidectomy were performed. Postoperatively all the patients were put on intravenous antibiotics, analgesics, antihistamines and topical nasal decongestants.

Mastoid bandage and stitches were removed after 7 post-op days. At follow-up, patients were observed for graft uptake and complications, if any, at 2, 4, 6 weeks and 3 month after operation. Audiological assessment by pure tone audiometry was done at 3 month post-op period and hearing improvement was recorded in terms of improvement in air-bone conduction gap.

Post-op gain in hearing was taken as 0 dB in graft failure patients. Success in terms of hearing improvement

was taken when improvement in air-bone conduction gap was at least 5 dB.

Results

Patients between age group 15–45 years of age were included in this study. Maximum patients in our study were between 15 and 25 years of age. A total of 62 (77.5%) patients out of 80 cases were in 15–25 years age group.

In the inactive (dry) ear group, maximum 15 (37.5%) patients were between age group 15–20 years, and minimum 2 (5%) patients were in age group 41–45. In the active (wet) ear group maximum 21 (52.5%) patients were in 15–20 age group and minimum 1 (2.5%) patients were in 41–45 age group (Table 1). In our study numbers of female patients outnumbered male patients. There were total 35 males (43.75%) and 45 females (56.25%) out of 80 patients.

Most of the patients (34 out of 80) in this study had duration of disease between 6 and 10 years. Moreover bilateral ear perforation was more common, observed in total 32 (40%) patients out of 80. Medium size perforation was observed more commonly in both active and inactive ear groups.

In all patients, preoperative hearing impairment was assessed by measuring the average of A–B gap (air conduction–bone conduction gap) at 500, 1000, 2000 and 4000 Hz with the help of pure tone audiometry.

On assessment of pre-op hearing impairment in all 80 COM patients it was found that maximum 35 (43.7%) patients had impairment in the range of 21–30 dB, while minimum 5 (6.25%) patient had >40 dB of hearing loss (Table 2).

In this study, persistent discharge; residual perforation and re-perforation of the graft at the 3 month post-op period, were considered as graft failure.

Overall successful graft uptake was achieved in 65 (81.25%) out of 80 patients and graft failure occurred in 15 (18.75%) patients (Table 3).

In our study, post-op gain in hearing was taken as 0 dB in graft failure patients and success in terms of hearing improvement was taken when hearing gain was at least 5 dB. Hearing improvement was achieved in 33 (82.5%) patients of inactive ear group and in 29 (72.5%) patients of active ear group. While 7 (17.5%) patients in inactive ear group and 11 (27.5%) patients in wet ear group had no improvement in hearing.

Successful graft uptake in inactive ear group was seen in 85% patients and graft failure was seen in 15% patients, while in active ear group success rate of graft uptake was 77.5% and graft failure was 22.5%. The difference in

Table 1 No. of patients on the basis of age group

Age group (in years)	Inactive (dry) ear N (%)	Active (wet) ear N (%)	Total N (%)
15–20	15 (37.5%)	21 (52.5%)	36 (45%)
21–25	13 (32.5%)	13 (32.5%)	26 (32.5%)
26–30	4 (10%)	1 (2.5%)	5 (6.25%)
21–35	4 (10%)	3 (7.5%)	7 (8.75%)
36–40	2 (5%)	1 (2.5%)	3 (3.75%)
41–45	2 (5%)	1 (2.5%)	3 (3.75%)
Total	40 (100%)	40 (100%)	80 (100%)

$p = 0.61$

Table 2 Pre-op hearing impairment (in terms of A–B gap)

Hearing impairment	Inactive (dry) ear N (%)	Active (wet) ear N (%)	Total N (%)
≤20 dB	8 (20%)	4 (10%)	12 (15%)
21–30 dB	18 (45%)	17 (42.5%)	35 (43.75%)
31–40 dB	11 (27.5%)	17 (42.5%)	28 (35%)
>40 dB	3 (7.5%)	2 (5%)	5 (6.25%)
Total	40 (100%)	40 (100%)	80 (100%)
$p = 0.41$	Mean (SD) 28.84 (7.92) dB	Mean (SD) 29.91 (5.75) dB	

Table 3 Hearing improvement (gain in A–B gap) after surgery

Hearing gain	Inactive (dry) ear N (%)	Active (wet) ear N (%)
0–5 dB	7 (17.5%)	11 (27.5%)
6–10 dB	3 (7.5%)	4 (10%)
11–15 dB	9 (22.5%)	5 (12.5%)
>15 dB	21 (52.5%)	20 (50%)
	40	40
p value =0.50	Mean (SD) 14.45 (9.60) dB	Mean (SD) 17.19 (10.06) dB

successful graft uptake between two group was statistically non-significant ($p = 0.568$) (Table 4).

In inactive ear group, mean pre-op A–B gap was 28.84 ± 7.92 dB while the mean post-op A–B gap was 15.09 ± 9.60 dB and the difference in the mean A–B gap between the two groups was statistically highly significant ($p < 0.0001$). In active ear group, mean pre-op A–B gap was 29.91 ± 5.75 dB while the mean post-op A–B gap was 17.19 ± 10.06 dB and the difference in the mean A–B gap between the two groups was statistically highly significant ($p < 0.0001$).

Mean pre-op hearing impairment was 28.84 ± 7.92 dB in active ear and 29.91 ± 5.75 dB in inactive ear. Difference of mean pre-op hearing impairment between inactive and active ear group was found statistically non-significant ($p = 0.49$).

Mean post-op hearing improvement in inactive ear group was 14.39 ± 7.98 dB and in the active ear group was 12.72 ± 8.68 dB. The difference of hearing improvement between the two groups was statistically insignificant ($p = 0.374$) (Table 5).

Discussion

Myringoplasty is a safe and effective technique to improve the quality of life of patients, avoiding continuous infections and allowing them contact with water. Ideal candidates for myringoplasty should have central perforation with normal middle ear mucosa, intact ossicular chain and good cochlear reserve.

In the present study, the variables of age, sex, and site and size of the perforation showed no significant differences between both groups. Also, we used the same approach, graft material, and technique for both groups; so, we believe that both groups are broadly comparable. Graft uptake rates for microscopic myringoplasty using temporalis fascia graft in an underlay technique have been variously described as between 80 and 95% by various authors [9, 10]. Similar graft uptake rates have been described in endoscopic myringoplasty using temporalis fascia [6].

Patients with active ear may present with ear discharge (mucoid or mucopurulent) or only edematous middle ear mucosa, and to make the group of active ears homogeneous, we included only patients with mucoid ear discharge.

Our outcomes for both groups fall within the range of successful myringoplasty rates described in the literature as regards graft intake (71–96%) and postoperative hearing improvement (72–97%) [11, 12]. One big series conducted by Mills et al. [11] has reported a success rate of 82 and 83% for myringoplasty in active and inactive ears, respectively. A meta-analysis done by Vrabec et al. [13] considering the effect of otorrhea on closure rate indicates that tympanoplasty on a discharging ear is as successful as in a dry ear. The 2 previously mentioned studies defined wet ear as an ear that is actively discharging and did not describe the nature of the discharge.

In a comparative study, Nagle et al. [14] included only patients with mucoid discharge in the wet ear group and achieved a primary complete graft uptake rate of 88 and 74% in dry and wet ears, respectively. They did not find this difference to be statistically significant, but the p value

Table 4 Number of patients with successful graft uptake

Graft uptake	Inactive ear N (%)	Active ear N (%)	Total N (%)
Uptake	34 (85%)	31 (77%)	65 (81.25%)
Failure	06 (15%)	09 (22.5%)	15 (18.75%)
Total	40 (100%)	40 (100%)	80 (100%)

$p = 0.568$ (non-significant)

Table 5 Comparison of hearing improvement in dry and wet ears

Type of ear	A–B gap improvement [Mean (SD)]	Significance
Dry ear (N = 40)	28.84 (7.92)–14.45 (9.60) 14.39 (7.98) dB	$p = 0.374$ (nonsignificant)
Wet ear (N = 40)	29.92 (5.75)–17.19 (10.06) 12.72 (8.68) dB	

was approaching the significance value ($p = 0.07$). Also, no statistical significance was found regarding hearing improvement in the two groups.

Contrary to our study Gersdorff et al. [15] and Pignataro et al. [16] found a better outcome when operating on a dry ear, and both recommended medical treatment of discharging ears to control the inflammatory changes before myringoplasty.

Noh and Lee [17] evaluated the vascularization time of the grafted temporalis fascia and tragal perichondrium in active and inactive mucosal chronic otitis media and found that there is no significant relationship between vascularization time of the graft and the status of middle ear mucosa (dry vs. wet).

Conclusion

Presence of mucoid discharge which is culture negative at the time of surgery is not a contraindication for surgery as it does not interfere much with the result of myringoplasty. There is no significant difference in the success rate in both inactive ear and culture negative active ear in our study.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Human and Animal Rights Statement All procedures performed in the study 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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