

## Original Article

# Outcome of myringoplasty

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### Abstract:

*A cross sectional, observational study was carried out on myringoplasty at a tertiary level hospital, with the aims to see the outcome of surgery. The study included 100 myringoplasty in central dry perforations of tubotympanic variety of CSOM. Age range of patients was from 15 years to 45 years; male was 56%. There was insignificant influences of age or sex on success rate. The surgeries were done under either local or general anaesthesia by underlay technique with temporalis fascia as a graft in all cases with different approaches without any significant influences on outcome. Site and size of the perforations had significant effect on surgical outcome. The overall graft take rate was 84%. The mean preoperative and postoperative air conduction threshold in the successful cases were 35.2dB & 24.1dB respectively with a mean audiological improvement of 11.1dB & air bone gap improvement was 12.4dB.*

**Key words:** Myringoplasty, outcome.

### Introduction:

Perforations of the tympanic membrane primarily results from middle ear infections, trauma or iatrogenic causes. The literature suggests that upto 80 percent of these perforations undergo spontaneous closure<sup>1</sup>. Myringoplasty is the term used to describe the surgical repair of a perforated tympanic membrane. The three principal indications for myringoplasty are (1) recurrent otorrhoea (2) desire to swim without having to waterproof the ear and (3) to improve a conductive hearing loss resulting from a non-healing perforation of the tympanic membrane. In Bangladesh, the incidence of chronic suppurative otitis media is very high and tubotympanic variety is the commoner among the two types of chronic suppurative otitis media. A hole in the tympanic membrane reduces the effective area of the membrane in contact with the sound wave, holes also reduce the pressure differential across the tympanic membrane and depending on the position, reduce the mechanical coupling between the remaining intact positions of the membrane and the malleus<sup>2</sup>.

There is a significant quantitative correlation between the size and site of perforation and hearing loss, 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 parts. However non marginal perforations with intact ossicular chain hearing loss is approximately 10-30 dB<sup>3</sup>.

Attempts to close perforations of the tympanic membrane date back to the sixteenth century. However, it was not until 1878 that successful closure of the tympanic membrane was achieved<sup>4</sup>. The advent of the operating microscope, antibiotics, advances in anaesthesia and use of inert graft materials have resulted in myringoplasty becoming today one of the more commonly performed otolaryngological ear procedures in adult and children. Myringoplasty has gone through many changes in techniques and grafting materials. A successful myringoplasty controls recurrent infection, improves hearing and helps in hearing aid insertion.

However there is still uncertainty about the prognostic factors in myringoplasty and there are also significant

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variations in the reported success rates of achieving an intact tympanic membrane after surgery. The current literature reports variable success rates for closure of the tympanic membrane 60-99 per cent in adult and 35-94 per cent in children<sup>5</sup>. Furthermore it is now becoming apparent that reperforation following myringoplasty may occur several years after the initial surgery, at present very few studies have such long term results. The prerequisite of myringoplasty are (a) central dry perforation (b) functioning Eustachian tube (c) no respiratory tract infection. Now a days myringoplasty is a common operation in the ENT department having microsurgical facilities. The present study aims to evaluate the outcome of myringoplasty especially the graft take rate and the hearing status of patients before and after myringoplasty.

#### Aims and objectives:

1. To compare hearing status before and after myringoplasty.
2. To explore the graft take rate respective to age & sex of the patient, size & site of the perforation, approaches for surgery (postaural, endaural, transcanal) & type of anaesthesia.

#### Methods:

It was a cross sectional and observational study. This study was carried in (Sir Salimullah Medical College & Mitford hospital, Dhaka) from January 2006 to December 2008. Total 100 patients were included in the study. Age of the patients were 15 to 45 years. Tubotympanic variety of CSOM with dry perforation underwent myringoplasty were included in the study. Patient had atticofacial disease, ossicular chain abnormalities, tympanosclerosis, csom with sensory neural deafness, previous surgery, csom with otitis externa, inner ear abnormality, age below 15 and above 45 years were excluded from the study.

A total of 100 tubotympanic variety of CSOM patients were collected from the department of otolaryngology & head neck surgery of SSMC & Mitford hospital with their descriptive history, clinical examination, preoperative and postoperative hearing threshold assessment during the period from January 2006 to December 2008.

The operations were done either under local or general anaesthesia. The incisions were either postaural, endaural or transcanal depending on the size of the

external canal and the site of the perforation. The grafts were inserted into the medial surface of the drum remnant, usually medial to the handle of the malleus (underlay technique). Temporalis fascia was used as graft materials in all cases. Gel foam was used as the support material in the middle ear.

During follow up examination every patient was examined after one & three months of postoperative period. Outcome of surgery was regarded as successful if the ear gets dry, the tympanic membrane heals & intact and mobile. Any graft which was seen to be intact three months after the operation was considered to have taken. Audiometric tests were performed according to ISO standard and which were done on 3<sup>rd</sup> month of postoperative period.

Preoperative & postoperative hearing threshold, air bone gap was determined by comparing the audiogram. The data was analysed with the help of a computer and chi – square test was done.

#### Results:

In this study, the age range of patients at presentation was 15 to 45 years with a mean of 27 years. maximum patients were in the age group 25-35 years (52%), Graft take rate was also maximum in this age group (88.46%) (Table-I).

**Table-I**  
*Age distribution*

Age group (years)	Number of Patients (%)	Successful Case (%)
15-24	34 (34%)	28 (82.35%)
25-34	52 (52%)	46 (88.46%)

( $\chi^2 = 1.90$ ;  $p > 0.05$  for age group with highest Vs lowest success rate)

**Table-II**  
*Sex distribution*

Sex	Number of Patients (%)	Successful Case (%)
Male	56 (56 %)	48 (85.71 %)
Female	44 (44 %)	36 (81.81 %)

Male outnumbered the female in a ratio of 1.27:1; there was no gross difference of graft take rate. (85.71% & 81.81% in male & female respectively)

**Table-III**  
*Involvement of ear*

Site	Number of Patients (%)	Graft taken or successful cases (%)
Unilateral	62 (62 %)	54 (87.01 %)
Bilateral	38 (38 %)	32 (84.02 %)

Operation done only in one ear, sixty two patients had unilateral perforation and thirty eight had bilateral perforation.

**Table-IV**  
*Distribution of size of perforation*

Size	Number of Patients (%)	Graft taken or successful cases (%)
Small	6 (6 %)	6 (100 %)
Medium	62 (62 %)	54 (87.09 %)
Subtotal	32 (32 %)	24 (75 %)

Success rate was more in case of medium size perforation (87.09) than subtotal perforation (75%), small perforations were found only in 6 cases with (100%) success rate.

**Table-V**  
*Distribution of site of perforation*

Site	Number of Patients (%)	Graft taken or successful cases (%)
Anterior	40 (40 %)	34 (85 %)
Posterior	28 (28 %)	26 (92.85 %)
Subtotal	32 (32 %)	24 (75 %)

Graft take rate was more common in posterior & anterior perforation than subtotal perforation.

**Table-VI**  
*Distribution of approach of operation*

Approach	Number of Patients (%)	Graft taken or successful cases (%)
Postauricular	72 (72 %)	60 (83.33 %)
Endaural	12 (12 %)	10 (83.03 %)

There was no gross difference in graft take with regard to approach of surgery.

**Table-VII**  
*Type of anaesthesia used*

Type of anaesthesia	Number of Patients (%)	Graft taken or successful cases (%)
Local	88 (88 %)	74 (84.09 %)
General	12 (12 %)	10 (83.33 %)

Type of anaesthesia not affect success rate.

**Table-VIII**  
*Hearing result in successful cases (84 cases)*

**(A)**

Preoperative air conduction threshold	Number of Patients (%)
0-20 dB	24 (28.05 %)
20-40 dB	52 (61.09 %)
40-50 dB	08 (09.05 %)

Mean= 35.02 dB

**(B)**

Postoperative air conduction threshold	Number of Patients (%)
0-20 dB	54 (64.28 %)
20-40 dB	26 (30.95 %)
40-50 dB	04 (04.76 %)

Mean= 24.01 dB

**Table-IX**  
*Overall results of 100 cases*

	Number of Patients (%)
Graft take rate (successful cases)	84 (84 %)
Graft failure	10 (10 %)
Reperforation	04 (04 %)
Anterior blunting	02 (02 %)
Hearing gain ( 54 out of 84 successful cases)	54 (64.28 %)
No Improvement (30 out of 84 successful cases)	30 (35.71 %)

The surgical failure in 16 cases (16%) was characterized by evidence of graft failure, reperforation & anterior blunting at the last follow up visit. Graft failure occurred during the first 4 weeks in 6 of 10 cases. Overall results of surgery are presented in tables.

**Table-X**  
*Perioperative Hearing Status*

	Mean dB
Preoperative air conduction threshold	35.02
Postoperative air conduction threshold	24.01
Preoperative air bone gap	24.03
Postoperative air bone gap	11.09
Change in air bone gap	12.04

Gain or loss of hearing 0-10 dB were not considered as significant. So, no improvement seen in 30 patients. No patient had developed significant loss of air or bone conduction threshold.

#### Discussion:

This study had been carried out over a limited period of time comprising a limited number of cases. The facts and figures mentioned here may considerably vary from a large series; still than, as the cases were collected from tertiary referral hospital, this study may be of some value in reflecting certain facts regarding hearing improvement; certain criteria were followed in the selection of patients for analysis.

The function of the Eustachian tube is a prerequisite for a successful myringoplasty. However there is no simple method for the accurate preoperative examination of Eustachian tube function. Patient's age has generally been considered as influencing surgical outcome. In our study maximum success rate was in the age group of 25-35 years (88.46%) followed by 82.35% and 71.42% in the age group of 15-25 years and 35-45 years respectively. Vrabec et al found better success with active age. This is due to lower incidence of upper airway infections and better Eustachian tube function in this age and the relative immaturity of the immune system in younger children<sup>6</sup>.

Male outnumbered the female with ratio of 1.27:1; there was no significant difference in surgical outcome between male and female (85.71% & 81.8% respectively) ( $p>0.05$ ). J. sade et.al shows in a study that 52.7% of the patients were male and 47.3% were female<sup>7</sup>.

Majority of the patient in our study came from middle class family (80%). History of intermittent otorrhoea (previously) and hearing loss were the major symptoms of this series, 62% per cent of patients had unilateral and 38% had bilateral diseases. The operation was done only in one ear in all cases; surgical success

rate 87.01% in the former and 81.02% in the latter. The difference that was not statistically significant. There was a discrepancy between our results and those of kessel et al and Denoyelle et al who found that a pathological contralateral ear independently influences the risk of graft material<sup>8,9</sup>. This seems to be related to the fact that our cases did not show any inflammatory changes in the contralateral ear.

Regarding the role of size of the perforation small (100%) and medium size (87.09%) perforation had more success rate than subtotal perforation (75%). A degree of controversy and confusion surrounds the influence of perforation size on the surgical outcome<sup>10</sup>. The best available evidence to date is probably the results obtained from the prospective myringoplasty audit conducted by the Royal College of Surgeons of England and from the retrospective study of 423 myringoplasties of Edinburgh. Each of these two papers contained a large sample size, measuring the power of the study and clearly demonstrating a higher success rate with smaller perforation (measuring less than 50% of the tympanic membrane.)<sup>11</sup>.

The site of the perforation statistically affect outcome, in our series as has been previously reported by others. Success rate of posterior perforation (92.85%) and anterior perforation (85%) are more than that of subtotal perforation (75%). Our finding of a higher rate of surgical failure in patients with anterior perforation in comparison to posterior perforation may have been due to the more limited visualization of the anterior part of the eardrum also due to limited access to this perforation. J. Sade et al concluded that smaller posterosuperior perforations have a better result than anterior perforation or very large ones (the bigger perforation or the more anteriorly placed one had a less favourable prognosis)<sup>7</sup>.

No significant differences was found when comparing the three surgical approaches, the success rate was 83.33% in postauricular, 83.3% in endaural and 87.5% in transcanal approach. Twelve of our patients (12%) were give general anaesthesia and 88 (88%) were given local anaesthesia. The was no significant difference in surgical outcome (84.09% and 83.33% respectively).

The mean pre and postoperative air conduction threshold on the successful cases were 35.2dB and 24.1 dB. The best improvement was observed at the frequency of 250 to 1000Hz, one might suppose that after a straightforward myringoplasty the air bone gap

should be within 10dB. This hearing result was achieved in only 64.28% (54 out of 84 successful operation). Sheehy and Anderson stated that in most cases of chronic otitis media, even though the ossicular chain may appear normal, there is some factor of scar tissue that prevents total restoration of hearing<sup>12</sup>. However in our series included thirty ears (35.71% of successful cases) in which hearing was not improved significantly after surgery despite having the eardrum heal perfectly and the middle ear remain aerated. No sensorinural hearing loss was observed after surgery<sup>12</sup>.

The overall success rate was 84 percent (84 out of 100). The surgical failure in 10 cases (10%) was characterized by evidence of a graft failure at the last follow up visit. Four patients (4) developed reperforation and two (2%) developed anterior blunting. So that failure was observed in 16 patients (16%). None of the patients developed epithelial pearl, granulation tissue, medialization or lateralization of graft. Crusting and otitis externa were seen in two successful cases that were treated accordingly.

#### Conclusion:

From this study it can be concluded that myringoplasty is a valid treatment modality for tubotympanic variety of CSOM to achieve an intact tympanic membrane and to gain hearing. The status of the middle ear (i.e. the presence of dry ear) significantly influences surgical outcome and so preoperative inflammatory changes in the middle ear mucosa should be carefully evaluated and its medical treatment considered. The evidence of a good audiological result in anatomically successful cases is associated with a highly probable return to normal function and lifestyle at any age.

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