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Role of Myringoplasty in Hearing Improvement

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ABSTRACT

Introduction: *This study was carried out to assess the graft take rate as well as hearing improvement after myringoplasty with temporal fascia graft by underlay technique.* ***Methods:*** *Study was done in department of ENT of Doctor`s Clinic Unit-2, Thanthania, Bogura from July 2016 to June 2017. Sixty (60) patients were included prospectively for this work. The age range of the patients was 10 to 50 years.* ***Results:*** *In this study graft taken rate was 85% (51 out of 60) and graft failure was 15% (9 out of 60). Highest number of patients was in the age group of 21to 30 years and graft take was also maximum in this age group. Graft take rate of small size perforation (100%) and medium size perforation (93.2%) had more than subtotal perforation (77.8%). Success rate of posterior perforation was maximum (93.7%) followed by anterior perforation (88.2%). In case of approach of operation, postaural approach had maximum success rate (88.0%), followed by transcanal (80%) and end aural approach (75%). In this study, the mean pre and postoperative air conduction threshold in the successful cases were 34 decibel (dB) and 24dB respectively, with a mean audiological improvement of 10 dB. Improvement of mean air bone gap was 11 dB. Of the successful cases, hearing was improved in 31 (60.8%) patients and 20 (39.2%) patients showed no significant hearing improvement.* ***Conclusion:*** *From this study, it can be concluded that myringoplasty is a valid treatment modality for tympanic membrane perforation.*

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INTRODUCTION

In Bangladesh, like all developing countries the incidence of chronic suppurative otitis media (CSOM) is very high because of poor socioeconomic standard, overcrowding, poor nutrition and lack of appropriate health education.[1] Among the two types of chronic supportive otitis media, tubotympanic variety is the commonest and is called safe variety as the risk of developing complications are less and the name tubotympanic indicate disease of Eustachian tube and tympanic cavity.[1] Tubotympanic disease is always characterized by central perforation involving the pars tensa of

varying size and shape but with a narrow margin of intact annulus and usually with part or all of the membrane of the malleus remaining.[2] The perforation of the tympanic membrane is associated with aural discharge and hearing loss. Aural discharge is always mucoid or mucopurulent and varies with upper respiratory tract infection. Discharge is usually intermittent whenever there is a fresh head cold or water enters in to the ear.[2] Hearing loss in tubotympanic disease is usually conductive in nature but a few case of sensorineural hearing loss is found.[3] Hearing loss with intact ossicular chain is approximately 10-30 dB.[4,5] But more when ossicular chain is disrupted. Myringo-plasty is the operation specially designed to repair or reconstruct the tympanic membrane. The earliest reported successful myringoplasty was done by Berthold in 1978, using full thickness skin graft.[3] Since then, myringoplasty has gone through many changes in technique and materials. Shea in 1960, first introduced underlie technique for myringoplasty but using vein graft and autologus temporal fascia used as graft material firstly by Heerman.[3] The surgical outcome of myringoplasty is influenced by many factors, such as age, size of perforation, allergy and surgical approach. The reported success rate of myringoplasty is therefore variable, partly because of differences in the inclusion and exclusion criteria. In a study, overall success rate of myringoplasty was 86%. Posterior and inferior perforations had a 98% success rate for repair compared to only 67% of anterior perforation. The success rate of subtotal perforation closure was (92.5%)[6] but the poorer results were in younger patients. A study found better success with advancing age,[7] This is due to lower incidence of upper airway infection and better Eustachian tube function in later age and the relative immaturity of system in younger children, Lorenzo Pignataro found better success rate in underlay technique than overly technique.[8] The success rate was 82.3% in the former and 79.1% in the later. At present, myringoplasty is a common operation in the Otolaryngology Department, having microsurgical facilities. The present study aims to evaluate the surgical and audiological outcome of myringoplasty using underlay technique with temporal fascia graft in selected patients with tympanic membrane perforation and to assess the factors potentially influencing those outcomes.

METHODS

This prospective study was carried out in the department of ENT of Doctor`s Clinic Unit-2, Thanthania, Bogura from July 2016 to June 2017. Sixty (60) cases were selected for this study who underwent myringoplasty using underlay temporal fascia graft. The assessment of the patients was established on the basis of history, clinical examination and audiometric test per operative assessment and postope-rative follow up was done.

Inclusion criteria:

Chronic supporative otitis media (CSOM)-Tubo tympanic type(inactive), uncomplicated, Age between 11 to 50 years and no evidence of cholesteatoma.

Exclusion criteria:

Evidence of cholesteatoma, previous tympanic surgery, severe tympanosclerosis, only hearing ear and chronic otitis externa.

The patients were post operatively followed up at weekly interval for 1st month and then at the period of three months interval for one year. At the follow up examination, result of surgery was regarded as successful, if ear was dry and the tympanic membrane was intact and mobile. Audio metric test Pure Tone Audiometry (PTA) and Impedence were performed after three months and hearing gain or loss was compared with pre-operative test.

RESULTS

Table I shows that overall graft taken in 51 cases (85.0%) and graft failure in 9 cases (15.0%), amongst which complete failure of graft was in 4 patients (6.7%), medialization in one patient (1.7%), residual perforation in 3 patients (5.0%) and re-perforation in one patient (1.7%). In this study maximum patients

were noted in the third decade 55%. Graft take rate was also maximum in this age group. The age of the youngest patient was 12 years and age of the oldest patient was 46 years. The mean age was 29 (Table II).

Table I: Graft take rate (n=60)

Tympanic membrane	No. of patients (%)
Graft take (intact & Mobile)	51 (85.0%)
Graft failure	9 (15.0%)

Table I (a): Categories of graft failure (n=9)

Tympanic membrane	No. of patients (%)
Complete graft failure	4 (6.7%)
Medialization	1 (1.7%)
Residual perforation	3 (5.0%)
Re-perforation	1 (1.7%)

Table II: Distribution with relative frequency of graft takes rate in different age groups

Age groups (Years)	No. of patients (60) (%)	Graft take No. of patients (%)	Graft failure No. of patients (%)
11-20	11 (18.3%)	9 (81.8%)	2 (18.2%)
2 1-30	33 (55.0%)	29 (87.9%)	4 (12.1%)
31- 40	13 (21.7%)	11 (84.7%)	2 (15.4%)
40 -50	3 (5.0%)	2 (66.7%)	1 (33.3%)
Total	**60 (100.0%)**	**51 (85.0%)**	**9 (15.0%)**

Table III: Relative frequency of graft takes rate in relation to the size of perforation

Size	Myringoplasty No. of patients (%)	Graft takes No. of patients (%)	Graft failure No. of patients (%)
Small (2-3mm)	2 (100.0%)	2 (100.0%)	0 (0.0%)
Medium (4-6mm)	31 (100.0%)	28 (91.3%)	3 (9.7%)
Subtotal (>6mm)	27 (100.0%)	21 (77.8%)	6 (22.2%)
Total	**60 (100%)**	**51 (85.0%)**	**9 (15.0%)**

The above Table III shows that medium size perforations were the commonest one and graft take rate was (91.3%), which was more than subtotal perforations (77.8%). Graft take was 100.0% in small size perforations.

Table IV: Relative frequency of graft take rate in relation to the site of perforations (n=60)

Site	No. of patients	Graft takes No. of patients (%)	Graft failure No. of patients (%)
Anterior	17	15 (88.2 %)	2 (11.8 %)
Posterior	16	15 (93.7 %)	1 (6.2 %)
Subtotal	27	21 (77.8 %)	6 (22.2 %)

Majority of subtotal perforations were operated but the graft take rate (77.8%) was less than posterior (93.8%) and anterior perforations (88.2 %) shown in Table IV.

Table V: Surgical approach (n-60)

Approach	No. of patients (%)	Graft taken (%)
Postaural	42 (70.0%)	37 (88.1%)
Transcanal	10 (16.7%)	8 (80.0%)
Endaural	8 (13.3%)	6 (75.0%)
Total	**60 (100.0%)**	**51 (85.0%)**

Above Table V shows that most common approach was postaural (70%) followed by transcanal approach (16.7%)). There is no gross difference in graft take rate with regard to approach of surgery.

Table VI: Audiological results in successful cases (51 cases)

(A) Preoperative air conduction threshold

Preoperative air conduction threshold	No. of patients (%)	Mean
0-20 dB	8 (15.7%)	34
21-30 dB	18 (35.3%)	
>30 dB	25 (49.0%)	
Total	**51 (100.0%)**	

(B) Postoperative air conduction threshold

Postoperative air conduction threshold	No. of patients (%)	Mean
0-20 dB	18 (35.3%)	24
21-30 dB	27 (53.0%)	
>30 dB	6 (11.7%)	
Total	**51 (100.0%)**	

(C) Air bone gap in pure tone audiometry of the patients those underwent myringoplasty:

Air bone gap	Mean (dB)
Preoperative air bone gap	23
Postoperative air bone gap	12
Change in air bone gap	11

Table VI (A,B,C) shows that mean preoperative and postoperative air conduction thresholds in successful cases were 34 dB and 24 dB respectively with a mean audiological improvement of 10dB. Improvement of air bone gap was 11dB.

Table -VII: Hearing improvement (n-51)

	Number of Patients	Percentage
Hearing gain	31	60.8
No improvement	20	39.2
Total	**51**	**(100.0%)**

Above Table VII shows that hearing gain occurred in 31 (60.8%) patients and no improvement seen in 20 (39.2%) patients.

DISCUSSION

In this study, 60 patients, those underwent myringoplasty using underlay technique with temporal fascia graft, were studied prospec-tively after taking relevant history, clinical examination, investigation and follow-up. In this series, the graft take rate was 85% (51 out of 60) and the graft failure was 15 % (9 out of 60). This rate of graft intake is more or less similar to the Ugo Fish[10] (86%), and Kotecha[11] (82%),whereas Eero Vartiainen[12] showed that rate of graft intake was 91.2% which is significantly higher than this study. In this study, the lowest and the highest ages of patients at presentation were 12 and 46 years respectively with a mean age of 29 years. Patients' age has generally been considered as influencing surgical outcome. Maximum graft take rate (84.8%) was in the age of 21-30 years, followed by 84.6%, 72.8% and 66.7% in the age groups of 31-40, 11-20 years and 41-50 years age group respectively. Vrabec et al[6] found better success with advancing age. This is due to low incidence of upper airway infections and better Eustachian tube function in this age and the

relative immaturity of the immune system in younger children.

Medium sized perforations were commonest one in this study and the graft take rate was also maximum in this group (91.3%). Graft take rate of subtotal perforation was significantly less (77.8%). In case of small size perforation, graft take rate was 100%. One series showed that the closure rate was reported to be higher in small perforations (74%) than large perforations (56%).[16] In this study, graft take rates in case of posterior and anterior perfora-tion were 93.7% and 88.2% respectively, which was significantly more than that of subtotal perforation (77.8%). The site of perforation statistically affect in our series as has been previously reported by others.[13,14] And higher rate of surgical failure in patients with anterior perforations in comparison to posterior perforations in this study, may have been due to the more limited vascularization of the anterior part of the ear drum, limited access to this perforation as well as difficulty in graft placement also. It may be due to the fact that anteriorly graft may lose contact from the remnant of tympanic membrane, leading to anterior perforation.

Surgical approach depended on dimension of external auditory canal, site of perforation as well as surgeon's preferences. In this study, graft take rate was significantly greater with postauricular approach (88.9%) than that of endaural (75%) and transcanal approach (80%), because, postaural approach gives better view than endaural and transcanal approach. Whenever other series found no difference of graft in take in relation to approach used.[9]

The mean pre and post-operative air conduction threshold in the successful cases were 34 dB and 24 dB respectively, with a mean audiological improvement of 10 dB. Improvement of mean air-bone gap was 11 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 a 10dB. This hearing result was achieved in only 60.8% (31 out of 51) of successful operations. Lee et al and Palva and Ransay stated that mean hearing improvement was 8 dB in their series, this improvement is often similar to our study.[16,17] Sheehy and Anderson[15] stated that in most cases of chronic suppurative otitis media, even though the ossicular chain may appear normal, there are some factors of scar tissue that prevents total restoration of hearing. However, in our series included 20 ears (39.2%) 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. This is similar to the Ugo Fish[10] who showed that hearing improvement occurred in 66% patient.

CONCLUSION

Myringopasty is a successful treatment moda-lity of tympanic membrane perforation. Success rate was more with advancing age than younger children. Although this also depends on size and approach of operations. So, myringoplasty can be used safely for repair of tympanic membrane perforation and hearing improvement.

Conflicts of Interest: None

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