



Effectiveness of Chemical Cauterization Using 50% Trichloroacetic Acid in Small Size Tympanic Membrane Perforation

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ABSTRACT

Introduction

Many office procedures are done for small size tympanic membrane perforation. The purpose of our study, is to know the effectiveness of chemical cauterization using 50% trichloroacetic acid in small size tympanic membrane perforation closure and to evaluate the hearing improvement after complete closure of tympanic membrane.

Materials and Methods

Study is conducted among 40 patients who are attending ENT OPD between September 2018 to October 2020 in Rajah Muthiah Medical College and Hospital, Chidambaram. All patients were evaluated preoperatively using audiometry to know the type and degree of hearing loss and paper patch test to know the improvement in hearing. By using 50% TCA in cotton tipped Jobson Horne Probe the edges of the perforation are cauterized in an inward to outward direction and followed up every week till the complete closure of tympanic membrane by subsequent application of 50% TCA.

Results

Among 40 patients, in the age group of 18-50 years 24 were male and 16 were female. Among 40 patients, 22 had right ear perforation and 18 had left ear perforation. Infection (n=23) was the most common cause of small size perforation and antero-inferior quadrant (n=21) is the most commonly involved quadrant. Success rate was found to be 90% and hearing gain was 4.89dB post operatively. The average number of TCA application needed was 4 times.

Conclusion

50% trichloroacetic acid is a cost effective and simple procedure which can be done as an outpatient procedure with high success rate and minimal complications.

Keywords: 50% trichloroacetic acid, gelfoam, paper patch

INTRODUCTION

Tympanic membrane perforation occurs due to direct trauma or infection due to Eustachian tube dysfunction. CSOM is a common disease of ear which troubles the normal day to day life of an

individual by decreasing the ability of hearing and discharge from ear during its active stage. It is a most common disease of ear which leads to dreadful complications.

Since it is a common disease and mostly requires surgical management. Small perforations can be managed by chemical cauterization using 50% trichloroacetic acid which can be done as an outpatient procedure without any complications. By this method we can improve the quality of life in patients who are not willing for surgery and who are not fit for surgery. This procedure is also cost effective and can be done as an office procedure.

AIMS

- To study the efficacy of chemical cauterization using 50% trichloroacetic acid in small size tympanic membrane perforation.

OBJECTIVES

- To know the clinical outcome of 50% trichloroacetic acid cauterization in small size tympanic membrane perforation.
- To assess the hearing improvement after complete closure of tympanic membrane perforation following 50% TCA cauterization.

MATERIALS AND METHODS

This is a prospective study conducted in the department of ENT, in Rajah Muthiah Medical College and Hospital, Chidambaram. This study was conducted in the time period of September 2018 to October 2020 among patients who are attending ENT OPD in Rajah Muthiah Medical College and Hospital. Sample size of the patients taken into consideration for the study is 40.

Inclusion criteria

1. Small size central perforation of tympanic membrane.
2. Dry ear for a minimum period of at least one month.
3. Cases who have pure conductive hearing loss of less than 40 Db.
4. Adult patients who are in the age group of 18-50 years.

Exclusion criteria

1. Active discharge in mucosal type of chronic suppurative otitis media.
2. Patients with mixed hearing loss.

3. Patients with ossicular discontinuity or fixation.
4. Atticoantral type of chronic suppurative otitis media.

General Examination

Patients who are taken into the study are informed about the advantage and disadvantage of this procedure. History of the patient, symptoms, duration of the symptom and the treatment history undergone till now, like ear surgeries (tympanostomy tube insertion or myringoplasty) for reperforation is taken. Clinical examination of complete ear, nose, throat are done to rule out other causes.

Otoscopic Examination

It is done to know the size of tympanic membrane perforation and to know the quadrant of tympanic membrane perforation and to find out whether it is single or multiple perforation which occurs due to trauma or infective cause like TB otitis media. To know whether the patient has active discharge or not.

Paper patch technique

Perforations of tympanic membrane result in a predominantly low frequency conductive hearing loss that is roughly proportionate to the size of perforation. An airborne gap that is disproportionately large for a given perforation size may indicate ossicular discontinuity or fixation.

A piece of cigarette paper or gelfoam coated with ointment is placed over the perforation and assessment of hearing is done before and after placing the patch. Improvement of hearing by closing the perforation with cigarette paper coated with ointment indicates normal ossicles. If hearing is not improved it indicates ossicular fixation or discontinuity which requires Tympanoplasty with ossicular reconstruction. Assessment of the audiometric profile can help the surgeon to anticipate the middle ear pathology which in turn can help in preoperative planning and counseling of patient.

Audiometric Examination

Audiometry examination will be done in acoustically treated room with manual audiometer with standard headphones. Before doing the procedure it is explained to the patient about the method and proper formal consent to be obtained.

It is done before the procedure to know the degree of hearing loss and type of hearing loss. Paper patch test done before the procedure can guide the surgeon to anticipate other causes of hearing loss like ossicular fixation or discontinuity.

Pure tone audiometry will be done from 125 Hz, 250 Hz, 500 Hz, 1000 Hz, 2000 Hz, 4000 Hz and 8000 Hz and average of three frequencies of 500 Hz, 1000 Hz and 2000 Hz is taken.

Audiometry is done at the end of three months after complete closure of tympanic membrane perforation due to chemical cauterization.

PROCEDURE

Patient is made to lie in supine position and ear is examined through microscope. External auditory canal is cleaned with betadine to remove the debris and tympanic membrane is anaesthetized by placing a cotton ball soaked in 4% xylocaine over the tympanic membrane and leaving it for 10 min for anaesthetizing the tympanic membrane.

After the tympanic membrane is anaesthetized, gelfoam is placed in the middle ear for protection

then by using cotton tipped Jobson Horne Probe with 50% TCA, the edge of perforation is cauterized in an inward to outward direction to break the epithelial barrier. It is noted by white colour change over edges of the perforation.

After the procedure sterile gelfoam is cut into pieces and soaked with antibiotic ear drops which is placed in the middle ear and external auditory canal for support and growth of tympanic membrane. Patient is prescribed with oral antibiotics and advised to keep the ear dry.

Patient is reviewed every week for examination and cauterization every week under aseptic precautions until complete closure of tympanic membrane perforation.

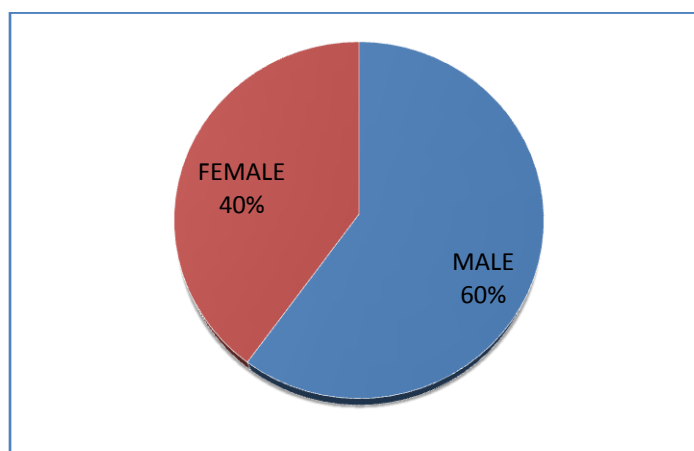
OBSERVATIONS AND RESULTS

Among 40 patients taken into study 24 were male and 16 were female in the age group of 18-50 years with minimum age being 18 and maximum age being 50. Most of the patients, around 18 cases (45%) were in the age group of 26-35 years.

Table 1: Sex Distribution

Gender	No. of Cases	Percentage
Male	24	60%
Female	16	40%
Total	40	100%

Fig 1: Sex Distribution



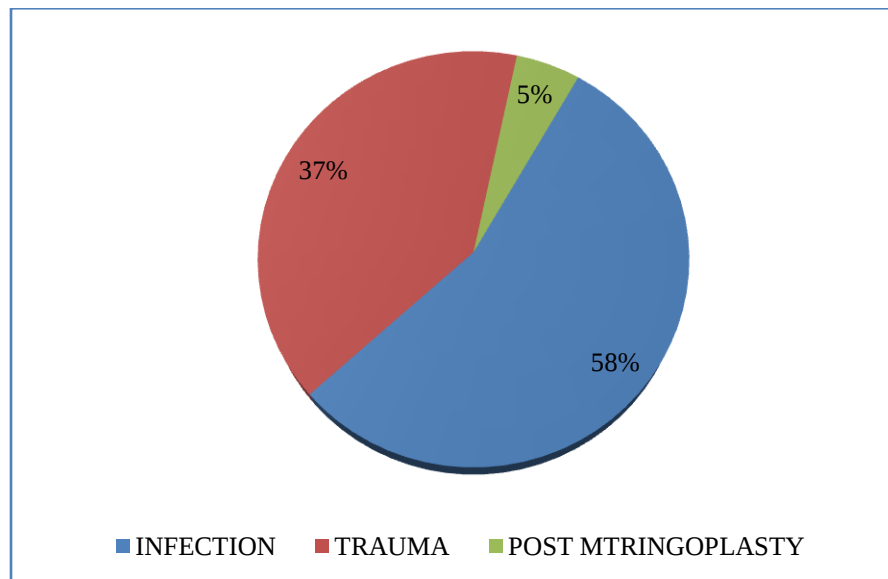
Among 40 patients 22 cases (55%) had right ear perforation and 18 cases (45%) had left ear perforation.

Among 40 patients taken into study infection was the most common cause for perforation around 23 cases (58%) followed by trauma 15 cases (37%) and reperforation post myringoplasty is 2 cases (5%).

Table 2: Aetiology of Perforation

Aetiology	No. of Cases	Percentage
Infection	23	58%
Trauma	15	37%
Postmyringoplasty	2	5%

Fig 2: Aetiology of Perforation



Among 40 patients taken into study, anteroinferior quadrant was the most commonly involved quadrant around 21 cases (52%) followed subsequently by posteroinferior quadrant 13 cases (33%) and anterosuperior quadrant, 4 cases (10%) and the least involved quadrant is posterosuperior quadrant 2 cases (5%).

Among 40 patients, 15 cases (37%) had preoperative hearing threshold between 16-20 dB, 19 cases (48%) had preoperative hearing threshold between 21-25 dB and 6 cases (15%) had preoperative hearing threshold between 26-30 dB.

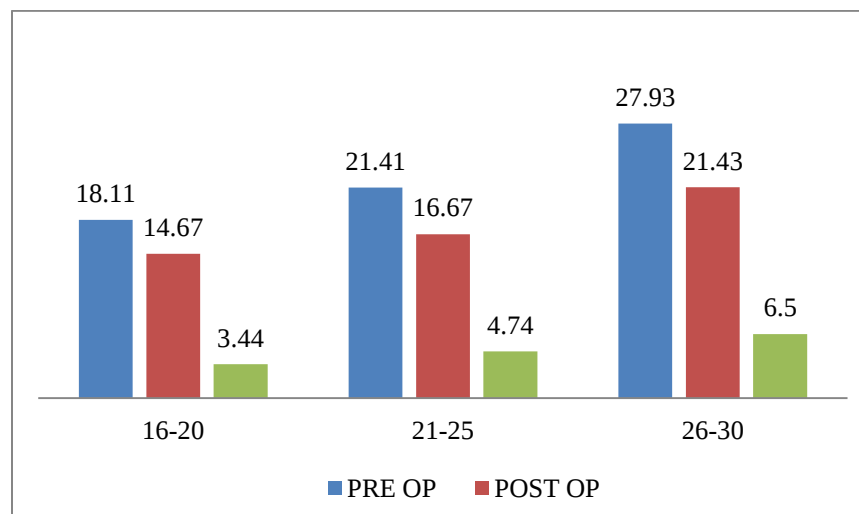
Among 40 patients, the preoperative hearing threshold with an average of 18.11 dB in 16-20 dB hearing threshold category had postoperative hearing threshold with an average of 14.67 dB with hearing gain of 3.44 dB, for patients with preoperative hearing threshold with an average of 21.41 dB in 21-25 dB hearing threshold category had postoperative hearing threshold with an average of 16.67 dB with hearing gain of 4.72 dB, for patients with preoperative hearing threshold with an average of 27.93 dB in 26-30 dB hearing threshold category had postoperative hearing threshold with an average of 21.43 dB with hearing gain of 6.5 dB. The minimal initial hearing threshold preoperatively was 16 dB and maximum hearing threshold 30 dB with an

average of 21.85 dB and minimum hearing threshold postoperatively was 12 dB and maximum of 26 dB with an average of 17.85 dB with hearing gain of 4.89 dB.

Table 3: Hearing Improvement

Hearing Loss	Pre Op PTA	Post Op PTA	Hearing Gain
16-20 dB	18.11	14.67	3.44
21-25 dB	21.41	16.67	4.74
26-30 dB	27.93	21.43	6.5

Fig 3: Hearing Improvement



Among 40 patients, 36 cases (90%) had successful closure following 50% Trichloroacetic acid cauterization and in 4 cases (10%), tympanic membrane perforation did not close following cauterization. The minimum number of attempt taken to close tympanic membrane was found to be 3 attempts in 4 patients and maximum number of attempt taken to close tympanic membrane was found to be 5 attempts in 4 patients, 4 attempts in 32 cases and the average number of attempts taken to close the tympanic membrane was found to be 4.

DISCUSSION

Tympanic membrane place a major role in conduction of sound and the most important of this function was the discovery of middle ear transformer mechanism by Helmholtz.

The basis of all surgery is to close that tympanic membrane perforation and the first attempt was made by Banzer⁴ in 1640 using pigs bladder and in 1853 Toynbee¹¹ used rubber disk attached to wire over a

perforation. Followed by Yearsly in 1863 improved the hearing ability by just placing a cotton ball over the perforation. Blake⁸ in 1879 used the paper patch over the perforation which is still used as a screening test before any procedure.

Roosa used silver nitrate chemical cauterization in 1876 and Okuneff⁹ in 1893 used trichloroacetic acid for chemical cauterization. In 1953 Derlacky¹ popularized 100% trichloroacetic acid with cotton pledge soaked in antibiotics and achieve success rate of 75.6% with average hearing gain of 16.3dB. In a later study, Juers⁵ reported 88% success with average of 3.7 applications. In a study by Monoj Mukherje² using 15% TCA and fat graft myringoplasty hearing gain was 7.2 dB and achieved 92% success rate. In a study by Manabendra et al.³ the success rate was found to be 83.33% in chemical cauterization and 90.9% success in fat plug myringoplasty. In a study by Parth Makwana⁶ using 50% trichloroacetic acid the success rate was 75% with an hearing gain 9.3 dB. In a study by Ganesh Bala⁷ using 50%

trichloroacetic acid the success rate was 92.5%. In a study by Priti Rakesh¹⁰ to compare fat plug myringoplasty and chemical cauterization using 50% Trichloroacetic acid the success rate was 96.67% in fat plug myringoplasty and 90.62% in 50% Trichloroacetic acid chemical cauterization.

The following analysis was obtained from our study:

Majority of the patients belonged to the age groups of 26-35 years (45%) and 18-25 years (27%). The youngest patient was 18 years old and the oldest patient was 50 years old. In our study there were 24 male and 16 female. Infection (n=23) (58%) was the most common cause for Small Size Perforation. Most of the patients had small size central perforation. Right ear (n=22) (55%) disease was more common than left ear (n=18) (45%). Antero-inferior quadrant (n=21) (52%) was involved most commonly among the four quadrants. There was hearing improvement in almost all patients who had complete closure of perforation and post-operative gain was found to be 4.89 dB. Efficacy of 50% TCA was found to be 90% where 36 patients out of 40 patients had successful closure and failure was found to be 10%, 4 patients out of 40. Infection (n=2) (5%) and Otomycosis (n=2) (5%) was the most common factor for failure. Out of 40 patients, 4 cases required only 3 TCA Applications, 32 cases required 4 TCA Applications and 4 tympanic membrane perforation failed to heal even after 5 applications and average was found to be 4 times taken to close tympanic membrane perforation.

CONCLUSION

50% Trichloroacetic acid cauterization is an effective method of small tympanic membrane perforation closure which can be done in a small setting for patients who are not fit for surgery and who are not willing for surgery. It is a simple and cost effective procedure which can be done as a outpatient office procedure.

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