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Original Article

Prognostic factors influencing anatomical and functional outcome of Myringoplasty

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Abstract

Objective: To assess the rate of healing of tympanic membrane, hearing status before and after operation and determine the factors influencing surgical outcome.

Methods: This cross-sectional study was done in the department of Otolaryngology & Head-Neck Surgery of SSMC & Mitford Hospital, Dhaka, during the period of January, 2008 to December, 2009. A total of 60 patients was underwent myringoplasty operation and taken detailed history, clinical findings and post operative assessment. Analyzed data presented by various tables, graphs and figures.

Results: The study included 60 patients of myringoplasty operation. Age of the patient was between 15-45 years. Out of 60 patients male was 60% and female was 40%. Highest number of patients was in the age group of 15-25 years.

Conclusion: Hearing improvement after myringoplasty in anatomically successful cases improve quality of life of the patient.

Key words: *Myringoplasty; Hearing improvement*

Introduction

Chronic otitis media (COM) implies a permanent abnormality of the pars tensa or flaccida, most likely a result of acute otitis media, negative middle ear pressure or otitis media with effusion. Chronic otitis media equates with classic term 'suppurative' otitis media that is no longer advocated as COM is not necessarily a result of 'the gathering of pus'. However the distinction remaining between active COM where there is inflammation and production of pus and inactive COM, where this is not the case though there is the potential for the ear to become active at some time. A third clinical entity is healed COM where there are permanent abnormalities of pars tensa but the ear does not have the propensity to become active because the pars tensa is intact and there are no significant retraction of the pars tensa or flaccida[1] .

In Bangladesh, chronic otitis media (COM) is a common disease in clinical practice. Poor living condition, overcrowding, poor hygiene, malnutrition, lack of health education and inadequate health care all have been suggested as a basis for the widespread prevalence of chronic otitis media in our country. It is the single most important cause of hearing impairment in rural population.

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Hearing loss arising from COM is a matter of serious concern because of its long term effects on communication, language development and educational process.

There is a significant quantitative correlation between the size and site of perforation and hearing loss, but this relationship is not constant and consistent in clinical practice seemingly identical perforation in size and location produce different degree of hearing loss.[2] Small perforations (10% of the membrane) produce losses of 10-15 dB below 3 KHz. Large perforations produce severe losses over the whole range particularly at higher frequencies, through these perforations the sound waves act directly on the round and oval windows. Small and moderate perforations (10-40% of the area) have far more severe effects when placed on the posterior and superior part of the membrane than when placed on the anterior and inferior part [3] However, non-marginal perforation with intact ossicular chain hearing loss is approximately 10-30 dB. The predominant hearing loss in mucosal disease is conductive in nature but a few cases of sensorineural hearing loss is also found.[4]

Many factors influence the surgical outcome of myringoplasty. The reported success rate is therefore variable, partly because of differences in the inclusion and exclusion criteria. In a study the overall success rate of myringoplasty was 86%. Posterior and inferior perforations had a 90% success rate for repair, compared to only 67% of anterior perforations.[5] This was due to poor access to anterior perforations and better tissue perfusion in the posterior part. The success rate of sub-total perforation closure (92.5%) was as good as the closure rate for small perforations (94.1%)[6] . But the poorer results were seen in younger patients. Vrabec et al.[7] found better success rate with advancing age. This is due to lower incidence of upper airway infections and better Eustachian tube function in later age and the relative immaturity of immune system in younger children. Caylon et al[8] found no statistical difference between two groups. No significant difference was found when comparing the two surgical techniques of overlay and underlay, the success rate was 79.1% in the former and 83.2% in the later[9]. When hearing improvement was the main indication for surgery it was improved in 67%.

Methods

Total 60 patients who underwent myringoplasty were studied in the Department of Otolaryngology Head & Neck Surgery of SSMC & Mitford Hospital, Dhaka with their descriptive history, clinical findings, pre and post operative assessment during the period of January to December 2008.

The assessment of the patient was done on the basis of history, clinical examination (Tuning fork test), radiological test (x-ray mastoid Towne's view, laboratory investigation and hearing function test (pure tone audiometry and impedance).

All patients were operated under local anaesthesia. The incision was either postauricular, endaural or transcanal depending upon the size of the external ear canal and the position of the perforation. The graft was inserted onto the medial surface of the drum remnant, usually below the handle of the malleus ("underlay" technique). Gelfoam was used as the support material in middle ear. Betadine soaked packed was given over the gel foam in the external auditory canal which was removed after two weeks. Antibiotics were given in the postoperative period for four weeks.

During the follow-up, every patient was examined after one and three months of postoperative period. Outcome of surgery was regarded as successful if the ear was dry and

the tympanic membrane intact and mobile. Postoperative pure tone audiometry was done on the third month of postoperative period. The results are presented as air bone gaps before and after operation by comparing audiometric graph.

Post-operative follow up was done at weekly interval for the first months and then as needed. The mean duration of follow-up 18 weeks (ranges from 12 weeks to 28 weeks).

Results

Table- I
Age distribution of patients and graft take rate (n= 60)

Age group (years)	No. of patients (%)	Graft take rate (%)
15-25	40 (66.67%)	36 (90.00%)
25-35	14 (23.33%)	12 (85.00%)
35-45	06 (10.00%)	04 (66.67%)
Total	60 (100%)	52 (86.67%)

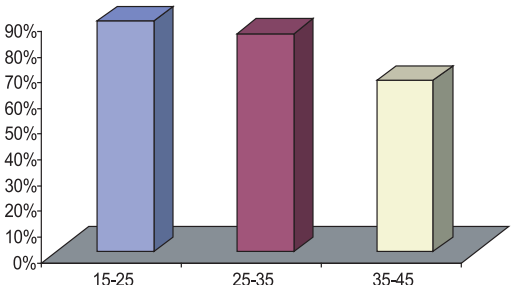

Fig.-1: *Effect of age on success rate*

Table-II
Sex distribution (n = 60)

Sex	No. of patients (%)	Successful case No of patients (%)
Male	36 (60%)	32 (88.89%)
Female	24 (40%)	20 (83.33%)

Table- III
Socio-economic group (n= 60)

Class	No. of patients (%)
Poor class	18 (30.00%)
Middle class	32 (53.33%)
Higher class	10 (16.67%)

Table- IV
Common presentation.

Class	No. of patients (%)
H/O otorrhoea	58 (96.67%)
Hearing loss	54 (90.00%)
Tinnitus	04 (06.67%)

Table- V
Involvement of the ear.

Site	No. of the patients (%)	Graft taken Success rate (%)
Unilateral	30 (50%)	26 (67%)
Bilateral	30 (50%)	26 (67%)

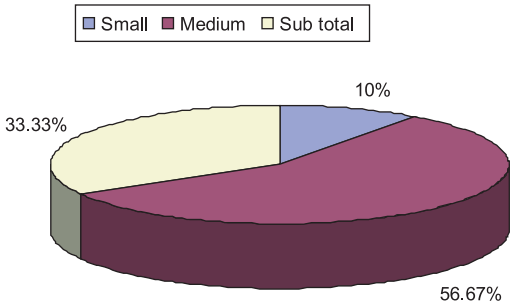

Fig.-2*: Distribution of size of perforation.*

Table-VI
Distribution of site of peroration.

Site	No. of patients (%)	Successful cases No. of patients (%)
Anterior	26 (43.33%)	23 (88.46%)
Posterior	14 (23.33%)	13 (92.85%)
Subtotal	20 (33.33%)	16 (80.00%)

Table- VII

Distribution of approach of operations.

Site	No. of patients (%)	Successful cases No. of patients (%)
Postauricular	45 (75.00%)	43 (95.56%)
Endaural	05 (08.33%)	04 (80.00%)
Transcanal	10 (16.67%)	08 (80.00%)

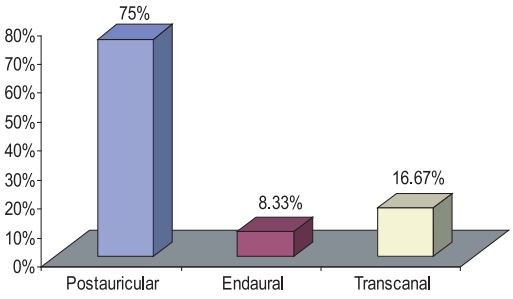

Fig.-3: *Distribution of approach of operation*

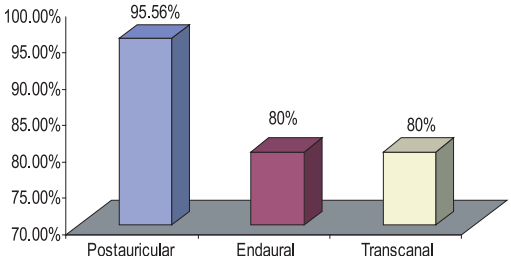

Fig.-4: *Effect of approach of operation on success rate.*

Table- VIII

Aggregated result myringoplasty operation.

Tympanic Membrane	No. of patients (%)
Intact and mobile	52 (86.67%)
Graft failure	5 (8.33%)
Adhesive	0
Lateralization	0
Medialization	0
Reperforation	2 (3.33%)
Tympanosclerosis	0
Postoperative cholesteatoma	0
Anterior blunting	1 (1.67%)

Table- IX

Hearing status in successful grafting cases (52 cases)

A) Pre & Post operative air condition threshold

	Preoperative air condition threshold		Postoperative air conduction threshold	
	No.	%	No.	%
0-20 dB	10	19.23	24	46.15
20-40 dB	28	53.85	28	53.85
40-60 dB	14	26.92	0	0

B) Hearing gain (n = 52)

	No. of patients (%)
Hearing gain	38 (73.08%)
No improvement	14 (26.92%

C) Hearing results

	Mean (dB)
Preoperative air conduction threshold	31.43
Postoperative air conduction threshold	21.43
Preoperative air bone gap	22.5
Postoperative air bone gap	1169
Change in air bone	10.83

Discussion

Eighty patient of different age groups were included in this series ,after taking relevant history, clinical examination and investigation,60 cases were included in the series.

The function of Eustachian tube is a prerequisite for successful myringoplasty. However, there is no simple routine method for the accurate preoperative examination of Eustachian tube function.

On the other hand, some authors have stated that tubal function may even improve following a successful myringoplasty[10] . It suggests that closure of a perforation may prevent irritation of the middle ear mucosa, which may encourage a return normal tubal function[11] . Patient age has generally been considered as influencing the surgical outcome. In our study, maximum success rate was in the age group 15-25 years (90%) followed by 85% and 66.67% in the age group of 25-35 years and 35-45 years respectively. This is due to lower incidence of upper airway infection and better Eustachian tube function in this age.

Male outnumbered the female (1.5:1).There was no significant difference in surgical outcome (88.89.vs 83.33 in male and female respectively).

Majority of the patients in our study came from middle class family (53.33%) and a significant number came from poor class family (30%). Previous history of intermittent otorrhoea (96.67%) and hearing loss (90%) were the major symptoms of this series.

Out of 60 patients, 30 patients had unilateral and 30 patients had bilateral diseases. The surgical success rate was equal in both unilateral and bilateral cases. Kessler et al [12] and denoyelle et al [13] who found that a pathological contralateral ear independently influence the risk of graft material, seems to be related to the fact that our cases did not show any inflammatory changes in the contralateral ear.

With regard to the role of size of perforation, small (100%) and medium size (88.23%) perforation had more success rate than the subtotal perforation (80%).

The site of perforation statistically affect outcome in our series as has been previously reported by others [14]. Success rate of posterior perforation (92.85%) and anterior perforation (88.46%) are more than the subtotal perforation (80%).Our finding of a higher rate of surgical failure in patients with anterior perforations in comparison to posterior perforations ,may have been due to the limited vascularization of the anterior part of the eardrum [15] and also due limited access to the anterior perforation.

Significant difference was found when comparing postauricular with endaural and transcanal approach. The success rate was 95.56% in postauricular, 80% in endaural and 80% in transcanal approach. Inwood et al[14] reported that surgical approach does not influence surgical outcome.

The mean pre and post operative air conduction threshold in the successful grafting cases were 31.43 dB and 21.43 dB respectively with a mean audiological improvement of 10 dB. Improvement of mean air bone gap was 10.83 dB. The best improvement was observed at the frequency of 250-1000 Hz. One might suppose that after a straightforward myringoplasty the air bone gap should be within 10 dB. This hearing result was achieved only in 73% cases (38 out of 52 successful operation). Sheehy and Anderson [15] stated that in most cases of chronic otitis media, even though the ossicular chain may appear normal, there are some factor of scar tissue that prevent total restoration of hearing. However in our series included 14 ears (26.92% of the successful cases) in which hearing was not improved significantly after surgery despite having the eardrum heal perfectly and the middle ear remain aerated. No sensorineural hearing loss was observed after surgery.

The overall success rate was 86.67% (52 out of 60).The surgical failure in five cases (8.33%) was characterized by evidence of graft failure at the last follow up visit. Two patients (3.3%) developed reperforation and one (I.67%) developed anterior blunting .So total failure was observed in 8 patients (13.33%). Graft failure occurred during the first -8 weeks in five cases. None of the patient developed epithelial pearl medialization or lateralization of the graft. In a prospective study 60 cases ,Mangal Singh et al [16] showed overall success rate of 93.3% and hearing improvement(air-bone gap<10 dB) in 92.8%.

Conclusion

Myringoplasty in a dry ear significantly improves surgical outcome so preoperative inflammatory changes in the middle ear mucosa should be carefully evaluated and its medical treatment should be considered. Hearing improvement after myringoplasty in anatomically successful cases improve quality of life of the patients.

References

1. George G. Browing. Chronic Otitis Media. Definition, In: Micheal Gleeson (Editor). Scott Brown's Otorhino-laryngology, 7th ed, vol. 3, London: Arnold; 2008.p.3396.
2. Alan G Kerr. Physiology of hearing. In: John Hibbert (editor). Scott-Brown's Otolaryngology, 6th ed. Vol. 1, London: Butterworths; 1997.1/2/7.
3. Ludman H. Reconstructions of the middle ear. In: Mawson's diseases of the Ear, 6th ed. London: Edward Arnold; 1998.p432-33.
4. Blakley BW. Does chronic otitis media cause sensorineural hearing loss? The J. of Otolaryng, 1998;27:17-20.
5. Bhat NA, De, R. Retrospective analysis of surgical outcome and hearing improvement following myringoplasty. J. Otolaryngol. 2000 Aug; 29 (4): 229-32.
6. Yung MW. Myringoplasty for subtotal perforation. Clin-Otolaryngol. 1995 Jun; 20(3):241-5.
7. Vrabec JT, Deskin RW, Grady JJ. Meta-analysis of pediatric tympanoplasty. Arch otolaryngol Head Neck Surg 1999;125: 530-4.
8. Caylan R, Titiz A, Falcioni M, De Donato G, Russo A, Taibah AA, et al. Myringoplasty in children. Otolaryngol Head Neck Surg, 1998;118:709-13.
9. Lorenzo pignataro, Lorenzo Grillo, Della Berta, pasquale Capaccio, Arturo Zaghis. Myringoplasty: anatomical and functional results. The Journal of Laryngology and Otology 2001; 115: 369-373.
10. Coats AC. The physiology of auditory and vestibular system. In: Ballenger JJ. Editor, Disease of nose, Throat, Ear, Head and Neck, 13th ed. Lea and Febiger, philadelphia, 1985; 925-30.
11. Jonathan D. Predictive value of Eustachian tube function in the successful outcome of myringoplasty. Clin otolaryngol 1990;15:431-34.
12. Kessler A, Postic WP, March R.Type 1 tympanoplasty in children. Arch otolar-yngol head neck sur1994;120:487-90.
13. Denoyelle F,Roger G, Chuvin P. Myringoplasty: Factors of outcome. Laryngoscope 1990;109:47-51.
14. Inwood JL, Wallace HC, Clarke SE. Endaural or postaural incision for myringoplasty: does it make a difference to the patient? Clin Otolaryngol, 2003;28:396-8.
15. Sheehy JJ, Anderson RG. Myrin-goplasty-a review of 472 cases. Ann otol Rhinol Larygol,1990; 89:331-34.
16. M singh, A Rai, SC Gupta. Comparative study of the underlay and overlay technique of myringoplasty. The Journal of Laryngology and Otology2003;117: 444-47.