

## ORIGINAL ARTICLE

# Is outcome of tympanoplasty affected by site and size of perforation?

Vishal Gojiya, Shradha Chandra, Chander Mohan, Abhinav Srivastava

Department of ENT, Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, India

### Corresponding Author:

Dr. Abhinav Srivastava,  
Department of ENT, Rohilkhand  
Medical College and Hospital,  
Bareilly, Uttar Pradesh, India.  
E-mail: drabhinavsrivastava7@  
gmail.com

Received: 12-04-2021

Accepted: 26-04-2021

**How to cite this article:** Gojiya V, Chandra S, Mohan C, Srivastava A. Is outcome of tympanoplasty affected by site and size of perforation? Int J Adv Integ Med Sci 2021;6(2):32-35.

**Source of Support:** Nil,

**Conflicts of Interest:** None declared.

**Introduction:** Chronic otitis media (COM) is one of the most common otorhinological health problems in India. Tympanoplasty is a surgical procedure for the removal of infection and restoring the function of the middle ear. It has been seen that hearing loss is directly related with the size of perforation. So greater the size of perforation more is the loss and one expect the same improvement in hearing once the tympanoplasty is successful with intact ossicles. In patients with healthy middle ear mucosa and intact ossicles, outcome of tympanoplasty is still variable and it may depend on site and size of tympanic membrane (TM) perforation. In patients with healthy middle ear mucosa and intact ossicles, outcome of tympanoplasty is still variable and it also depends on site and size of TM perforation.

**Materials and Methods:** This prospective study was carried out on 42 patients who underwent tympanoplasty for the mucosal type of COM during 1 year period. The result was assessed in terms of successful graft uptake and hearing improvement in terms of Post-operative Air Bone gap hearing gain. **Observations and Results:** Most of the cases affected were in the age group of 18–25 years and females were mostly affected by COM. Site and Size of the perforation was not a determining factor for the successful graft uptake. The effect of perforation site and size on the improvement of hearing was also found to be not associated. **Conclusion:** There was no statistical association between outcome of tympanoplasty with size and site of perforation.

**KEY WORDS:** Chronic otitis media, hearing loss, site of perforation, size of perforation, tympanoplasty

## INTRODUCTION

The term chronic otitis media (COM) defines as chronic inflammation of the middle ear and mastoid cavity, which presents with recurrent ear discharge or otorrhoea through a tympanic membrane (TM) perforation. It is an umbrella term for a group of complex infective and inflammatory condition affecting the middle ear.

COM is one of the most common otorhinological health problem in India. However, with the increase in healthcare facility and better

antibiotics, there is a decline in the incidence of complications but they still occur due to poor socio-economic conditions, lack of consciousness about health care and accessibility of trained specialist in rural settings. India falls into countries with the highest prevalence of >4%.<sup>[1]</sup> However, COM severity and incidence remains high, more so in developing countries and among population of low socioeconomic status. The prevalence of COM in the world is around 65–330 million/year.<sup>[2]</sup>

Mucosal type is associated with central perforation with or without active ear discharge involving middle ear ossicles into a variable extends. Squamous disease presents as an early acute phase with essentially mucosal and bony pathological changes which continue to a late chronic phase with well-established intractable mucoperiosteal disease. The recurrent episode of otorrhoea and mucosal changes are characterised by osteogenesis and bone erosion which is usually followed by the involvement of temporal bone and intracranial extension. The risk of complications is high in squamous type in comparison to mucosal type.

Access this article online	
Website: <a href="http://www.ijaims.in">www.ijaims.in</a>	Quick Response code

This is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), allowing third parties to copy and redistribute the material in any medium or format and to remix, transform, and build upon the material for any purpose, even commercially, provided the original work is properly cited and states its license.

Mucosal type is treated with aural toilet and antibiotics followed by tympanoplasty as the definite surgical treatment. On the other hand, squamous type cannot be simply stopped by antibiotics, hence various type of mastoidectomy is the treatment of choice depending on extent of cholesteatoma.

Tympanoplasty is a surgical procedure for the removal of infection and restoring the function of the middle ear. The procedure aims to eradicate disease in the middle ear and reconstruct the hearing mechanism along with TM grafting.

Tympanoplasties are classified as types I–V, wherein type I involves reconstruction of only the TM, while types II–V involve reconstruction of the ossicular chain with or without repair of the TM.<sup>[3]</sup> The choice of incision depends on several factors including the nature of the anticipated pathology and reconstruction, the desired degree of exposure of the tympanic cavity, the state of the patient's ear canal and external auditory meatus, whether additional mastoid or atticotomy procedures are contemplated, and preference of the otologic surgeon.

There is number of studies in literature that stresses on site and size as the determining factor in the success of tympanoplasty. One group believes that larger perforation carries a high risk for re-perforation and concludes that the high success of tympanoplasty is inversely related to size of perforation. Many groups of otologists believe that it's the technique of procedure that matter and is a deciding factor for a successful outcome. Some has classified perforation into groups, one with more than 50% perforation and other with equal or <50%, higher success is seen in perforation smaller than 50%. Perforations confined to the anterior part are technically difficult to close because of more space in the anterior recess and thereby increasing the possibility of residual perforation in the anterior part of TM.

It has been seen that hearing loss is directly related with the size of perforation. So greater the size of perforation more is the loss and one expect the same improvement in hearing once the tympanoplasty is successful with intact ossicles. In patients with healthy middle ear mucosa and intact ossicles, outcome of tympanoplasty is still variable and it may depend on site and size of TM perforation. The present study has been undertaken to assess the outcome of tympanoplasty in terms of graft uptake and hearing and its association with the site and size of perforation.

## MATERIALS AND METHODS

This prospective study was carried out in the Department of Otorhinolaryngology and Head and Neck surgery, Rohilkhand Medical College and Hospital, Bareilly, a tertiary care and teaching hospital in western Uttar Pradesh for a duration of 1 year and included a total of 42 patients who underwent tympanoplasty for the mucosal type of COM.

The cases were selected as per laid down inclusion and exclusion criteria. Inclusion Criteria included all patients above 18 years of age with mucosal type of COM and willing to participate in this study. Patients with squamous type of COM, having sensor

neural type of hearing loss or with the previous history of any Otologic procedure were excluded from the study.

Pure Tone Audiometry was performed on all patients before surgery and after surgery at 3<sup>rd</sup> month. The site and size of perforation was recorded by following standard guidelines. The TM was divided into four quadrants: Antero-superior, Antero-inferior, Postero-inferior and Postero-superior. Size was categorised as small central if perforation is equivalent to one quadrant; Subtotal perforation, if perforation size is equivalent to 2–3 quadrant and if all the four quadrants were involved then it was labelled as total perforation.

The result was assessed in terms of successful graft uptake and hearing improvement in terms of Post-operative AB gap <25 dB and Post-operative hearing gain >10 dB. The result so obtained was statistically analysed using Statistical Package for the Social Sciences version 22.

## OBSERVATIONS AND RESULTS

Most of the cases affected were in the age group of 18–25 years followed by 26–35 years [Figure 1]; females were mostly affected by the disease in 57.14% cases [Figure 2].

Size of the perforation was not a determining factor for the successful graft uptake as the result was statistically not significant [Table 1].

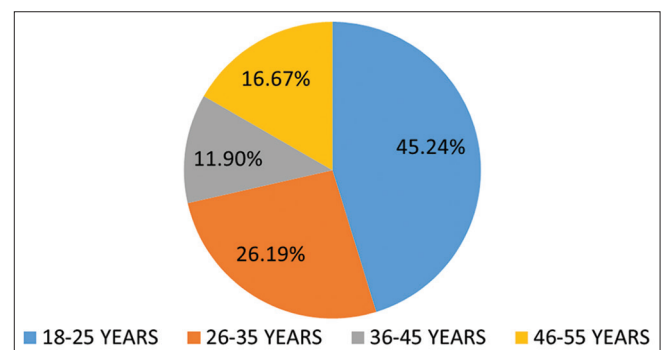


Figure 1: Age wise distribution of cases

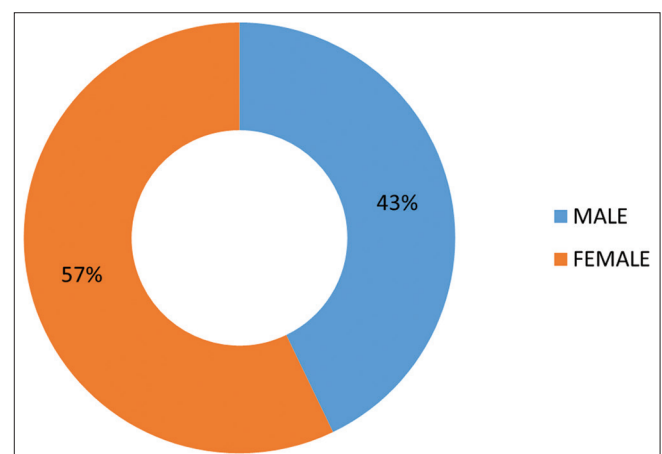


Figure 2: Gender distribution of cases

The effect of perforation size on the improvement of hearing was found to be statistically not significant [Tables 2 and 3].

The effect of perforation site on graft uptake was found to be not significant [Table 4].

However, the effect of site of perforation on improvement in hearing was found to be not significant [Tables 5 and 6].

## DISCUSSION

In our study, the most common age group affected was 18–25 years with 19 (45.24%) cases and it goes with study done by Hair Krishna and Sobha Devi.<sup>[4]</sup> and Basak *et al.*<sup>[5]</sup> who also found that mucosal type of COM is more prevalent in the age span of 10–30 years. The probable reason could be acute suppurative otitis media is more frequent among children and the illness is mostly acquired during infancy or childhood. Unless addressed, this disease remains throughout early and middle adulthood. As a result, young people were more likely to be affected.

In our study, females were more commonly affected than males (57.14%). Basak *et al.*<sup>[5]</sup> also found female predominance in their study. Improper nourishment and lower education level should be the probable causes for the higher incidence in females.

Kumar *et al.*<sup>[3]</sup> and Onal *et al.*<sup>[6]</sup> concluded that the success of tympanoplasty matters on multiple factors, one of them is the location of perforation. They observed the highest failure rates with anterior perforations. This is most likely owing to a lack of blood flow to the anterior portion and surgical access to the area. However, our study has witnessed reasonable successful outcomes among cases with anterior perforations. Study done by Gonzalez *et al.*<sup>[7]</sup> found posterior perforations to have a higher success rate than subtotal perforations.

Our study has found a statistically not significant outcome based on the location of perforation and goes in agreement with the study done by Sharma *et al.*<sup>[8]</sup> who also observed no significant difference between the location of perforation and outcome of tympanoplasty.

Lee *et al.*,<sup>[9]</sup> Onal *et al.*,<sup>[6]</sup> Chrobok *et al.*,<sup>[10]</sup> Wasson *et al.*<sup>[11]</sup> and Nirwan and Somashekara.<sup>[12]</sup> concluded in their studies that size of perforation affects the outcome of tympanoplasty and observed that larger perforation had poorer outcomes in compare to small perforations. Emir *et al.*<sup>[13]</sup> also found that >50% TM perforation had significantly poorer hearing results and a lower rate of graft success. Whereas, Alshehabi *et al.*,<sup>[14]</sup> Sharma *et al.*,<sup>[8]</sup> Singh *et al.*,<sup>[15]</sup> Naderpour *et al.*<sup>[16]</sup> and concluded that the size of perforation doesn't affect the outcome of tympanoplasty surgery. Onal *et al.*<sup>[6]</sup> suggested that graft uptake is better in posterior perforations than anterior perforations, and smaller perforations had better graft uptake than bigger perforations.

**Table 1: Perforation size and graft uptaker**

Perforation size	Number of patients (%)	Graft uptake	Graft rejected	Success percentage	P-value
Small central perforation	13 (30.95)	13	0	100	0.114
Subtotal perforation	16 (38.1)	15	1	93.75	
Total perforation	13 (30.95)	10	3	66.66	

**Table 2: Perforation size and post-op AB gap**

Perforation size	<25 dB post-op AB gap	Success percentage	P-value
Small central perforation	12	92.30	0.09
Subtotal perforation	16	100	
Total perforation	11	84.61	

**Table 3: Perforation size and hearing gain**

Perforation size	Hearing gain >10 dB	Success percentage	P-value
Small central perforation	13	100	0.197
Subtotal perforation	14	87.5	
Total perforation	10	76.92	

**Table 4: Perforation site and graft uptake**

Perforation site	Number of cases (%)	Graft uptake	Success percentage	P-value
Antero superior+Antero inferior	10 (23.81)	10	100	0.161
Antero superior+Antero inferior+Postero inferior	9 (21.43)	9	100	
Antero superior+Antero inferior+Postero inferior+Postero superior	23 (54.76)	18	78.26	

**Table 5: Perforation site and post-op AB gap**

Perforation site	<25 DB post-op AB gap	Success percentage	P-value
Antero superior+Antero inferior	9	90	0.152
Antero superior+Antero inferior+Postero inferior	9	100	
Antero superior+Antero inferior+Postero inferior+Postero superior	21	91.30	

**Table 6: Perforation site and hearing gain**

Perforation site	Hearing gain>10 dB	Success percentage	P-value
AS AI	10	100	0.249
AS AI PI	8	88.88	
AS AI PS PI	18	78.26	

AS: Antero superior, AI: Antero inferior, PI: Postero inferior, PS: Postero superior

Wasson *et al.*<sup>[11]</sup> stated that size of the perforation also affects the hearing outcome. The study finds a direct correlation of the amount of hearing loss with the size of perforation. However, other researchers claimed that the perforation's size was less important than the perforation's location. There is a school of thought that suggests that hearing loss caused by a tiny perforation is minor and is mostly caused by other causes. As a result, patients' hearing improves less when such perforations were closed. Kumar *et al.*<sup>[3]</sup> found increase of hearing loss with the increase in the size of TM.

## CONCLUSION

The disease is more seen among young population with more prevalence among females. However, there is no statistical association between outcome of tympanoplasty with size and site of perforation. Hence, it's the technique of surgery that influences the outcome rather than site and size of perforation.

## REFERENCES

1. Pawar SR, Shukla Y. A clinical study on complications of chronic otitis media and level of awareness in patients admitted

at tertiary care hospital in central India. *Int J Community Med Public Health* 2015;2:223-7.

- Mahadevan M, Navarro-Loeclin G, Tan HK, Yamanaka N, Sonsuwan N, Wang PC, *et al.* A review of the burden of disease due to otitis media in the Asia-Pacific. *Int J Pediatr Otorhinolaryngol* 2012;76:623-35.
- Kumar N, Madkikar NN, Kishve S, Chilke D, Shinde KJ. Using middle ear risk index and et function as parameters for predicting the outcome of tympanoplasty. *Indian J Otolaryngol Head Neck Surg* 2012;64:13-6.
- Hair Krishna P, Sobha Devi T. Clinical study of influence of prognostic factors on the outcome of tympanoplasty surgery. *IOSR J Dent Med Sci* 2013;5:41-5.
- Basak B, Gayen GC, Sarkar MD, Dhar G, Ray R, Das AK. Demographic profile of COM in a rural tertiary care hospital. *IOSR J Pharm* 2014;4:43-6.
- Onal K, Uguz MZ, Kazikdas KC, Gursoy ST, Gokce H. A multivariate analysis of ontological, surgical and patient-related factors in determining success in myringoplasty. *Clin Otolaryngol* 2005;30:115-20.
- Gonzalez CF, Vilas CC, Rodriguez EC, Elhendi W, Lago PV, Caballero TL. Prognostic factors influencing anatomic and functional outcome in myringoplasty. *Acta Otorhinolaryngol* 2002;53:729-35.
- Sharma A, Saxena RK, Verma LR, Bhandari S. Correlation between MERI and hearing after tympanoplasty. *J Nepal Med Coll* 2015;13:6-9.
- Lee P, Kelly G, Mills RP. Myringoplasty: Does the size of the perforation matter?. *Clin Otolaryngol Allied Sci* 2002;27:331-4.
- Chrobok V, Pellant A, Meloun M, Pokorny K, Šimáková E, Mandysova P. Prognostic factors for hearing preservation in surgery of chronic otitis media. *J Int Adv Otol* 2009;24:125-9.
- Wasson JD, Papadimitriou CE, Pau H. Myringoplasty: Impact of perforation size on closure and audiological improvement. *J Laryngol Otol* 2009;123:973-7.
- Nirwan S, Somashekara KG. A study of hearing improvement after tympanoplasty by means of pure tone audiometry. *J Evid Based Med Healthc* 2015;2:113-22.
- Emir H, Ceylan K, Kizilkaya Z, Gocmen H, Uzunkulaoglu H, Samim E. Success is a matter of experience: Type 1 tympanoplasty. *Eur Arch Otorhinolaryngol* 2007;264:595-9.
- Alshehabi M, Almazrou K, Alqahtani M. Middle ear risk index as a prognostic factor in paediatric ossicular reconstruction. *Indian J Otol* 2013;19:23.
- Singh GB, Kumar D, Aggarwal K, Garg S, Arora R, Kumar S. Tympanoplasty: Does dry or wet temporalis fascia graft matter? *J Laryngol Otol* 2016;130:700-5.
- Naderpour M, Moghadam YJ, Ghanbarpour E, Shahidi N. Evaluation of factors affecting the surgical outcome in tympanoplasty. *Iran J Otorhinolaryngol* 2016;28:99-104.