

Evaluate the Eustachian Tube Function Inchronic suppurative Otitis Media with Reference to Its surgical Treatment Outcome

S.Shaheera Tarnoom, Sridharanarayanan, M.K. Rajasekar*

Department Of Otorhinolaryngology, Sree Balaji Medical College & Hospital Affiliated to Bharath Institute of Higher Education and Research, Chennai, Tamil Nadu, India.

**Corresponding author e-mail id: rajasekar.k@bharathuniv.ac.in*

ABSTRACT

To assess the outcome of myringoplasty related to Eustachian tube function in CSOM. Compare the surgical outcome of CSOM, in both normal Eustachian tube function and Eustachian tube dysfunction. To evaluate the importance of normal ET function prior to surgery using Tympanometry. A pre-operative test of tubal function is therefore of great importance as one can achieve satisfactory result of Myringoplasty. In view of ET dysfunction, treating the cause of Eustachian tube dysfunction is essential for successful post op graft uptake. A pre operative test of tubal function is therefore of great importance as one can achieve satisfactory result of Myringoplasty.

Keywords: Tympanometry, nasopharynx and myringoplasty.

1. INTRODUCTION

A The eustachian tube, also known as the pharyngotympanic tube, connects the middle ear cavity to the nasopharynx. It removes mucus from the middle ear into the nasopharynx and aerates the middle ear system. [1, 2] The Eustachian tube plays a critical part in the proper workings of the middle ear. Eustachian tube dysfunction causes negative pressure in tympanum and it leads to retraction, effusion and such complications. The eustachian tube has three functions in relation to the middle ear: 1. pressure modulation, 2. protective function, and 3. clearance function. Enlightenment and spiritual growth and increased (these words have in common the idea of enlarging or broadening) Chronic otitis media is characterized by ear discharge and permanent perforation and is described as chronic inflammation of the mucoperiosteal lining in part or all of

the middle ear. Tubotympanic (the protected type) and Atticoantral (the dangerous type) are the two clinical types. The source of infection in the Tubotympanic type of chronic otitis media is either lesion in the nasopharynx, oropharynx, nasal cavity and paranasal sinuses. The infection reaches the middle ear through the Eustachian tube.[3] In the present study the Eustachian tube function will be evaluated in Chronic otitis media and the Eustachian tube function in non intact Tympanic membrane will be measured by Impedance Audiometry.[4-6] This study is to assess the function of Eustachian tube in Chronic Suppurative Otitis Media with reference to its surgical outcome.

2. MATERIALS AND METHODS

STUDY DESIGN: Prospective

STUDY AREA: Sree Balaji Medical College & Hospital.

SAMPLE SIZE: 100 cases were taken up during
2-year course of time.

ETHICAL CLEARANCE: obtained

Inclusion Criteria:

1. Chronic Otitis Media (Tubotympanic type- Inactive stage).
2. Patients of age 15-45 involving both sexes.
3. Patient who are willing to give consent for the study.

Exclusion Criteria :

1. Atticoantral disease
2. Age below 15 years
3. Patients who are not willing to give consent for the study.
4. Comorbidities

INVESTIGATIONS:

GENERAL INVESTIGATION:

1. A COMPLETE OTOLARYNGOLOGICAL EXAMINATION WILL BE PERFORMED TO RULE OUT ANY ASSOCIATED PATHOLOGIES AND FOCUS OF INFECTION.
2. BLOOD INVESTIGATIONS
3. OTO-ENDOSCOPY
4. DIAGNOSTIC NASAL ENDOSCOPY
5. PLAIN X-RAY BOTH MASTOIDS
6. X-RAY OF THE CHEST, X-RAY OF PNS (WATER'S VIEW) AND X-RAY OF NASOPHARYNX (LATERAL VIEW).

AUDIOLOGICAL INVESTIGATION:

1. PURE TONE AUDIOMETRY
2. IMPEDENCE AUDIOMETRY

METHODOLOGY:

100 patients with unilateral or bilateral Chronic otitis media (mucosal type) reporting in outpatient department of ENT of SREE BALAJI MEDICAL COLLEGE AND HOSPITAL in the study period studied for Eustachian tube function. They were assessed clinically to determine the tympanic membrane perforation and middle ear status and complete ENT clinical assessment was done. All routine investigations like HB, TC, DC, ESR, AEC, ANC, PLATELET COUNT, BLOOD GROUPING & RH typing, Urine routine, HIV, HBsAg, LFT, RFT, lipid profile, S.E (Na⁺, K⁺, Cl⁻), RBS, X-Ray of the mastoid, X-Ray of the chest, X-ray of PNS (water's view), and X-Ray of nasopharynx (lateral view). Patients with dry middle ear mucosa were taken up for Tympanoplasty after assessing ETF. All patients were started on suitable antibiotics. Antibiotics was given for one week along with analgesics, antihistamines. Mastoid bandage was removed on

the second post operative day. The sutures were removed on the seventh post operative day. Patients were reviewed two weeks after discharge and second and third review were on first and third month post operatively.

3. RESULTS

In this study analysis of 100 patients with CSOM (tubotympanic-safe type) inactive stage was done in department of ENT, SreeBalaji Medical College and Hospital from Dec 2017 to Jan 2019 to determine the importance of ETF in surgical outcome. Each case was evaluated in detail comprising the history, clinical examination and investigations. Surgical and medical treatment was done and all cases were followed up. The clinical information was obtained using a proforma, and the findings were analyzed using the master map. All data was subjected to descriptive statistics, which were expressed as mean values and percentages. The required statistical analyses of contrast were carried out. The unpaired t test was used to look at continuous variables. The Chi-Square Test and Fisher Exact Test were used to investigate categorical variables. P 0.05 was used as the threshold for statistical significance. SPSS version 17 and Microsoft Excel 2007 were both used to analyze the results.

Study Groups

In this analysis, an observational method was used to test the role of the eustachian tube in chronic suppurative otitis media in relation to the surgical treatment outcome. Internally, data from 100 randomly chosen participants was compared, tabulated, analysed, and analyzed using descriptive and inferential statistics in accordance with the study's stated objectives.

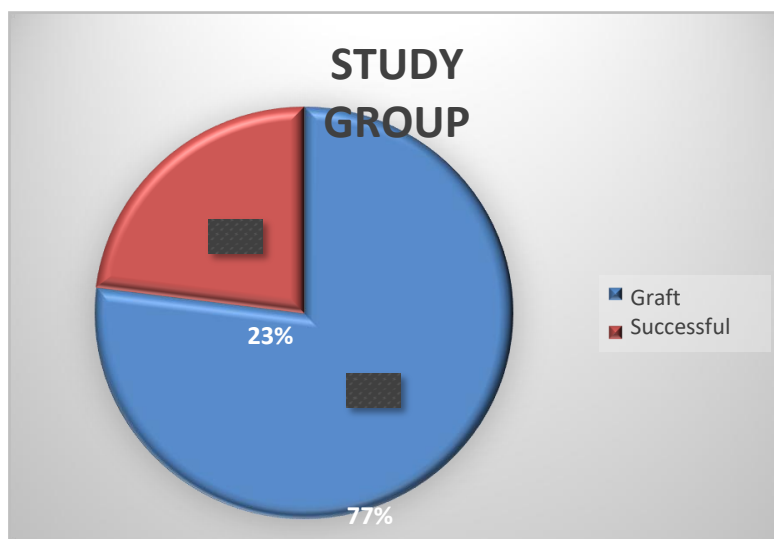


CHART 1 : STUDY GROUPS

Age

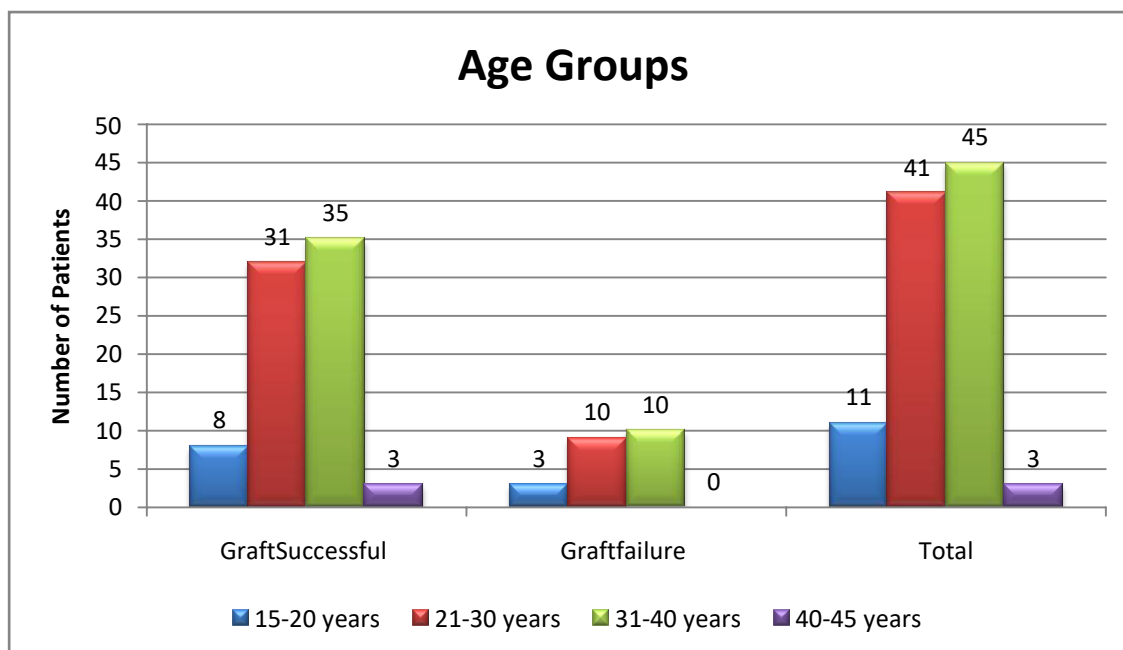


CHART 2 : AGE

| Gender Groups | Graft Successful | % | Graft failure | % | Total | % |
|------------------|------------------|--------|---------------|--------|-------|--------|
| Male | 35 | 44.87 | 12 | 52.17 | 47 | 47.00 |
| Female | 42 | 53.85 | 11 | 47.83 | 53 | 53.00 |
| Total | 78 | 100.00 | 23 | 100.00 | 100 | 100.00 |
| P value | | | | 0.756 | | |
| Chi Squared Test | | | | | | |

TABLE 1 : GENDER

The above table and bar chart represents the association between the Gender and Post operative graft status.

While analysing gender status, it was observed that majority of the graft successful study subjects were females (n=42, 53.85%) and graft failure study subjects were equally distributed to both gender (n=11, 47.83%) (p= 0.756, chi squared test). When statistically comparing gender status between the outcome groups, the difference in the percentage of male patients in graft successful group (44.87%) and graft failure group (52.17%) was found to be statistically insignificant (p >0.05).

| X-RAY MASTOID | |
|----------------------|------------|
| WELL PNEUMATISED | 77 (77%) |
| POORLY PNEUMATISED | 23 (23%) |
| TOTAL | 100 (100%) |

TABLE 2 :X-RAYMASTOID

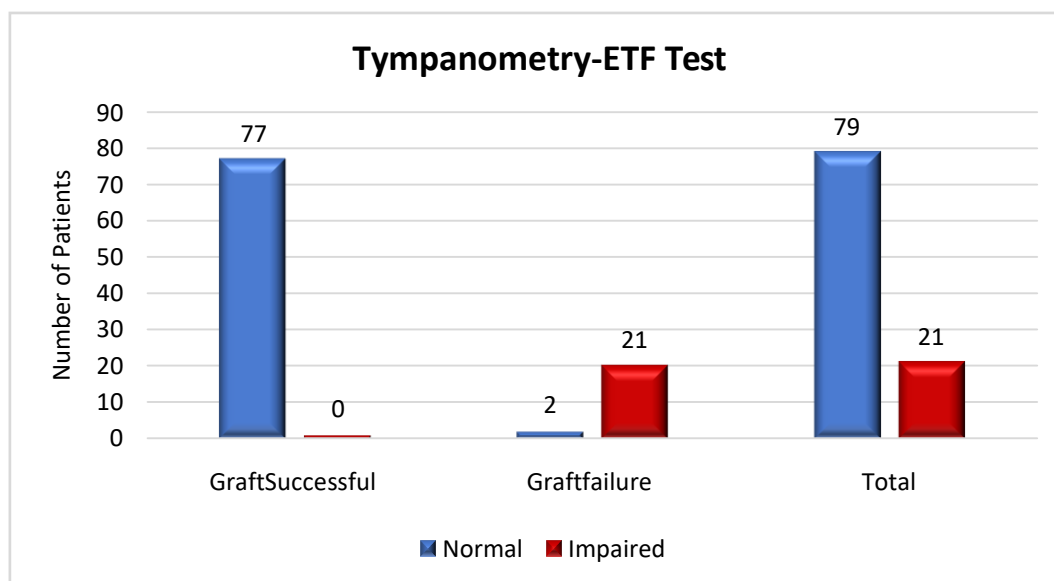
The above table and pie chart represents the frequency of pneumatization of mastoid air cell system in our study group.

| POST OP FOLLOW UP-GRAFT UPTAKE | |
|---------------------------------------|------------|
| TAKEN UP | 77 (77%) |
| PERFORATION | 23 (23%) |
| TOTAL | 100 (100%) |

TABLE 3 : POST OP FOLLOW UP-GRAFT STATUS

The above table and pie chart represents the frequency of Post operative graft status in our study group.

TYMPANOMETRY-ETF TEST VS POST OP FOLLOW UP- GRAFT UPTAKE



**CHART 3 :TYMPANOMETRY-ETF TEST VS POST OP
FOLLOW UP-GRAFT UPTAKE**

While analysing tympanometry-ETF test status, it was observed that majority of the graft successful study subjects had normal results (n=77, 97.47%) and majority of the graft failure study subjects had impaired results (n=21, 100.00%) ($p = <0.001$, chi squared test). When statistically comparing tympanometry-ETF test status between the outcome groups, the difference in the percentage of normal test result in graft successful group (97.47%) and graft failure group (2.53%) and the difference in the percentage of impaired test result in area in graft successful group (0.00%) and graft failure group (100.00%) was found to be statistically insignificant ($p < 0.05$).

4. DISCUSSION

The present study includes 100 patients presenting with chronic otitis media (Tubotympanic -safe type)- Inactive stage. The study group included both adult males and females of age 15-45, different economic status in urban and rural population. In our study patients with healthy (dry status) middle ear were taken up for type 1 tympanoplasty.[7] In the present study there were 11 patients (11%) in the age group 15 to 20 years in which 8 patients (10.39%)

had successful graft uptake and 3 patients (13.04%) had graft failure, 41(41%) patients in the age group of 21 to 30 years in which 31(40.26%) patients had successful graft uptake and 10(43.48%) patients had graft failure, 45 patients(45%) in the age group of 31 to 40 years in which 35 patients(45.45%) had successful graft uptake and 10 patients (43.48%) had graft failure and 3 patients in the age group 40 to 45 years in which 3 patients(3.9%) had successful graft uptake and no patients had graft failure, it was observed that majority of the graft successful study subjects were distributed in 31 -40 years. This age group is commonly affected as one is more active in this decade. Another reason is , this age group is most socially active , more cautious about their hearing, increased health awareness and because of professional necessities.[8-11]

In the present study Eustachian tube function is assessed by Tympanometry. The tympanometric studies revealed that out of 100 patients, 79 patients had normal Eustachian tube function in which 2 patients(2.53%) had graft failure and 77 patients(97.47%) graft uptake was successful whereas 21 patients(100%) had perforation with severe impairment of Eustachian tube function. Proper functioning of the Eustachian tube is necessary for maintaining the middle ear pressure at the ambient atmospheric pressure. [12] This, in turn is essential for the middle ear to carry out the impedance matching function. Assessment of ET function by the impedance audiometer is clinically more rational and clinically relevant as this process of evaluation of tubal function assesses the physiological function of ET which is more important to the clinician than the mere assessment of the anatomical patency of the tube as is possible by most of the other methods. Adequate tubal function is a pre-requisite for the success of reconstructive middle ear surgery.[13]

This trend of significantly higher incidence of normal tympanometry-ETF test status at diagnosis in graft successful group and higher incidence of impaired tympanometry-ETF test status at diagnosis in graft failure group was observed by Yoganadh et al . [14] He assessed ETF by using impedance audiometry and dye instillation and observed a success rate of 95.5% in patients with normal ETF. In a study conducted by Vishal et al, they discovered an 87 percent progress rate in patients with normal ETF. Holmquist⁴ observed eustachian tube function in adults before and after tympanoplasty and confirmed that the procedure has high rate of success in successful eustachian tube function. As a result, an ETF examination should be performed prior

to surgery to ensure a successful outcome. After a month and three months post-op, a follow-up was conducted. Following surgery, patients were examined using otoscopy and otoendoscopy. Patients were split into two outcome categories based on ear findings: successful outcome (defined as a healed graft) and unsuccessful outcome (defined as a graft that was not healed). Graft loss, also known as perforation, was regarded as a failure. (15–17)

Out of 100 patients with CSOM (tubotympanic -healthy type)inactive stage of age 15-45 years, 77 patients (77%) had a good outcome with healed graft and 23 patients (23%) had graft failure with perforation, according to this report. The ETF score before surgery has a strong relationship with the surgery's result.

CONCLUSION

A properly functioning eustachian tube is an integral part of a normally functioning middle ear and it plays a vital role in the success of Myringoplasty. On outcome comparison (graft successful versus graft failure) following myringoplasty in both normal functioning Eustachian tube and Dysfunction Eustachian tube, the following significant conclusions were observed. Eustachian tube functional status is significantly assessed by tympanometry-ETF test and it seems to have a direct influence on the degree of post-operative graft uptake. In this study it was observed that 79 patients had normal Eustachian tube function in which 77 patients (97.47%) had successful outcome with healed graft and 2 patients (2.53%) had graft failure with perforation. 21 patients had perforation with impaired Eustachian tube function. Patients showed increase in success rate of graft uptake with normal ETF when compared with those with impaired ETF.

Funding: No funding sources

ETHICAL APPROVAL: The study was approved by the Institutional Ethics Committee

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ACKNOWLEDGMENTS

The encouragement and support from Bharath University, Chennai is gratefully acknowledged. For provided the laboratory facilities to carry out the research work.

References

1. Evaluation of Factors Affecting the Surgical Outcome in Tympanoplasty Masoud Naderpour, Yalda Jabbari Moghadam, Ensieh Ghanbarpour, Nikzad Shahidi Iran J Otorhinolaryngol. 2016 Mar; 28(85): 99–104.
2. Emir H, Ceylan K, Kizilkaya Z, Gocmen H, Uzunkulaoglu H, Samim E. Success is a matter of experience: type 1 tympanoplasty. European archives of otorhinolaryngology. 2007;264(6):595–9.
3. Mohan C, Sharma S, Srivastava A. Has mastoid pneumatization any bearing on tympanoplasty?. Indian J Otol 2015;21:266 -9.
4. Holmquist J, Bergström B. The mastoid air cell system in ear surgery. Arch Otolaryngol 1978;104:127-9.
5. Priya K, Karthikeyan P, Coumare VN, Sambandan AP (2012) Evaluation of Eustachian tube function in chronic suppurative otitis media (tubotympanic type) with reference to its treatment outcome. Indian J Otol 18:179–183
6. Dave, V. & Ruparel, M. Indian J Otolaryngol Head Neck Surg (2019) 71: 10. <https://doi.org/10.1007/s12070-018-1525-y>
7. Srivastava Abhinav, Mohan Chander, Sengar Arjun (2014) How relevant is eustachian tube function in surgical outcome of tympanoplasty? J Evol Med Dent Sci 3(08):1855–1858.
8. Cohn AM eustachian tube function and tympanoplasty. Ann. Otol 1979;8:339 -47
9. Palva T (1987), Surgical treatment of Chronic middle ear disease, Myringoplasty and tympanoplasty. Acta Otolaryngological, 104(3 -4);
10. Yoganandh, M (2016) Evaluation of Eustachian Tube Function in Chronic Suppurative Otitis Media (Tubotympanic Type) with Reference to Surgical Outcome. Masters thesis, Madras Medical College, Chennai.
11. Prasad, Kishore & Hegde, Mahesh & Prasad, Sampath & Meyappan, Hari. (2009). Assessment of eustachian tube function in tympanoplasty. Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery. 140. 889-93. 10.1016/j.otohns.2009.02.015.
12. Evaluation of prognostic factors and middle ear risk index in tympanoplasty. Pinar E, Sadullahoglu K, Calli C, Oncel S Otolaryngol Head Neck Surg. 2008 Sep; 139(3):386-90.
13. Andreasson L, Harris S. Tympanoplasty and Eustachian tube function. Clin Otolaryngol

Allied Sci 1978;3:421-30.

14. EI-Gunindy A. Manometric and endoscopic study of tubal function in drum perforation. *Am J Otol* 1993;14:5804.
15. Srivastav SC, Gupta SC, Singh AP. Efficacy of various methods in evaluation of Eustachian tube function. *Indian J Otolaryngol Head Neck Surg* 1993;2:188-90.
16. Blue Stone CD. Assessment of Eustachian tube function. In: Jerger J, Norther J, editors. *Clinical Impedance Audiometry*. New York: American Electromedics Corporation; 1980. p. 83 -108
17. Cohn AM, Schwaber MK, Anthony LS, Jerger JF. Eustachian tube function and tympanoplasty. *Ann Otol* 1979;88:339-47.