ejpmr, 2020,7(11), 161-164

SJIF Impact Factor 6.222

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

A STUDY OF TYPE-I TYMPANOPLASTY BY UNDERLAY TECHNIQUE-RISK FACTORS AND THEIR EFFECT ON OUTCOME

Lt. Col. Dr. Salah Uddin Ahmmed*[1], Mejbah Uddin Ahmed[2], Col. A. K. M Asaduzzaman[3], Col. Md. Tauhidul Islam[4], Lt. Col. Md. Bashir Ahmed[5], Lt. Col. Md. Iftekharul Alam[6] and Lt. Col. Md. Misbah Al Kabir[7]

[1]Classified ENT Specialist and Head Neck Surgeon, Border Guard Hospital, Dhaka, Bangladesh.
[2]Associate Professor, Department of Microbiology, Enam Medical College, Savar, Dhaka, Bangladesh.
[3,4,5,6,7]Classified ENT Specialist and Head Neck Surgeon, Combined Military Hospital (Dhaka), Bangladesh.

***Corresponding Author: Lt. Col. Dr. Salah Uddin Ahmmed**

Classified ENT Specialist and Head Neck Surgeon, Border Guard Hospital, Dhaka, Bangladesh.

Article Received on 10/09/2020 **Article Revised on 30/09/2020** **Article Accepted on 20/10/2020**

ABSTRACT

Background: Type 1 Tympanoplasty is a common and established surgical procedure involving reconstruction of the tympanic membrane defect along with elimination of disease, if any, from the middle ear. It is very safe and effective procedure with a variation in the outcome. The success rate varies in different setups and there are some confounding factors like; the size, type and location of perforation which affect the result. The purpose of this study was to determine risk factors and to assess their effect on the success rate. **Methods:** This study was conducted at Combined Military Hospital, Rangpur and Border Guard Hospital, Dhaka from June 2018 to June 2020. All the patients who presented with dry ears, no nasal disease and persistent tympanic membrane perforations during this period were operated upon and overall success rate was calculated. In addition, the relationship between the site of perforation, size of perforation and the type of perforation and the success rate of Type-I Tympanoplasty was also calculated. **Results:** A total of 132 patients were included in this study. Out of these 121 (91.66%) showed complete healing after surgery. The success rate was highest 95.34% in central perforation and lowest 85.71% of the cases in anterior perforation. 100% of the small perforation healed completely while only 74.07% of the large perforations showed successful result after surgery. **Conclusion:** Tympanoplasty is an effective procedure that can lead to improvement in hearing function in patients and prevention of recurrent ear discharge. Optimal results can be achieved through use of the appropriate surgical technique.

KEYWORDS: Type-I Tympanoplasty; Size of perforation; Site of perforation; Outcome percentages.

I. INTRODUCTION

The tympanic membrane (TM) is a delicate translucent fibrous membrane which separates the external from the middle ear.[1] Perforation of the TM may result from either trauma or infective process; out of which infective or suppurative process is the most common cause.[2] An intact TM plays a significant role in the conduction of sound waves across the middle ear and as well protects the middle ear cleft from infection.[3] Due to the perforation of TM when middle ear is exposed to water gets infected and as a result there are chances of recurrent attacks of acute and chronic suppurative otitis media (CSOM) with possible extracranial as well as intracranial complications.[4] Most of the perforations usually heal spontaneously. But this spontaneous healing is affected by chronicity of infection and certain pathophysiological changes at the perforation margins, leading to a nonhealing permanent perforation. Eventually leads to constant exposure of middle ear for reinfection and hearing disability.[5,2] These complications are declining day by day because surgeons are doing the modern treatment successfully.[6] Many techniques and modifications have been developed for the repair of tympanic membrane perforation.[7] Type-I Tympanoplasty is a procedure which is done to close the tympanic membrane perforation after inspecting the middle ear and clearing any residual disease. It is a very safe procedure with very few complications.[4] The closure of perforation is achieved using different autologous graft materials. The commonly used graft materials are temporalis fascia, perichondrium, cartilage, fascia lata, vein and fat.[8,9] Among the various options available otologists prefer to use temporalis fascia or perichondrium as it gives a good healing, sufficient quantity of graft, good tensile strength and acoustic property similar to that of normal TM. Unfortunately, fascia grafts are found to succumb to infections and significant pressure gradient during the post-operative period. This can be avoided in certain cases using a cartilage perichondrial graft.[10, 9] There are two popular surgical techniques, the underlay and overlay grafting techniques, which involve, respectively, the insertion of a graft either medially or laterally to the fibrous tympanic membrane annulus. Each technique has its own

application, advantages and complications.[11,7] Underlay technique is the most widely used technique with good postoperative results[4]. This technique is quicker and easier to perform and the creation of a tympanomeatal flap with elevation of the annulus allows inspection of the ossicular chain. However, there is a risk of medial displacement of the graft, especially in large and or anterior perforations. The overlay technique avoids this pitfall, but there is a risk of keratin pearl formation within the tympanic membrane and also a risk of blunting of the angle between the drum and the anterior meatal wall.[12,13] Several factors which may influence the success rate including; age of the patient, site and size of the perforation, surgical approach (endaural, postaural) and technique (underlay or overlay), duration of the ear being dry prior to surgery, presence or absence of infection at the time of surgery and the type of graft utilized.[14,2,15] We perform Type-I Tympanoplasty routinely in our daily practice. By this study, we will be able to assess the outcome of this procedure in our setup and we will try to find out the confounding factors resulting in failures. We will also compare it with the outcomes in other setups.

II. MATERIAL AND METHODS

This study was conducted at Combined Military Hospital, Rangpur and Border Guard Hospital, Dhaka from June 2018 to June 2020. A total of 132 patients who fulfilled the inclusion criteria were included in this study. Informed written consent was taken from all the patients. Patients were followed up for a period of minimum 6 months and their grafts were assessed for healing. The patients were examined after one month then after 2 months and then after 6 months each. Unhealed tympanic membrane meant that there is residual perforation in the tympanic membrane as seen on the final postoperative visit. We also documented the site and size of perforations and checked for any relationship with graft rejection. Marginal and central perforations were also checked for their success rates. All the patients had preoperative evaluation for any nasal disease and were treated for it before undergoing Type-I Tympanoplasty. In all cases the ear was dry and with normal middle ear mucosa for at least one month prior to surgery. Children below 16 were excluded from the study. Also, patients who had any nasal disease and did not receive any treatment for it were also excluded from the study. All data were analyzed statically using computer program SPSS version 12 for windows.

III. RESULTS

A total of 132 patients were included in this case series. In table –I we showed that out of the total 132 patients, 73 (55.30 %) were male and 59 (44.70 %) were female with a ratio of 1.23: 1. Age range was from 16 to 64 years. Our youngest patient was a 16 year-old boy and oldest patient was also a male 64 years of age. Age grouping was done in three. The first group was from 16 to 30 years. The second was from 31 to 45 years and the third group was above 45 years. Only 10 (7.57 %) patients were above 45 years of age 63 (47.72 %) patients were between 16–30 years. And 59 (44.69 %) patients were between 31–45 years of age.

Table-I Age and sex distribution of patients. (N=132)

Age group	Male	Female	Total
16 to 30 Years	35 (26.51 %)	28 (21.21 %)	63 (47.72 %)
31 to 45	32 (24.24 %)	27 (20.45 %)	59 (44.69 %)
Above 45	6 (4.54 %)	4 (3.03 %)	10 (7.57 %)
Total	73 (55.30 %)	59 (44.70 %)	132 (100 %)

Right ear was operated in 75 (56.81%) patients and left ear was operated in 57 (43.18%) patients. Patients were followed up for a minimum period of 6 months and at that time 121 (91.67%) patients had completely healed tympanic membranes. About 11 (8.33%) patients showed non-healing of their tympanic membranes when they were examined after 6 months of surgery. The site of perforation was divided as Anterior, Central and Posterior perforations. Anterior perforations are those which are involving the anterior part of the pars tensa with or without involving the annulus. Similarly, posterior perforation is mainly involving the posterior part of the pars tensa with or without involving the annulus. Central perforations are those which cannot be classified as anterior or posterior perforation. We had 42 (31.81%) anterior perforations, 43 (32.57%) were central and 47 (35.60%) were posterior perforations table-II. We noted that among the 42 anterior perforations 36 (85.71%) were healed. While among the perforations which were central in location 41 (95.34%) healed. The healing was 44 (93.61%) in case of posterior perforations.

Table-II: Success rate for different sites of perforation. (N=132)

			Healing at 6 Months	
			Healed	**Not healed**
Site of Perforation		**Anterior** 42 (31.81 %)	36 (85.71 %)	6 (14.28 %)
		Central 43 (32.57 %)	41 (95.34 %)	2 (4.65 %)
		Posterior 47 (35.60 %)	44 (93.61 %)	3 (6.81 %)
Total		**132**	121 (91.66 %)	11 (8.33 %)

The size of the perforation was also documented. When the perforation was less than one quarter of the tympanic membrane it was termed as small. When the perforation was less than half of the tympanic membrane it was classified as medium and when it was involving more than half of the tympanic membrane it was classified as large perforation. In our study, according to this classification 34 (25.75%) were small, 72 (54.54%) were medium and 26 (19.69%) were large perforations. Size of perforation also affected the healing of tympanic membrane. All the 100% patients of the small perforations were healed by the surgery. While 93.05% of the medium perforations showed healing and only 74.07 % of the large perforations showed complete healing 6 months postoperatively.

Table-III: Success rate for different sizes of perforation. (N=132)

		Healing at 6 Months	
		Healed	**Not healed**
Size of Perforation	**Small** 34 (25.75%)	34 (100%)	0 (00%)
	Medium 72 (54.54%)	67(93.05%)	5 (7.07%)
	Large 26 (19.69%)	20 (74.07%)	6 (22.22%)
Total		121 (91.67%)	11 (8.33%)

IV. DISCUSSION

Tympanoplasty is now popularized in our country due to its great success rate with less complication. Outcome depends on selection of patients. A total of 132 cases were analyzed male were more common than female with a male to female ratio of 1.23: 1. The age range was from 16 to 64 years. Our youngest patient was a 16 year old boy and oldest patient was also a male 64 years of age. The highest frequency was of the age group 16-30 years, followed by those in the age group 31-45 years in our study. Study done by Sajid T *et al*, found 61 (54 %) were males and 52 (46%) females with a male to female ratio of 1.17:1. The found highest 54 (47.8 %) patients were in the age group between 16–25 years, followed by 53 (46.9 %) patients in between 26–40 years of age.[4] In another study Barake R *et al*. also found that males more than females. Out of 1100 patients 665 (60.5 %) patients were males and 435 (39.5 %) patients were females with male to female ratio of 1.52:1.[7] While Thakur SK *et al.* from Nepal found female were more common than male, with a female to male ratio of 1.6: 1.Regarding age distribution highest frequency were in the age group 21-30 years, followed by those in the age group 13-20 years in their study.[16] Naderpour M *et al.* found highest number of patient age ranged between 29 to 39 years followed by the age group 40 to 49 years of age. Regarding sex of the patient, they found female more than male with a male to female ratio of 1: 2 in their study.[17] In our study right ear was operated in 75 (56.81%) patients and left ear was operated in 57 (43.18 %) patients. In a study Wahid FI also found that perforation of TM were more common in right ear (61.1 %) than left ear.[10] In our study we found 42 (31.81 %) anterior perforations, 43 (32.57 %) were central and 47 (35.60 %) were posterior perforations. Those who had perforation central in location 41 (95.34 %) were healed. In case of anterior perforations 36 (85.71 %) were healed and healing rate was 44 (93.61%) in case of posterior perforations. Over all healing rate were 121 (91.66 %). Relationship between the site of perforation and success rate of healing was also observed in different studies. In a study done by Naderpour M *et al.* found anterior perforation in 12 (20 %) patients, posterior in 14 (23.3 %) patients and central in 34 (56.7 %) patients. Highest success rate 97.05 % was found in case of central perforation. Followed by 92.8 % in posterior perforation and in case of anterior perforation success rate was found 83.3 %.[17] Study done by Sajid T *et al*, found 36 (31.9 %) anterior perforations, 37 (32.7 %) were central and 40 (35.4 %) were posterior perforation. They also noted that among the 36 anterior perforations only 58.3 % healed. While among the perforations which were central in location 94.6 % healed and healing was 87.5 % in case of posterior perforations.[4] Regarding the size of perforation, in our study, we found 34 (25.75 %) were small 72 (54.54 %) were medium and 26 (19.69 %) were large perforations. In case of the small size perforation 100% of the patients were healed by the surgery. While 93.05 % of the medium perforations showed healing and only 74.07 % of the large perforations showed complete healing 6 months postoperatively. Results of different studies showed the relationship between the size of perforation and healing. In a study done by Naderpour M *et al.* found small size (< 50% of TM) in 32 (53.33 %) patients, medium size (50-75 % of TM) in 20 (33.33 %) patients and large size (≥ 75% of TM) in 08 (13.33 %) patients. In their study highest success rate was observed 96.08 % in small size perforation. Success rate were 95 % in the both medium and large size perforation.[17] In a study by Sajid T from Pakistan found 58.3 % success rate in patients with large size perforation while in small perforations success rate was in 100% of the cases.[4] Another study by Said Al-Jaaf SM *et al.* from Iraq found 100% success rate in patients with small size perforation, 90 % success in patients with moderate to large size and 79 % success rate was in large or subtotal perforation.[18]

V. CONCLUSION

Tympanoplasty is a safe and effective technique to avoid continuous infection and to improve the hearing loss. Even though many different factors can influence the results of the operation, Underlay technique is relatively simple, technically easier to perform and takes less time. Therefore, underlay technique should be widely used, but

the ultimate decision about the technique to be employed depends on the surgeons preference and the site of perforation. However, more studies on more samples in various centers should be conducted in order to make an acceptable conclusion.

REFERENCES

1. Sogebi OA, Oyewole EA and Mabifah TO. Traumatic tympanic membrane perforations: characteristics and factors affecting outcome. *Ghana Medical Journal*, 2018; 52(1): 34-40.
2. Ravishankar C, Dhanapala N and Rajpu R. A Review of Results of Type I Tympanoplasty in Active and Inactive Tubotympanic Chronic Suppurative Otitis Media. Research in Otolaryngology, 2014; 3(5): 77-80.
3. Ediale J, Adobamen PR and Ibekwe TS. Aetiological factors and dimension of tympanic membrane perforation in Benin City, Nigeria. *Port Harcourt Medical Journal*, 2017; 11: 55 – 9.
4. Sajid T, Shah MI, Ghani R and Asif M. Type-I Tympanoplasty By Underlay Technique – Factors Affecting outcome. Journal of Ayub Medical College, Abbottabad, 2017; 29(2): 258 -261.
5. Gao T, Li X, Hu J, Ma W, Li J, Shao N and Wang Z. Management of traumatic tympanic membrane perforation: a comparative study. Therapeutics and Clinical Risk Management, 2017; 13: 927 - 931.
6. Mahmud K, Faruque MN and Faisal KA. A Study onType-1Tympanoplasty in Perforated Ear Drum. *Journal* of the *Dhaka National Medical College & Hospital*, 2012; 18(02): 14-16.
7. Barake R, El Natout T, Bassim M and El Natout MA. Loop underlay tympanoplasty for anterior, subtotal and total tympanic membrane perforations: a retrospective review. Journal of Otolaryngology Head and Neck Surgery, 2019; 48: 12. https://doi.org/10.1186/s40463-019-0335.
8. Ramadan MO, Abd-Algaleel AA, Ahmad RA. Formaldehyde treated temporofascial graft versus cartilage graft in repairing failed tympanic membrane grafting. *Egyptian* Journal of *Otolaryngology*, 2017; 33: 626 – 30.
9. Aneesa AM, Pillai A and Rajamma KB. Outcome of Type 1 Tympanoplasty with Cartilage-perichondrium Graft in Comparison with Temporalis Fascia. *International Journal* of *Scientific* Study, 2019; 6(10): 62-67.
10. Wahid FI and Nagra SR. Tympanoplasty type I using tragal perichondrium graft: Our experience. Pakistan Journal of Medical Sciences, 2019; 35(4): 1076-1080.
11. Razzak MA, Murshed KMM, Sobhan AKMA, Hossain MR, Imtiaz SMN. Outcome of Myringoplasty in UnderlayTechnique. *Bangladesh Journal of Otorhinolaryngology*, 2018; 24(2): 131-136.
12. Abdel Aziz AA. Underlay cartilage tympanoplasty: different ways of application of the graft. *Egyptian* Journal of *Otolaryngology*, 2018; 34: 194-197.
13. Nemade SV, Shinde KJ, Naik CS and Qadri H. Comparison between clinical and audiological results of tympanoplasty with modified sandwich technique and underlay technique. *Brazilian* Journal of *Otorhinolaryngology*, 2018; 84(3): 318 - 323.
14. Dangol K and Shrivastav RP. Study of Various Prognostic Factors Affecting Successful Myringoplasty in a Tertiary Care Centre. *International* Archives of *Otorhinolaryngology*, 2017; 21: 250–254.
15. Sergi B, galli J, De Corso E, Parrilla C and Paludetti G. Overlay versus underlay myringoplasty: report of outcomes considering closure of perforation and hearing function. ACTA Otorhinolaryngologica Italica, 2011; 31: 366 – 371.
16. Thakur SK, Singh SK, Afaque A and Ghimire N. Outcome of Type 1 tympanoplasty: An experience at Biratnagar eye hospital in Eastern Nepal. Asian Journal of Medical Sciences, 2016; 7(2): 55 - 60.
17. Naderpour M, Moghadam YJ, Ghanbarpour E and Shahidi N. Evaluation of Factors Affecting the Surgical Outcome inTympanoplasty. Iranian Journal of Otorhinolaryngology, 2016; 28(2): 99 – 104.
18. Said Al-Jaaf S, Mustafa Shem A and Dabbagh L. Myringoplasty [Risk factors and the effect of post-operative follow up on the outcome of success rate in Erbil / Kurdistan of Iraq]. Zanco Journal of Medical Sciences, 2010; 14(3): 1-9.