

Original Research Article

Assessment of eustachian tube dysfunction in middle ear pathologies

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ABSTRACT

Background: Auditory tube dysfunction is suspected as primary cause of chronic otitis media and leads to surgical related complications in otitis media with tympanic membrane perforation. The diagnosis of eustachian tube malfunction is essential to know the pathogenesis of chronic otitis media.

Methods: A total 150 cases and 75 age, sex matched control subjects between age group 20-50 years were selected. Pre and post-surgical history was noted and detailed ear examination, tympanometry was done. Auditory tube function was evaluated through Valsalva test, nasopharyngoscopy, pneumatic otoscopy. Intact tympanic membrane was assessed by Williams test, perforated tympanic membrane by Toynbee's test.

Results: Postoperative assessment of eustachian tube function by Toynbee's test for 19 cases with failed tympanoplasty showed normal ET function in 5 cases, 8 cases had partial and 6 cases had gross ET dysfunction. Postoperative assessment ET function by William's test showed 4 cases among 19 cases had partial ET dysfunction and 01 cases had gross ET dysfunction.

Conclusions: Efficient surgical outcome of middle ear complications always depends on eustachian tube function. Most of the cases with residual CP showed partial or gross ET dysfunction. Patients with tubal dysfunction should be evaluated for underlying cause and treatable causes should addressed before proceeding for surgery as it increases the success rate of tympanoplasty.

Keywords: Chronic otitis media, Eustachian tube, Retracted tympanic membrane, Toynbee's test, William's test

INTRODUCTION

Eustachian tube dysfunction is termed as an insufficient dilatory function causing secondary ear pathology which can develop from mechanical or functional causes or obstruction.¹ Middle ear pathology is caused by multiple factors among that abnormal function of eustachian tube plays a key role in the middle ear diseases.²

Majority investigations of auditory tube dysfunction cannot differentiate weather it is type of functional or mechanical which is need in management of complication. Functional dysfunction occurs due to inherent tubal muscle weakness and mechanical

dysfunction occurs due to obstruction in nasal and paranasal sinuses.^{1,3}

Multiple treatment modalities are available to examine the function of eustachian tube such as Valsalva manoeuvre, Politzer's test, Toynbee test, pneumatic autoscopia, eustachian tube catheterisation etc.⁴ Normal eustachian tube function is important in the tympanoplasty which is stated by studies conducted tympanoplasty in cases with and without normal tubal function.⁵ The fruitful outcome of tympanoplasty depends on the proper diagnosis and treatment of eustachian tube dysfunction before surgery. With reference to the above literature the present study designed to assess the

eustachian tube function in cases with middle ear diseases and control subjects.

METHODS

The present study was conducted in the Department of ENT, Mallareddy Institute of Medical Sciences Medical College, Hyderabad during April 2016 to March 2018. A total 150 cases with chief complaints of middle ear disease, chronic otitis media and 75 age, sex matched control subjects with normal tympanic membrane were recruited. All the participants were in between 20 -50 years. Grade 1 and grade 2 type of retracted pars tensa of tympanic membrane, cases who had type 1 tympanoplasty and myringoplasty 3 months prior to the study were included. Cases with ear discharge, Grade 3 and grade 4 types of retracted pars tensa of tympanic membrane, UPTI, other middle year diseases were excluded from the study.

A detailed clinical history was collected and cases were undergone to detailed clinical examination and complete haemogram. Pre and post-surgical history was noted and detailed ear examination, tympanometry was done. Auditory tube function was evaluated through Valsalva test, nasopharyngoscopy, pneumatic otoscopy. Intact tympanic membrane was assessed by Williams test, perforated tympanic membrane by Toynsbee test. Pre and post-operative data was extracted and percentages was analysed by using Microsoft office excel sheet.

RESULTS

A total 150 cases with chronic otitis media and 75 age and sex matched control subjects were selected. Among the cases majority cases were in between age group 26-35 years.

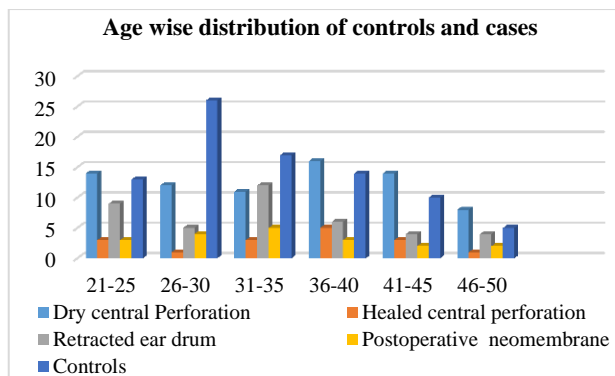


Figure 1: Age wise distribution of controls and cases.

Table 1: Status of tympanic membrane in patients.

Details of ear drum	Total cases	
	Number	(%)
Dry central perforation	75	100
Healed central perforation	16	21.3
Grade 1 and 2 retracted ear drum	40	53.3
Post op neomembrane	19	25.3

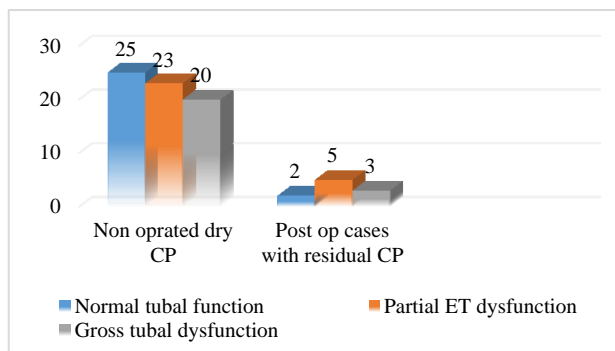


Figure 2: Eustachian tube function in patients with CSOM.

Table 2: Details of auditory tube function in retracted tympanic membrane, healed central perforation, post op patients.

Age in years	Controls	Dry CP cases	Healed CP	Retracted ED	Post op with neomembrane
Total no of cases	75	75	16	40	19
Normal ETF	75	19	11	05	14
Ear drum dysfunction	Partial	56	04	28	04
	Gross		01	07	01

Tympanic dry central perforation was seen in 100% cases and Grade 1 & II retracted ear drum was seen in 53.3% cases (Table 1). In non-operative CSOM cases, normal eustachian tube function was seen in 25 cases, partial dysfunction in 23 cases and gross dysfunction in 20 cases. Whereas in postoperative cases with residual CP showed normal ET function in 2 cases, partial dysfunction in 5 cases and gross dysfunction in 3 cases (Figure 2).

In this study, postoperative assessment of eustachian tube function assessed by Toynbee’s test for 19 cases with failed tympanoplasty. Among the 19 cases, 5 cases had normal ET function, 8 cases had partial and 6 cases had gross ET dysfunction.

Partial TM dysfunction was seen in 56 cases with dry CP, 4 cases with healed CP, 28 cases of retracted CP. whereas gross dysfunction was seen in 1 case with healed CP, 7

cases with retracted CP (Table 2). In cases with normal ED, eustachian tube function was abnormal in 3 cases, in retracted ED, ET function was abnormal in 34 cases, in

recurrent CSOM, ET function was abnormal in 10 cases and in healed CP, eustachian tube function was abnormal in 5 cases (Table 3).

Table 3: Comparison of Eustachian tube function in between different conditions.

	Normal ED	Retracted ED	Recurrent CSOM	Healed CP
Eustachian tube function				
Normal	72	06	03	11
Abnormal	03	34	10	05

DISCUSSION

Eustachian tube or auditory tube is liable for pressure stabilisation between external environment and tympanic cavity and safeguards tympanic cavity from nasopharyngeal secretions.⁶ Auditory tube dysfunction make ear to susceptible for chronic middle ear diseases by generating negative pressure inside the middle ear which leads to shifting of intravascular fluid in to interstitial spaces then to lumen of tympanic cavity and retracting ear drum. Thus leading to the pathogenesis of chronic otitis media.⁷⁻⁹ In this study a total 150 COM cases with dry central perforation, healed central perforation, retracted ear drum and post-operative cases who had type 1 tympanoplasty and myringoplasty were recruited and assessed for auditory tube function. To assess this, intact tympanic membrane was assessed by Williams test, perforated tympanic membrane by Toynsbee test.

In present study, all the control subjects had normal eustachian tube function whereas in dry CP cases, 19 cases were shown normal ET function and 56 cases shown ET dysfunction. In present study, postoperative assessment of eustachian tube function assessed by Toynsbee's test for 19 cases with failed tympanoplasty. Among the 19 cases, 5 cases had normal ET function, 8 cases had partial and 6 cases had gross ET dysfunction. Study by Saravanan et al, found that out of 7 cases with failed tympanoplasty, 1 case had normal ET function, 3 had partial and 3 had gross ET dysfunction.⁷ The findings are suggesting that effective surgical outcome always depends on eustachian tube function.^{10,11}

In this study postoperative assessment of ET function by William's test showed 4 cases among 19 cases had partial ET dysfunction and 01 cases had gross ET dysfunction which is comparable with the findings of Biswas et al, where 6 cases had partial and 2 cases had gross ET dysfunction among 34 cases.¹² This study also correlating with the findings of Saravanan V et al., where 2 cases had partial ET dysfunction among 12 cases.⁷

In cases with grade 1 and grade 2 retracted tympanic membrane, ET dysfunction was seen in 35 cases. Among 35 cases, 28 cases had partial and 7 cases had gross ET dysfunction.

CONCLUSION

The findings are suggesting that efficient surgical outcome of middle ear complications always depends on eustachian tube function. ET function was found to be partially or grossly impaired in most patients with residual CP. Eustachian tube function testing by impedance audiometry is a simple non-invasive method of testing the Eustachian tube function and helps in identifying the tubal dysfunction. Patients with tubal dysfunction should be evaluated for underlying cause and treatable causes should addressed before proceeding for surgery as it increases the success rate of tympanoplasty.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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