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GRAFT UPTAKE IN MYRINGOPLASTY AMONG THE
TERTIARY CARE HOSPITAL KPK.

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ABSTRACT

Introduction: Tympanoplasty refers to any operation involving reconstruction of the tympanic membrane and /or the ossicular chain. Myringoplasty is a tympanoplasty without ossicular reconstruction. Over the years many methods have been used for closing perforations. Myringoplasty was introduced by Berthold in 1878 but the modern era began only in 1950s with the work of Wullstein and Zoellner. The study aims to analyse the common factors which are predictive of success of myringoplasty in adult patients and to construct and validate a prognostic index that could be used as tool to predict the success of myringoplasty in adults.

Objectives: To determine the frequency of common factors influencing the graft uptake in myringoplasty.

Materials and Method: In this study, a total sample size was 376, using 4.08% proportion of fourth degree perineal tear, 95% confidence level and 2% margin of error under WHO software for sample size determination. Moreover, consecutive non probability sampling technique was used.

Results: The mean age was 40 years with standard deviation of ± 2.63 . Sixty two percent of the patients were male while thirty eight percent patients were female. The success rate of myringoplasty was 90% while the failure rate was 15(10%) patients in which 4(25%) patients had medium perforation, 5(33%) patients had large perforation while 6(42%) patients had subtotal perforation. Regarding the causes of perforation among 15(10%) patients, 13(85%) patients had infection while only 2 patients had trauma.

Conclusion: The study concludes that infection (85%) was the most common cause of perforation followed by trauma (15%) in the graft uptake in myringoplasty.

Keywords: *frequency, common factors, influencing graft, myringoplasty, tertiary care hospital*

INTRODUCTION

Tympanoplasty refers to any operation involving reconstruction of the tympanic membrane and/or the ossicular chain. Myringoplasty is a tympanoplasty without ossicular reconstruction. Over the years many methods have been used for closing perforations.¹ Myringoplasty was introduced by Berthold in 1878 but the modern era began only in 1950s with the work of Wullstein and Zoellner. Many techniques and materials have been used over the years but underlay techniques is advocated by Austin and Shea is now universally used. Many factors have been investigated to determine their effects on the graft take rate of these factors only size of perforations and presence of bilateral perforations have been shown to affect the myringoplasty outcome².

The most widely used and accepted method is underlay graft of temporalis fascia or sometimes perichondrium. The basic procedure is to excise the rim of the perforation so that there is a raw surface from which new tissues will grow³. Playa and Ramsay looked at the outcome of 281 myringoplasties in their department. The closure rate in Playa's hands was 97 percent, while in the hands of other members of the department it was only 74 percent⁴. Similarly, Virtanen reported that the successful tympanic membrane closure rate for trainees was 78 percent compared to 95 percent for the senior staff. Successful outcome seems to be significantly influenced by the expertise of the surgeon⁵.

Damage to tympanic membrane is commonly the result of chronic ear disease. However damage can also occurs form various forms of trauma. Direct physical injury, burns, scalds, and pressure effect and head injuries. Iatrogenic damage by inserting ventilator tube can also occur. Most perforations heal spontaneously such as those caused by trauma and acute supportive otitis media⁶.

Myringoplasty thus not only helps in improving hearing but also protection of middle ear, external ear and even inner ear from suppuration etc. In one of the study 50 patients of central perforations in the tympanic membrane with dry ears for at least 6 months and no focus of infection in ear, nose, sinuses or throat were included. The success rate was 100% in cases of traumatic perforation (6/6) and 77.3% in perforation caused by chronic suppurative otitis media{CSOM}(34/44); 87.5% in patients with medium sized perforation (14/16) and 83.3% in patients with large central perforation (20/24);60% in patients with subtotal perforation(6/10); 71.4% in patients with sclerotic mastoid (20/28) and 91% with cellular mastoid (20/22); 97.5% in patients with good Eustachian tube function (39/40) and 10% in diseased Eustachian tube (1/10).The success rate of myringoplasty is affected by various factors especially age, nature and size of perforation, cellularity of mastoid and good functioning Eustachian tube⁷.

Treatment of tympanic membrane perforation includes keeping the ear dry, aural toilet and local application of antibiotic drops⁸.If the perforation is less than 25% of tympanic membrane surface, then 90% of the perforation heals spontaneously. Large size, perforation infection and foreign bodies are the factors which reduce spontaneous healing⁹.In addition to age; other factors have been suggested as interfering with the success of the surgery. The size and site of the perforation. Causes of the perforation active infection at the time of surgery, the state of the auditory ossicles and of the mucosa of the middle ear, state of the contralateral ear (as a measure

of the function of Eustachian tube) and the surgical technique utilized¹⁰. The rationale of this work is to analyze common factors which are predictive of success of myringoplasty in adult patients and to construct and validate a prognostic index that could be used as tool to predict the success of myringoplasty in adults.

MYRINGOPLASTY

Tympanoplasty refers to any operation involving reconstruction of the tympanic membrane and/or the ossicular chain. Myringoplasty is a tympanoplasty without ossicular reconstruction.



Figure 01: Myringoplasty

Over the years, many methods have been used for closing perforations. The most widely used and accepted method is underlay graft of temporalis fascia or sometimes perichondrium. The basic procedure is to excise the rim of the perforation so that there is a raw surface from which new tissue will grow. The mucosa on the under surface of the remaining tympanic membrane near to the perforation is removed or scraped with a sickle knife or similar instrument to provide a bed for the graft.

This is then placed under the tympanic membrane remnant and acts as a scaffold for new growth of the squamous epithelial layer. The mucosa over the promontory should be carefully preserved to reduce the likelihood of post-operative adhesions between the graft and the promontory. Outcomes: tympanic membrane take rate the success rate in achieving an intact tympanic membrane in expert hands is often quoted at around 95 percent. However, when results of large numbers of operations⁶ in the hands of many surgeons are reported, the success rate is much lower.

PaIva and Ramsay¹¹ looked at the outcome of 281 myringoplasties in their department. The closure rate in PaIva's hands was 97 percent, while in the hands of other members of the department it was only 74 percent. Similarly, Vartiainen¹² reported that the successful tympanic membrane closure rate for trainees was 78 percent compared to 95 percent for the senior staff. Successful outcome seems to be significantly influenced by the expertise of the surgeon.

Many reports are based on relatively short follow up of 6-12 months. However, longer-term follow up suggests that some ears which are initially intact develop recurrent perforation. The closure rate is reported to be higher in small perforations (74-percent) than large perforations (56 percent). Numerous authors have reported that the failure rate in anterior perforations is

higher. However, this failure rate can be greatly reduced by anchoring the anterior margin of the graft beneath the annulus.¹⁴ Prophylactic antibiotics do not influence closure rate. A five-day course of ampicillin and flucloxacillin commenced preoperatively in 130 patients with inactive COM undergoing myringoplasty did not increase the success rate (85 percent intact tympanic membrane versus 87 percent in controls).¹⁵ Revision surgery can be considered in those ears where the graft fails.

The possible reasons for failure should be considered and, if necessary, the surgical method can be modified. Halik and Smyth¹³ found that only 60 percent of tympanic membranes were intact after revision surgery which is a much lower success rate than usually claimed for primary surgery. Outcomes: hearing Successful closure of the tympanic membrane usually gives only a small improvement in hearing.

MATERIALS AND METHODS

SETTING: ENT (Otolaryngology) Unit North West General Hospital & Research Centre Hayatabad Peshawar.

STUDY DESIGN: Descriptive study (cross sectional)

DURATION: Six months (17/7/2014 to 18/2/2015).

SAMPLING SIZE: Using WHO calculator the proportion of size of perforation (subtotal)=60%⁷.Margin of error=8%.Confidence level=95% so sample size was 145 patients.

SAMPLING TECHNIQUE: Consecutive (Non probability sampling).

INCLUSION CRITERIA:

The following inclusion criteria was used for the selection of patients:

1. Patients with dry ears for at least six months.
2. Age range from 16-60 years.

EXCLUSION CRITERIA

The following exclusion criteria was used:

1. Patients having ears with acute discharge.
2. Focus of infection in their nose, sinuses or throat,
3. Chronic ear disease with granulations or cholesteatoma.
4. Patients suffering from sensorineural hearing loss.

DATA COLLECTION PROCEDURE

Approval of the study was obtained from the medical and ethics committee of the hospital. All patients fulfilling inclusion and exclusion criteria who were undergoing myringoplasty were enrolled in the study and were admitted through OPD in NWGH Hayatabad Peshawar. The

purpose and benefits of the study was explained to patient and patients were assured that confidentiality was maintained and written informed consent was obtained.

Demographic characteristics like name, age, sex, address and phone numbers of all patients were recorded. Complete history was taken and complete general physical and systemic examination was done. All patients were pre-operatively prepared by doing mandatory investigations like CBC, serum urea, serum creatinine, x-ray chest, ECG, RBS and virology. Otoscopy, Rinnes, weber test, pure tone audiometry and tympanometry done for each patient to aid diagnosis for future record and all operative and post-operative finding was recorded The patients were operated by a single consultant surgeon having minimum of five years of experience and well versed with myringoplasty.

The patients were called for follow up at intervals of 10 days, 1 month, 3 months and 6 months. Inclusion and exclusion criteria was strictly followed to control confounders and bias in study. The demographic and clinical data of all the patients such as name, age, gender was recorded in a proforma.

DATA ANALYSIS

The collected data was entered in the SPSS version 17. Frequency and percentages were computed for categorical variables such as gender and common causes like infection and trauma and size of perforation. Numerical variables such as age and duration of illness were presented with mean and SD. Common factors were stratified among age and gender and duration of illness to see the effect modifiers. The results were presented in the form of tables and graphs. Post stratification chi square test was applied in which P value was ≤ 0.05 was considered as significant value.

RESULTS

This study was conducted at ENT (Otolaryngology) Unit North West General Hospital & Research Centre Hayatabad Peshawar in which a total of 145 patients were observed to determine the frequency of common factors influencing the graft uptake in myringoplasty and the results were analyzed as:

Age distribution among 145 patients was analyzed as 17(12%) patients were in age range 15-25 years, 41(28%) patients were in age range 26-35 years, 44(30%) patients were in age range 36-45 years, 32(22%) patients were in age range 46-50 years, 11(8%) patients were in age range 56-60 years. Mean age was 40 years with standard deviation ± 2.63 (as shown in table no 1). Gender distribution among 145 patients was analyzed as 90(62%) patients were male while 55(38%) patients were female (as shown in table no 2). Duration of illness among 145 patients was analyzed as 65(45%) patients had illness < 10 weeks while 80(55%) patients had illness > 10 weeks (as shown in table no 3).

In the current study the success rate of myringoplasty was 90% while the failure rate was 15(10%) patients in which 4(25%) patients had medium perforation, 5(33%) patients had large perforation while 6(42%) patients had subtotal perforation. Regarding the causes of perforation among 15(10%) patients, 13(85%) patients had infection while only 2 patients had trauma (as shown in table no 4, 5).

Stratification of common causes with age, gender and duration of illness was given in table no 6,7,8.

Table 1: Age Distribution (N=145)

AGE DISTRIBUTION	FREQUENCY	PERCENTAGE
15-25 years	17	12%
26-35 years	41	28%
36-45 years	44	30%
46-50 years	32	22%
56-60 years	11	8%
Total	145	100%

Mean age was 40 years with standard deviation ± 2.63

Table 2: Gender Distribution (n=145)

GENDER DISTRIBUTION	FREQUENCY	PERCENTAGE
Male	90	62%
Female	55	38%
Total	145	100%

Table 3: Duration of Illness (n=145)

Duration	FREQUENCY	PERCENTAGE
≤ 10 weeks	65	45%
> 10 weeks	80	55%
Total	145	100%

Mean duration of illness was 10 weeks with SD ± 1.75

Table 4: Size of Perforation (n=15)

	FREQUENCY	PERCENTAGE
Medium	4	25%
Large	5	33%
Subtotal	6	42%
Total	15	100%

Table 5: Frequency Common Causes (n=15)

Common causes	FREQUENCY	PERCENTAGE
infection	13	85%
trauma	2	15%
Total	15	100%

Table 6: Stratification of Common Causes with Age (n=15)

Common causes		15-25 years	26-35 years	36-45 years	46-50 years	56-60 years	Total	P Value
Infection	Yes	1	4	4	3	1	13	0.473
	No	16	37	40	29	10	132	
Total		17	41	44	32	11	145	
Trauma	Yes				1	1	2	0.312
	No	17	41	44	31	10	143	
Total		17	41	44	32	11	145	

Table 7: Stratification of Common Causes with Gender (n=15)

Causes		Male	Female	Total	P value
Infection	Yes	8	5	13	0.763
	No	82	50	132	
Total		90	55	145	
Trauma	Yes	1	1	2	0.811
	No	89	54	143	
Total		90	55	145	

Table 8: Stratification of Common Causes with Duration of Illness (n=15)

Common causes		≤10 Weeks	>10 Weeks	Total	P value
Infection	Yes	7	6	13	0.741
	No	58	74	132	
Total		65	80	145	
Trauma	Yes	1	1	2	0.793
	No	64	79	143	
Total		65	80	145	

DISCUSSION

The study shows that mean age was 40 years with standard deviation ± 2.63 . Sixty two percent patients were male while thirty eight percent patients were female. In this study the success rate of myringoplasty was 90% while the failure rate was 15(10%) patients in which 4(25%) patients had medium perforation, 5(33%) patients had large perforation while 6(42%) patients had subtotal perforation. Regarding the causes of perforated among 15(10%) patients, 13(85%) patients had infection while only 2 patients had trauma.

Similar results were found in another study as 50 patients of central perforations in the tympanic membrane with dry ears for at least 6 months and no focus of infection in ear, nose, sinuses or throat were included. The success rate was 100% in cases of traumatic perforation (6/6) and 77.3% in perforation caused by chronic suppurative otitis media{CSOM}(34/44); 87.5% in patients with medium sized perforation (14/16) and 83.3% in patients with large central perforation (20/24);60% in patients with subtotal perforation(6/10); 71.4% in patients with sclerotic mastoid (20/28) and 91% with cellular mastoid (20/22); 97.5% in patients with good Eustachian tube function (39/40) and 10% in diseased Eustachian tube (1/10).The success rate of

myringoplasty is affected by various factors especially age, nature and size of perforation, cellularity of mastoid and good functioning of eustachian tube⁷

In a local study conducted by Rehman H et al¹⁶, graft was taken up successfully in 80% (40/50) cases. Success rate was 84% in patients with underlay technique (21/25) and 76% in patients with onlay technique (19/25). The graft take up rate was 83.3% where temporalis fascia (30/36) was used and 71.4% where tragal perichondrium (10/14) was used as a graft material. The success rate was 100% in cases of traumatic perforation (6/6) and 77.3% in perforation caused by chronic suppurative otitis media{CSOM}(34/44); 87.5% in patients with medium sized perforation (14/16) and 83.3% in patients with large central perforation (20/24); 71.4% in patients with sclerotic mastoid (20/28) and 91% with cellular mastoid (20/22); 97.5% in patients with good Eustachian tube function (39/40) and 10% in diseased Eustachian tube (1/10). The success rate of myringoplasty is affected by various factors especially age, nature and size of perforation, the type of graft used, cellularity of mastoid and good functioning eustachian tube. Graft take up was better in cases of traumatic perforation than the perforation caused by CSOM. Sergi B et al¹⁷ had shown that in underlay technique the primary causes of perforation were infection (86%) and trauma (14%) where as in overlay technique the primary causes of perforation were infection (92%) and trauma (5%).

CONCLUSION

The study concludes that infection (85%) was the most common cause of perforation followed by trauma (15%) in the graft uptake in myringoplasty in the setup.

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