Prospective study of myringoplasty using different approaches

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Abstract

Background Myringoplasty is one of the various surgical techniques for the management of chronic suppurative otitis media of tubotympanic type (CSOM-TT). The presence of a perforation of tympanic membrane with intermittent discharge and hearing loss of conductive nature are the indications of myringoplasty. Myringoplasty can be performed by any of the three approaches, i.e. permeal, endaural, or post-aural. It is a beneficial procedure done for closing tympanic membrane perforation and improving hearing.

Objective The aim of this study was to evaluate and compare different approaches of myringoplasty and various factors influencing surgical outcome.

Materials and methods Myringoplasty was done in 90 cases of tympanic membrane perforation with temporalis fascia graft by underlay or onlay technique through one of the three approaches, i.e. permeal, endaural and post-aural.

Results The overall success rate in this study was 81.11% with majority of patients had improvement in hearing. Statistically there was no significant difference in results with different approaches. Age, sex, site, size and duration of disease had no bearing on graft take in this study.

Conclusion In repairing tympanic membrane perforations similar success rates are achieved with postaural or endaural approaches. A permeal approach is most limited in the exposure obtained. What is important in choosing the appropriate approach is the location and size of the perforation and size of external auditory canal.

Keywords CSOM · Myringoplasty · Approach · Permeal · Endaural · Postaural

Introduction

Chronic suppurative otitis media continues to be a major otological problem accounting for a large number of out-patient cases in our country. Patients suffering from chronic suppurative otitis media of tubotympanic type with permanent perforation syndrome are handicapped not only because of hearing loss but also from recurrent otorrhoea. Myringoplasty is one of the various surgical techniques for the management of CSOM-TT disease. It is defined as simple surgical repair of a tympanic membrane perforation without ossicular reconstruction. The aim of the operation includes perforation closure with a dry stable grafted membrane and improvement in hearing levels.

The concept of surgical repair of tympanic membrane perforation was started by Berthold (1878) [1], with thick skin graft by overlay technique. Wullstein [2], and Zollner [3], rediscovered the procedure using split skin grafts. Since then different techniques and graft materials have been used. Grafting the tympanic membrane with autologous temporal fascia helps in restoration of its integrity as fascia is a thin, non-shrinking and a tissue with low metabolic rate resembling tympanic membrane in texture and structure. Both the techniques overlay and underlay have been used with variable success.

Surgical procedures on middle ear cavity can be undertaken by permeal, endaural or post aural approach. Each approach has its own advantages and disadvantages. The aim of this study was to evaluate and compare different approaches of myringoplasty and to study practical difficulties encountered in operative procedures, success rate and complications associated with these approaches. Hearing improvement after myringoplasty and various factors influencing surgical outcome were also studied. As myringoplasty is a common surgical procedure so analysis of these factors will certainly help in future selection and care of patients.

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Table 1 Age and sex distribution

Age in years	Male	Female	Total
15–24	26 (28.89%)	18 (20.00%)	44 (48.89%)
25–34	04 (4.45%)	22 (24.44%)	26 (28.89%)
35 & above	05 (5.56%)	15 (16.67%)	20 (22.22%)
Total	35 (38.89%)	55 (61.11%)	90 (100%)

Table 2 Duration of ear discharge

Duration in years	No. of cases	% age
0–2	21	23.33
3–5	15	16.67
6–10	25	27.78
>10	29	32.22
Total	90	100

Table 3 Site of perforation

Quadrant involved	No. of cases	% age
Anterior	14	15.56
Posterior	14	15.56
Inferior	34	37.78
All the Quadrants	28	31.10
Total	90	100

Table 4 Air bone gap in speech frequencies

Air bone gap	No. of cases	%age
25–35	33	36.66
36–45	57	63.34
Total	90	100

Table 5 Graft take vs approach

Approach	No. of Patients	Graft taken up	%age of graft take
Permeatal	30	22	73.33
Endaural	30	25	83.33
Post-aural	30	26	86.66
Total	90	73	81.11

Table 6 Statistical analysis

Approach	X ²	DF	P value	Significance
Permeatal vs Endaural	0.883	1	>0.05	NS
Permeatal vs Post-aural	1.666	1	>0.05	NS
Endaural vs Post-aural	0.130	1	>0.05	NS
All three Approaches	1.885		>0.05	NS

Materials and methods

In this prospective study, 90 cases (30 each for either approach) of either sex who fulfilled the standard criteria of myringoplasty, i.e.

1. Central or subtotal perforation with dry ear having duration of at least 6 weeks.
2. Intact ossicular chain.
3. Mild to moderate conductive hearing loss.
4. Normal/Good Eustachian tube and cochlear function.

Cases were selected from Department of ENT, Rajindra Hospital Patiala during the period 2000–2001. A thorough history, clinical, audiological and radiological examination was carried out. Patients having a history of previous ear surgery were excluded. The preoperative examinations included ear, nose and throat examination, and otoscopic examinations of both ears. The external auditory meatus and the tympanic membrane were examined and site of the perforation was noted. The tuning fork test was performed with a frequency of 512 Hz. Audiometric examinations were performed using a clinical audiometer and pre-operative A-B gap were calculated by taking the averages of bone conduction and air conduction at the frequencies of 500, 1000 and 2000 Hz.

The patients were examined under microscope prior to surgery. Examination under microscope was done of the ear to be operated. This was carried out with a speculum under the operating microscope to reliably assess the tympanic membrane, site of the perforation, to rule out any other pathology and to assess the status of ossicular chain. All the cases were operated under local anaesthesia using 2% xylocaine with 1:100000 adrenaline.

The temporalis fascia graft was harvested by a separate incision in cases where permeatal approach was used for myringoplasty. In cases where endaural approach or postaural approach was used for myringoplasty, the incision was extended upwards to harvest the temporalis fascia graft. Under operating microscope myringoplasty was performed by underlay technique. Small pieces of gelfoam impregnated with Beclate-N ointment were placed over the graft and over the reposed skin of external auditory canal. A thin roller gauze impregnated with Beclate-N ointment was placed over it in the external auditory canal and usual mastoid dressing was done. Stitches were removed after 1 week and pack was removed after 2 weeks. Patients were observed for graft take and complications, if any 3 weeks, 6 weeks and 12 weeks after operation. Assessment of hearing was done by tuning fork tests and pure tone audiometry 6–12 weeks after surgery.

Observation and results

Myringoplasty was done in 90 cases of tympanic membrane

Fig. 1 Age and sex distribution

Fig. 2 Showing surgical success rate with different approaches

perforation with temporalis fascia graft by underlay or onlay technique through one of the three approaches i.e. permeatal, endaural and post-aural. Most of the cases presented in the second and third decade of the life i.e. 77.78% with youngest being 15 years old (Table 1, Fig. 1). The dominant etiological factor of tympanic membrane perforation was infection (94.45%) while in five patients trauma was the causative factor. 60% of patients had long duration of disease (5–10 or more years) (Table 2). There was not much difference about the involvement of side of the ear. In 35.56% cases bilateral involvement was present. Perforation of tympanic membrane was either sub-total or involved one or both inferior quadrants in majority of the patients. (Table 3)

Audiometry for pure tone in speech frequencies i.e. 500Hz, 1000Hz, 2000Hz revealed an air bone gap of 26–35db in 36.66% of cases. This group of patients had small sized perforation and duration of illness ranging from

2–5 years. The patients with larger size of perforation had an air bone gap of 36–45 db. (Table 4). Site of perforation did not have a consistent effect on hearing loss.

Discussion

The study consisted of 90 patients with 61.11% female patients who underwent myringoplasty by either of the three approaches, i.e. permeatal or transcanal approach, endaural approach or post-aural approach.

Permeatal approach

Thirty cases were operated upon using permeatal or transcanal approach. The advantage of this approach lies in that it was an easy approach. There were no scar marks on the pre-auricular or post auricular areas. Only small incision was required separately to harvest temporalis fascia graft. This approach was excellent for small central perforations and also in acute traumatic perforations. But this approach was suitable in only those cases that had wide external auditory canal, wide enough to allow complete visualization of perforation. Site of perforation was also an important factor. It was found to be suitable for central and posterior segment perforations. This approach was found to be unsuitable for large perforations and anterior perforations that were obscured by anterior overhang of canal wall. Difficulty was encountered while placing the graft in this approach.

Endaural approach

Endaural approach was used in performing myringoplasty in thirty cases of perforated tympanic membrane. Endaural approaches require less time than postaural approaches. This approach gave more anterior surgical view than the permeatal approach. This approach was found suitable for posterior segment perforations, large central perforations and some anterior perforations. But for more anterior perforations, this approach was excellent for all other perforations. Canalplasty was required in some cases to get the proper surgical view of perforation. Temporalis fascia graft was harvested by extending the incision superiorly. The placing of graft was also easy with this approach. The drawback of this approach was anterior margin of perforation present in the anterior quadrant could not be reached. Other disadvantage was the scar mark in the preauricular area.

Postaural approach

Postaural approach was used for myringoplasty in thirty cases in this study. The temporalis fascia graft was harvested by extending the incision superiorly. This approach provided

complete exposure of the anterior edge of the tympanic membrane. This approach provided excellent surgical view for the closure of perforated tympanic membrane. The placing of graft after raising tympanomeatal flap was easy with this approach. Difficulty was encountered in some posterior segment perforations. Granulations of external auditory canal and granuloma formation were found in some patients where this approach was used.

Surgical success rate

The criterion of success applied was the restoration of an intact functional tympanic membrane with no evidence of middle ear disease and improvement in hearing. Based on this fact, 73 (81.11%) patients had successful myringoplasty. The success rate associated with various approaches i.e. permeatal, endaural and post-aural approach was 73.33%, 83.33% and 86.66% respectively. (Table 5, Fig. 2 Showing surgical success rate). The statistical analysis between permeatal and endaural approach, permeatal and post-aural approach, endaural and post-aural approach showed no significant difference. Improvement in hearing was variable. (Table 6). The narrowing of air bone gap was 25–30 db. in 22.22% cases whereas in another 46.67% cases air bone gap narrowed by 16–25 db.

The post-aural approach has been shown to be superior to a permeatal approach by Sheehy and Anderson, (1980); and Shelton, (1985) [4,5]. Saeed A.Al-Ghamdi (1994) [6] in their study, had myringoplasty operation done by post-aural approach in 82 cases and by permeatal approach in 101 cases. The overall success rate was 73.2%. Comparison between two approaches failed to show any significant difference. Quraishi and Jones (1995) [7], compared myringoplasty operation done by permeatal approach with myringoplasty done via endaural or post-aural approach. No significant difference could be found ($p > 0.05$) in these two groups.

There was no relation of graft take [8], to the age and sex of the patient in our study. The size of the perforation has been studied for its significance in the final outcome of surgery. In this study, the size of perforation was thought to be a factor that may influence the success rate. However, statistical analysis showed no significant difference in success rate between large and small perforations ($p > 0.10$).

Problems may arise with perforations located anteriorly and reaching the annulus. These problems can be overcome with improved techniques. Many authors have found no relation between site of perforation and graft take rate. In this study also there was no statistically significant difference in the final outcome. Presence of bilateral perforation had adverse effect on the success rate for graft take.

Conclusion

Myringoplasty is a beneficial procedure done for closing tympanic membrane perforation and improving hearing. It can be done by any of the three approaches depending upon the size and site of perforation. For permeatal approach the external auditory canal should be wide for proper exposure of the perforation. In repairing tympanic membrane perforations most studies report similar success rates achieved with postaural or endaural approaches. Endaural approaches require less time than postaural approaches but do not give as good exposure for anterior perforations. A permeatal approach is most limited in the exposure obtained. What is important in choosing the appropriate approach is the location and size of the perforation and size of external auditory canal.

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