

Original Article

Hearing gain after myringoplasty in relation to the size of tympanic membrane perforation

Sutanu Kumar Mondal¹, Ashim Kumar Biswas², Md. Mahmudul Huq³, Md Hasan Ali⁴, Md. Kamruzzaman⁵, Md. Abul Hasnat Joarder⁶

Abstract:

Objectives: To assess hearing gain after successful myringoplasty in relation to the size of tympanic membrane perforation.

Methods: This cross-sectional study was done in the department of otolaryngology and head neck surgery, BSMMU, Sahbag, Dhaka during the period of January 2009 to December 2010. A total of 60 patients were under went myringoplasty operation after taking detailed history, clinical examination and investigation. Preoperative and postoperative hearing assessment was done. Analysed data presented by various tables, graphics and figures.

Results: In case of small size perforation preoperative mean bone conduction threshold was 7.66 dB, mean air conduction threshold was 34.14 dB and mean air bone gap was 26.48 dB. In case of medium size perforation preoperative mean bone conduction threshold was 9.61 dB, mean air conduction threshold was 44.48 dB. Mean air bone gap was 34.87 dB. In case of large size perforation preoperative mean bone conduction threshold was 13.12 dB, mean air conduction threshold was 59 dB, and mean air bone gap was 45.88 dB.

Hearing loss increases with increasing size of perforation. Ahmed and Rahim (1979) showed in the study that hearing loss increases with increasing the size of the perforation which was relevant in the study. After myringoplasty post-operative mean air bone gap was 21.24 dB in small size, 21.74 dB in medium sized and 24 dB in large size.

From the record improvement of mean air bone gap or hearing gain was 5.24 dB in small size perforation respectively. The different of air bone gap closure between small and medium size perforation was statistically significant by unpaired' test

Conclusion: Hearing gain after myringoplasty is better in large size perforation.

Key words: Myringoplasty, Hearing improvement.

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1. Associate Professor, Department of Otolaryngology and Head Neck Surgery, Khulna Medical College.
 2. Associate Professor, Department of Otolaryngology and Head Neck Surgery, BSMMU.
 3. Assistant Professor, Department of Otolaryngology and Head Neck Surgery, Khulna medical college.
 4. Junior Consultant, ENT Department, Mohammad Ali Hospital, Bogra.
 5. Associate Professor, Department of Otolaryngology and Head Neck Surgery, Khulna medical college
 6. Professor, Department of Otolaryngology and Head Neck Surgery, BSMMU.

Address of correspondence: Dr. sutanu Kumar Mondal, Associate Professor, Department of Otolaryngology and Head Neck Surgery, Khulna Medical College, Khulna. Mobile: 01711-144213, E-mail: sutanukmondal@gmail.com

Introduction:

Chronic suppurative otitis media is a worldwide health problem. The incidence of the disease is very high in Bangladesh because of lower socioeconomic condition, overcrowding, poor nutrition and lack of health education.¹ Among the two types of chronic suppurative otitis media, tubotympanic variety is more common and always characterized by central perforation of tympanic membrane.² The perforation is associated with discharge and hearing loss. This hearing loss is a matter of serious concern globally particularly in children and young adults because of its long-term effects on communication, language development, educational process and achievements. Hearing disability in adults is a burden to the individual, family and enter society. There is a significant quantitative correlation between the sizes of perforation with hearing loss. Myringoplasty operation is such a procedure by which patient improves hearing status. In my study I have proved that hearing gain is better in large size of perforation of tympanic membrane after successful myringoplasty.

Myringoplasty is the term used to describe the surgical repair of the perforated tympanic membrane. Attempts to close perforation of tympanic membrane started date back to the 16th century. The advent of operating microscope, higher antibiotics, advances in anaesthesia and use of graft materials have resulted in myringoplasty becomes today one of the more commonly perforated otolaryngologic ear procedures in adults and children.

The size of perforation was graded according to involved surface area of tympanic membrane. It was graded as small (less than 25%), medium (50%-75%) and large (more than 75%) perforation of pars tensa.³ One of the outcomes of successful myringoplasty is hearing improvement. The audiometric results following myringoplasty showed that closure of large perforation resulted in greater hearing gain than small perforation.

A significant reduction in air bone gap following myringoplasty and had improved hearing.⁴ In study Black Jh showed that post-operative air bone gap was less than 20 dB in 77.9% of patient.⁵ An audiological improvement was also seen in 70.6% of patient in another study.⁶

Methods:

Total 60 patients who underwent myringoplasty were studied in the department of otolaryngology and head neck surgery, BSMMU, Shahbag, Dhaka with their descriptive history, clinical findings, pre and post-operative assessment during the period of January 2009 to December 2010.

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

Majority of the patients were operated under general anaesthesia, and rests were operated under local anaesthesia. Most of the myringoplasty were done by post auricular approach. Rest of the patients were operated by transcanal approach depends on the condition of the external auditory canal and position of perforation. In all of the patients Temporalis fascia was used as graft material. Under lay technique was used in every case. In patients with bilateral ear diseases operation was performed in one ear at a time. Operations were performed by different surgeons.

Patients were followed up post operatively up to 3 months, two follow up in this period. First follow up at the end of 1 month. 2nd follow up at the end of 3rd month. Pure tone audiometry was done during 2nd follow up. During follow up condition of the wound, external auditory canal and tympanic membrane was noted. Hearing gain after myringoplasty was assessed on the basis of pure tone audiometry by closure of air bone gap.

Results:

Table I :
Distribution of patients by age (n=60)

Age group (years)	Male	Female	Total	Percentage
10-20	9	7	16	26.67
21-30	18	12	30	50.00
31-40	3	8	11	18.33
41-50	0	3	3	5.00
Total	30	30	60	100

Table II :
Distribution of patients by sex (n=60)

Sex	No. of patients	Percentage (%)
Male	30	50.00%
Female	30	50.00%
Total	60	100

Table III :
Distribution of patients by education (n=60)

Education status	No. of patients	Percentage (%)
Illiterate	4	6.67
Primary	16	26.67
Secondary	22	36.67
Higher secondary	8	13.33
Graduate and above	10	16.66
Total	60	100

Table IV :
Distribution of patients by habitat (n=60)

Habitat	No. of patients	Percentage (%)
Urban	22	36.67
Rural	38	63.33
Total	60	100

Table V :
Distribution of patients by clinical feature (n=60)

Symptoms	No. of patients	Percentage (%)
Intermittent otorrhoea	60	100
Impaired of hearing	58	96.67
tinnitus	12	20

Table VI :
Distribution of patients according to the types of anesthesia received (n=60)

Types of anesthesia	No. of patients	Percentage (%)
Local	3	5.00
General	57	95.00
Total	60	100.00

Table VII :
Distribution of patients on patients on the basis of perforation size (n=60)

Size of perforation	No. of patients	Percentage (%)
Small	29	48.33
Medium	23	38.33
Large	8	13.34
Total	60	100

Table VIII :

Distribution of patients on patients on the basis of surgical approach (n=60)

Surgical approach	No. of patients	Percentage (%)
Post auricular	55	91.67
Trans canal	5	8.33
Total	60	100

Table IX :

Distribution of patients on patients on the basis of involvement of ear (n=60)

Ear involved	No. of patients	Percentage (%)
Unilateral	42	70
Right -22		
Left-20		
Bilateral	18	30
Total	60	100

Table X :

Distribution of preoperative hearing threshold in relation to the size of tympanic membrane perforation (n=60)

Size of perforation	Bone conduction threshold Mean (dB)	Air conduction threshold Mean (dB)	Air bone gap Mean (dB)
Small	7.66	34.14	26.48
Medium	9.61	44.48	34.87
Large	13.12	59.00	45.88

Table XI :

Distribution of postoperative hearing threshold in relation to the size of tympanic membrane perforation (n=60)

Size of perforation	Bone conduction threshold Mean (dB)	Air conduction threshold Mean (dB)	Air bone gap Mean (dB)
Small	0.83	22.07	21.24
Medium	1.65	23.39	21.74
Large	3.25	27.25	24.00

Table XII :

Distribution of improvement of hearing threshold after myringoplasty in relation to the size of the perforation (n=60)

Size of perforation	Improvement of Bone conduction thresholds Mean (dB)	Improvement of Air conduction thresholds Mean (dB)	Improvement of air bone gap Mean (dB)
Small	6.83	12.07	5.24
Medium	7.96	21.09	13.13
Large	9.88	31.76	21.88

Discussion:

In the study, 60 patients those underwent myringoplasty in the department of otolaryngology and head neck surgery, BSMMU, Dhaka were studied prospectively after taking relevant history, clinical examination, investigation and follow up. Hearing gain after myringoplasty was assessed on the basis of post-operative pure tone audiometry by closure of air bone gap.

Age of the patients in this study range from 10-50 years. Mean age of the patients was 26 years. The maximum successful myringoplasty was 50% in the age group of 21-30 years by 26.67%, 18.33% and 5 % in the age group of 10-20 years, 31-40 years and 41-50 years respectively.

In this series, male and female were equal. Male and female ratio was 1:1. Majority of the patients came from middle class 48.33%, from lower class 41.67 and 10 % from upper class. Level of educational status most of them were secondary 36.67% followed by primary 26.67% graduate 16.66% higher secondary 13.33% and illiterate 6.67%.

Majority of the patients 63.33% came from rural area. Majority of the patients bathed in tube well 45%. According to occupation 36.67% patients were student 33.33% house wife, 11.67% farmers, 11.67% service holder and 6.66% businessman.⁷ showed that CSOM was more prevalent in rural area which was relevant with this study.

Intermittent otorrhoea previously and hearing impairment were the major symptoms of this series 100% of the patients have history of intermittent otorrhoea and 96.67% have impairment of hearing and 20% patients have tinnitus. Forty two out of sixty patients had unilateral and eighteen had bilateral diseases but operation was performed in one ear at a time.

Most of the patients were operated under general anaesthesia (95%). Most of the patients under went myringoplasty by post auricular approach (91.67%)

All of the patients underwent myringoplasty by underlay technique. Temporalis fascia used as graft in all patients. The significance of the size of perforation was recorded in this study, the perforation were categorized as small, medium and large size^{8,9} on the basis of surface area involved. In this study 48.35 were small, 38.33% medium and 13.45 large.

In case of small size perforation preoperative mean bone conduction threshold was 7.66 dB, mean air conduction threshold was 34.14 dB and mean air bone gap was 26.48 dB. In case of medium size perforation preoperative mean bone conduction threshold was 9.61 dB, mean air conduction threshold was 44.48 dB. Mean air bone gap was 34.87 dB. In case of large size perforation preoperative mean bone conduction threshold was 13.12 dB, mean air conduction threshold was 59 dB, and mean air bone gap was 45.88 dB.

From this record it is showed that hearing loss increases with increasing size of perforation. Farrior and Lee^{10,11} showed in the study that hearing loss increases with increasing the size of the perforation which was relevant in the study. After myringoplasty post-operative mean air bone gap was 21.24 dB in small size, 21.74 dB in medium sized and 24 dB in large size.

From the record improvement of mean air bone gap or hearing gain was 5.24 dB in small size perforation respectively. The difference of air bone gap closure between small and medium size perforation was statistically significant by unpaired' test ($p=0.001$). The different of air bone gap closure between medium and large size

perforation was statistically significant by unpaired' test ($p=0.001$). The difference of air bone gap closure between small and large size perforation was statistically significant by unpaired' test ($p=0.000$). Closure of large perforation resulted in greater hearing gain post operatively.¹² This is relevant with this Study.

Conclusion:

From this study, it can be concluded that size of tympanic membrane perforation affects the degree of hearing loss and improvement of hearing after myringoplasty. In relation to the size of perforation from the record, hearing gain was minimum in small size, medium in medium size and maximum in large size perforation. So, it was proved that hearing gain is better in large size of perforation after successful myringoplasty.

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