SAS Journal of Surgery
Abbreviated Key Title: SAS J Surg
ISSN 2454-5104
Journal homepage: https://www.saspublishers.com

OPEN ACCESS

ENT

Outcome of Tympanoplasty with Cortical Mastoidectomy in Tubotympanic Type of CSOM

Dr. Zubaidul Haque[1*], Dr. Abdul Karim[2], Dr. Dipon Kumar Sarker[3], Dr. Md. Oli Ullah[4], Dr. Md. Ariful Islam[5]

[1]Assistant Professor (ENT), Netrokona Medical College, Netrokona, Bangladesh
[2]Assistant Professor (ENT), Sheikh Hasina Medical College, Jamalpur, Bangladesh
[3]Associate Professor (ENT), TMSS Medical College, Bogura, Bangladesh
[4]Jr Consultant (ENT), Netrokona Sadar Hospital, Netrokona, Bangladesh
[5]Assistant Professor (ENT), Uttara Adhunik Medical College, Dhaka, Bangladesh

DOI: 10.36347/sasjs.2022.v08i12.005 | **Received:** 24.10.2022 | **Accepted:** 30.11.2022 | **Published:** 07.12.2022

***Corresponding author:** Dr. Zubaidul Haque
Assistant Professor (ENT), Netrokona Medical College, Netrokona, Bangladesh

Abstract **Original Research Article**

Background: Chronic suppurative otitis media (CSOM) is one of the most common ear diseases in under developing countries. Otolaryngologists debate whether to perform tympanoplasty with or without cortical mastoidectomy when treating CSOM. ***Objective:*** To see the outcome of tympanoplasty with cortical mastoidectomy for hearing gain and grafting success. ***Methods:*** This observational study was carried out in the Department of Otolaryngology - Head and Neck Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka from July 2018 to June 2020. A total of 30 patients who underwent type 1 tympanoplasty with cortical mastoidectomy were enrolled in this study. Following enrollment, the condition of the pinna, preauricular region, postauricular region, and external auditory canal were examined. The location and extent of the tympanic membrane perforation, the state of the remaining tympanic membrane, the health of the middle ear mucosa, and the ossicles were all examined during the otoscopy. Tuning fork tests, tests for facial nerve integrity, and fistula tests were also carried out. The hearing level was assessed by pure-tone audiometry with masking. ***Results:*** Among 30 patients' females were 53.3% and males were 46.7%. All of the patients ranged in age from 16 to 60, with the majority of them falling between the ages of 21 and 30. Most of the patients came from middle-class families, and the majority of patients were from rural areas. The majority of patients showed unilateral ear involvement. Most often, the central malleolar region was perforated, then the anterior central region and the posterior central region. The most frequent perforation size was medium, followed by small, large, and subtotal. The pre- treatment bone conduction threshold was 11.74± 4.42 dB, which was reduced to 10.14 ±3.70 dB after treatment ($p<0.05$). The pre-treatment air conduction threshold was 39.78± 8.76 dB, which was reduced to 26.45 ±9.19 dB after treatment ($p<0.05$). The pre-treatment air-bone gap was 28.03 ±7.75 dB, which was reduced to 16.31 ±7.61 dB after treatment ($p<0.05$). Success rate of graft uptake was 93.3%. ***Conclusion:*** Following treatment, there was a significant improvement in hearing gain, and the grafting success rate was 93.3%.

Keywords: Tympanoplasty, mastoidectomy, chronic suppurative otitis media.

INTRODUCTION

CSOM is a chronic infection of the middle ear cleft that is characterised by tympanic membrane perforation and ear discharge. Poor socioeconomic status, inadequate nutrition, and a lack of health education in rural areas all contribute to a higher incidence of CSOM [1].

CSOM is one of the most prevalent juvenile health diseases and in many underdeveloped countries, including Bangladesh [2]. High rates of CSOM have been associated with a number of factors, including overcrowding, inadequate housing, poor hygiene, a lack of breastfeeding, poor nutrition, a compromised immune system, passive smoking, frequent upper respiratory tract infections, high rates of nasopharyngeal colonisation with potentially pathogenic bacteria, and a lack of or inaccessible health care [3]. Due to poorer socioeconomic conditions, overcrowding, subpar nutrition, and a lack of health education, it has a very high incidence in Bangladesh [4-6].

With or without tympanic membrane grafting, a surgical procedure known as a tympanoplasty is

performed to treat middle ear disease and reconstruct the hearing mechanism [7]. Tympanoplasty typically results in successful perforation closure and improved hearing in more than 90% of patients [8].

The mastoid gland is crucial for controlling pressure and aeration in the middle ear. A cortical mastoidectomy is a surgical procedure that preserves the bony external auditory canal wall and middle ear contents while treating disease in the mastoid antrum, air cell system, and aditus and antrum [9].

Cortical mastoidectomy with tympanoplasty has long been considered the preferred surgical procedure because there has been a clinical impression that failure to perform an aerating mastoidectomy at the time of the initial tympanoplasty may be a significant source of failure in patients with chronic non-cholesteatomatous otitis media [10].

The purpose of this study was to see the outcome of tympanoplasty with cortical mastoidectomy in the treatment of tubotympanic type chronic suppurative otitis media.

METHODS

This two-year study was carried out in the Department of Otolaryngology - Head and Neck Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka from July 2018 to June 2020. A total number of 30 patients who underwent type 1 tympanoplasty with cortical mastoidectomy were collected from the Department of Otolaryngology - Head & Neck Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka. For this study the patients were examined thoroughly after taking detailed history. During examination the condition of the pinna, preauricular region, postauricular region and external auditory cannal were noted. On otoscopy, site and size of perforation of tympanic membrane, condition of the rest of the tympanic membrane, condition of the middle car mucosa and the ossicles were also noted. Perforation was categorized as small, medium, large and subtotal on the basis of the surface area of the tympanic membrane. Tuning fork tests, test for facial nerve integrity and fistula test were performed in every case. Hearing level was assessed by pure tone audiometry with masking. Pure tone audiometry was done in the Audiometry Unit at BSMMU. X- Ray mastoid & X- ray paranasal sinuses were done to exclude local pathology.

The patients followed up at weekly interval for the first month, then monthly up to 3 months and after that as needed after the procedure. During follow up, condition of the wound, condition of the external auditory canal and the appearance of newly formed tympanic membrane were noted. Outcome of surgery was regarded as successful if the car was dry and tympanic membrane intact and mobile, criteria of the newly formed intact tympanic membrane regarded as (1) sealed scaled and no perforation, (2) Epithelialization, and (3) Vascularity developed in then newly formed tympanic membrane. Pure tone Audiometric test was performed before operation and after three months and onward after operation according to ISO standard. The hearing thresholds measured at 250, 500, 1000 and 2000 Hz. Air and bone conduction thresholds were determined throughout with appropriate masking techniques. Hearing improvement was assessed by closure of the air-bone gap. Graft taken was assessed by as completely taken, incompletely taken & not taken or failure.

All data were checked and verified thoroughly to reduce the inconsistency. Statistical analysis was performed using descriptive and inferential statistics using Paired t-test and software used in the analysis was SPSS 12.0 version and $P < 0.05$ was considered statistically significant ($P < 0.05$).

RESULTS

Table 1: Socio-demographic profile of the study subjects (N=30)

Parameters	Frequency (n)	Percentage (%)
Age (years)		
16 - 20	8	26.7
21 – 30	13	43.3
31-40	9	30.0
Mean±SD	24.86±6.78	
Min - max	16.0- 38.0	
Gender		0.0
Male	14	46.7
Female	16	53.3
Educational status		
Below secondary	7	23.3
Secondary	5	16.7
Higher secondary	7	23.3
Graduate and above	11	36.7

Parameters	Frequency (n)	Percentage (%)
Occupation		
Student	13	43.3
Housewife	7	23.3
Service	8	26.7
Residence		
Urban	10	33.3
Rural	20	66.7
Socioeconomic status		
Low	8	26.7
Middle	19	63.3
High	3	10.0

Females (53.3%) were predominant than male (46.7%). All patients were of age between 16 to 60 years and most of them were in the age group of 21-30 years. Most of the patients were students (43.3%). Majority of the patients were from rural area (66.7%). Maximum patients were from middle class family (63.3%) followed by poor family (26.7%) (Table 1).

Table-2: Ear involvement, ear operated site, perforation site and perforation size of the study subjects (N=30)

Parameters	Frequency (n)	Percentage (%)
Ear involved		
Unilateral	18	60.0
Bilateral	12	40.0
Ear operated		
Right	16	53.3
Left	14	46.7
Perforation site		
Anterior central	12	40.0
Posterior central	4	13.3
Central malleolar	14	46.7
Perforation size		
Small	7	23.3
Medium	12	40.0
Large	7	23.3
Subtotal	4	13.3

In most of the cases unilateral ear involvement was observed (60.0%). Operated ear was right ear in most of the cases (53.3%). Perforation site was central malleolar in maximum cases (46.7%) followed by anterior central and posterior central. Perforation size was medium in maximum cases (40.0%) followed by small, large and subtotal (Table 2).

Table-3: Effect of surgery on hearing threshold

Hearing threshold	Pre-treatment	Post treatment	p-value	Hearing gain
Bone conduction threshold (db)	11.74 ± 4.42	10.14 ± 3.70	0.019	1.60 ± 3.53
Air conduction threshold (db)	39.78 ± 8.76	26.45 ± 9.19	<0.001	13.32 ± 11.34
Air-bone gap (db)	28.03 ± 7.75	16.31 ± 7.61	<0.001	11.72 ± 11.21

Pre-treatment bone conduction threshold was 11.74 ± 4.42 dB which was reduced 10.14 ± 3.70 dB ($p<0.05$. Pre- treatment air conduction threshold was 39.78 ± 8.76 dB reduced to 26.45 ± 9.19 dB ($p<0.05$). Pre-treatment air bone gap was 28.03 ± 7.75 dB which was reduced to 16.31 ± 7.61 dB ($p<0.05$).

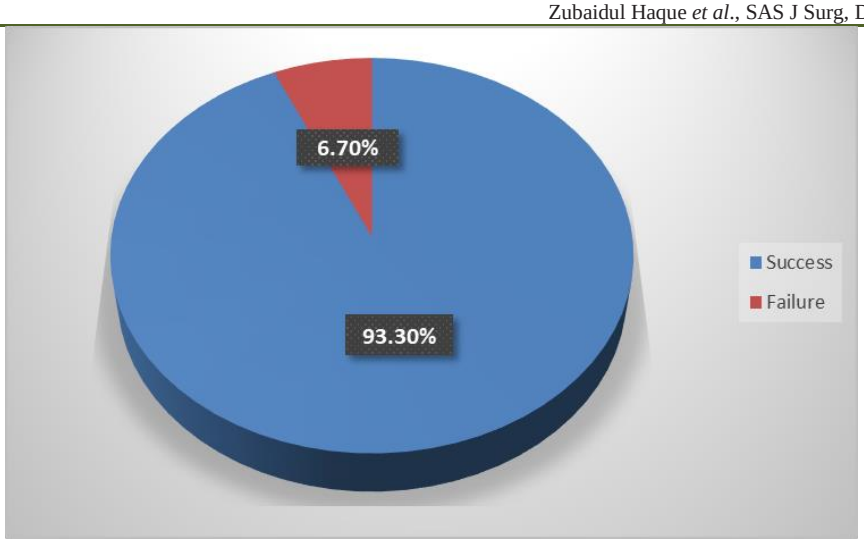

Figure-1: Graft uptake by the study subjects (N=30)

DISCUSSION

In this study, patients between 16 years to 60 years were enrolled. It was revealed that maximum number of the patients (43.3%) were in the third decade. This result was comparable with other studies [11-13]. Females were predominant (53.3%). This result was correlated with the study of Girde *et al.,* [14] and Lasisi *et al.,* [13]. Right ear was operated more i.e. 14 cases (53.3%). This result was correlated with Girde *et al.,* [14]. Small perforation was seen in 23.3% cases, medium perforation in 40.0% cases, large perforation in 23.3% cases and subtotal perforation in 13.3% cases. Biswas *et al.,* [12] and Kaur *et al.,* [15] reported moderately-sized perforation to be the most common. This result was comparable with previous studies [15-17].

In this study, it is worth noted that outcome of hearing gain in terms of post-operative mean air –bone gap was 16.31 ± 7.61 dB. Improvement of air bone gap was found 11.72 ± 11.21. Similar finding was observed in the study of Agrawal and Bhargava [1], in their study improvement of air bone gap was found 12.05 ± 4.98 dB.

In this study, failure rate of graft uptake was 6.7%. These results were comparable with other studies [12, 13, 18, 19]. In a study conducted by Saha *et al.*, [20], Type 1 tympanoplasty with cortical mastoidectomy showed excellent surgical success rate (100%).

CONCLUSION

Success rate of graft uptake in Tympanoplasty with cortical mastoidectomy was 93.3%. Improvement in hearing gain was found significant.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interests regarding the publication of this paper.

REFERENCES

1. Agrawal, A., & Bhargava, P. (2017). Comparative evaluation of tympanoplasty with or without mastoidectomy in treatment of chronic suppurative otitis media tubotympanic type. *Indian Journal of Otolaryngology and Head & Neck Surgery*, *69*(2), 172-175.
2. Berman, S. (1995). Otitis media in developing countries. *Pediatrics*, *96*(1), 126-131.
3. WHO/CIBA Foundation workshop report, Prevention of hearing impairment from chronic otitis media.UK 19–21 Nov 1996.
4. Shaheen, M. M., Raquib, A., & Ahmad, S. M. (2012). Prevalence and associated socio-demographic factors of chronic suppurative otitis media among rural primary school children of Bangladesh. *International journal of pediatric otorhinolaryngology*, *76*(8), 1201-1204.
5. Biswas, A. C., Haq, A. H. M. Z., Khan, F. A., Alauddin, M., & Dutta, P. G. (2005). A comparative study of prevalence of chronic suppurative otitis media (CSOM) between rural and urban school going children. *Bangladesh J Otorhinolaryngol*, *11*(12), 17-21.
6. Rahim, M. M., Joarder, M. A. H., Taous, A., Hossain, D., Ahmed, M. U., & Sayeed, A. H. M. N. (2006). Prevalence of CSOM in selected rural and urban community of Bangladesh. *Bangladesh J Otorhinolaryngol*, *12*, 1-6.
7. Frootko, N. J. (1997). Reconstruction of the middle ear", In: *Scott Browns Otolaryngol*, 3(11), 1- 29.
8. Gross, N. D., & McMenomey, S. O. (2003). Aural Complication of Otitis Media. Glasscock-Shambaugh Surgery of the Ear, *5th edition, Ontario, Elsevier*, 22, 432.
9. Adunka, O. F., & Buchman, C. A. (2011). Mastoidectomy. Otology, Neurotology and Lateral Skull Base Surgery, *1st edition, New York, Thieme*, 5, 295-96.
10. Alper, C. M., Kitsko, D. J., Swarts, J. D., Martin, B., Yuksel, S., Cullen Doyle, B. M., ... & Doyle,

W. J. (2011). Role of the mastoid in middle ear pressure regulation. *The Laryngoscope*, *121*(2), 404-408.

11. Khan, F. K., Rejee, R. E., & Sajilal, S. M. (2014). Assessment of factors affecting the outcome of myringoplasty and type-1 tympanoplasty. *Int J Biomed Res*, *5*(5), 340-3.
12. Biswas, S. S., Hossain, M. A., Alam, M. M., Atiq, M. T., & Al-Amin, Z. (2010). Hearing evaluation after myringoplasty. *Bangladesh Journal of Otorhinolaryngology*, *16*(1), 23-28.
13. Lasisi, A. O., & Afolabi, O. A. (2008). Mastoid surgery for chronic ear: a ten year review. *Internet J Head Neck Surg*, *2*(2), 13.
14. Girde, H., & Code, Q. R. A Comparative Evaluation between Tympanoplasty with or Without Cortical Mastoidectomy. *Small*, *43*(24), 40.
15. Kaur, M., Singh, B., Verma, B. S., Kaur, G., Kataria, G., SinghS Kansal, P., & Bhatia, B. (2014). Comparative evaluation between tympanoplasty alone and tympanoplasty combined with cortical mastoidectomy in non cholesteatomatous chronic suppurative otitis media in patients with sclerotic bone. *ISOR-JDMS*, *13*(6), 40-45.
16. Singha, V., & Debbarma, A. (2015). Type 1 tympanoplasty with cortical mastoidectomy: results and complications. *Journal of Evolution of Medical and Dental Sciences*, *4*(82), 14348-14354.
17. Nagle, S. K., Jagade, M. V., Gandhi, S. R., & Pawar, P. V. (2009). Comparative study of outcome of type I tympanoplasty in dry and wet ear. *Indian Journal of Otolaryngology and Head & Neck Surgery*, *61*(2), 138-140.
18. Mishiro, Y., Sakagami, M., Kondoh, K., Kitahara, T., & Kakutani, C. (2009). Long-term outcomes after tympanoplasty with and without mastoidectomy for perforated chronic otitis media. *European archives of oto-rhino-laryngology*, *266*(6), 819-822.
19. Krishnan, A., Reddy, E. K., Chandrakiran, C., Nalinesha, K. M., & Jagannath, P. M. (2002). Tympanoplasty with and without cortical mastoidectomy—a comparative study. *Indian journal of otolaryngology and head and neck surgery*, *54*(3), 195-198.
20. Saha, A. K., Munsi, D. M., & Ghosh, S. N. (2006). Evaluation of improvement of hearing in type I tympanoplasty & its influencing factors. *Indian Journal of Otolaryngology and Head and Neck Surgery*, *58*(3), 253-257.