

A STUDY ON CLOSURE OF TYMPANIC MEMBRANE BY 10% TCA

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ABSTRACT: Purpose of closure of central perforation of Tympanic Membrane is to restore continuity and restore hearing.⁽¹⁾ This study was carried on 50 patient with small dry central perforation over a duration of two years with success rate of seventy seven percentage and 5-6% dB hearing improvement.

KEYWORDS: BPSK Modulator, Convolutional Encoder, CORDIC, DS-CDMA/CI, FPGA.

HOW TO CITE THIS ARTICLE: Sathi Raju Velaga S. S. P, Krishna Chaitanya V, Gowthami Sandhya D. "A Study on Closure of Tympanic Membrane by 10% TCA". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 89, November 05; Page: 15440-15442, DOI: 10.14260/jemds/2015/2204.

INTRODUCTION: Chronic supportive otitis media is most common problem in India.⁽¹⁾ Various methods have been advocated from decades mostly surgical i.e. tympanoplasty.⁽²⁾ But for small central perforation closure can be done with 10% trichloro acetic acid which was advocated by Okonuff in 1895 and was still popular.⁽³⁾

AIMS: The main purpose of this study to see the success rate in closure of small perforations and also in patients with associated ENT problems like deviated nasal perforation, allergic rhinitis.

MATERIALS AND METHODS: This study was done in Srinivasa ENT hospital, Kakinada during period of Nov 2012 to Nov 2014 with sample size of 50 patients and with 6 month follow up.

Inclusive Criteria:

- Dry small central perforation for 6 weeks mild to moderate conduction hearing loss.
- Normal eustachian tube function.
- Traumatic perforation.
- Residual perforation in post myringoplasty.

Exclusion Criteria:

- Subtotal and total perforation large central perforation.
- ASOM.
- Otosclerosis.
- Atticoantral perforation.

Patients selected are completely evaluated with otoscopy, diagnostic nasal endoscopy and pure tone audiometry.

Informed written consent taken from patients.

Preparation of TCA: It is prepared by mixing 10grams of 100% TCA with 10ml of distilled water.^(4,5)

Procedure was done under local anesthesia with 4% xylocaine on tympanic membrane with cotton ball for 30 minutes,⁽⁶⁾ 10% TCA is kept on the rim of tympanic membrane with care taken not to scar promontory.⁽⁷⁾

Procedure repeated after every 10-14 days after closure PTA is done.⁽⁸⁾

DISCUSSION: Perforation of the tympanic membrane causes a conductive hearing loss.⁽⁹⁾ Perforation induced losses are greatest at lowest frequencies. Larger perforations result in larger hearing losses. Identical perforations in two different ears have conductive losses that can differ by up to 20-30db.^(10,11) The tendency of even very large perforation of the tympanic membrane to heal spontaneously was noted as early in 1876 by Roosa.^(4,12) In 1851 Toynbee demonstrated five distinct layers of the pars tensa of the tympanic membrane as follows.^{(1,13):}

1. An outermost epidermis.
2. Dermis of fibrous tissue, blood vessels and nerves.
3. Outer radiate fibrous layer.
4. Inner circular fibrous layer.
5. Innermost thin mucosal layer.

A large perforation of the tympanic membrane heals often into a thin atrophic scar which lacks the fibrous layers, having only an outer epidermis and inner mucosal layer.^(4,13) This may rupture easily by external trauma, forcible inflation of the Eustachian tube and in otitis media. But a perforation closed by repeated acid cautery of the rim usually results in a normal appearing tympanic membrane with all the five layers.⁽¹⁴⁾

Histo pathological study of a newly formed perforation shows proliferation of squamous epithelium within 12 hours at the edge of the perforation, granulation formation within 18 hours, while the inner mucosa of the membrane takes several days to regenerate.^(7,14) In chronic tympanic membrane perforation, squamous epithelium is found adjacent to the middle ear mucosa and creates a perforation edge with no raw surface. This is a contributing factor for a perforation to persist and was observed by Dunlop and Schuknecht in 1947.^(6,15,16)

The principle of chemical cauterization is that when on application, it breaks up fibrosis, promotes granulation and new tissue formation at the margin of the perforation. The patch acts as a splint to bridge the margins of the perforation. Given a flat surface, the epithelium grows at the rate of 1mm per day.

Financial or Other, Competing Interest: None.
Submission 11-10-2015, Peer Review 12-10-2015,
Acceptance 21-10-2015, Published 04-11-2015.

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DOI: 10.14260/jemds/2015/2204.

Three guidelines to promote healing of perforation by acid cautery of the rim.^(17,18,19):

1. The outer squamous epithelium that has grown inward across the edges must be destroyed repeatedly, to permit fibroblastic proliferation of the fibrous layer.
2. The rim of the perforation should be kept moist as drying immediately kills the young fibroblasts.^(20,21)
3. Hyperemia stimulates fibroblastic proliferation and should be induced by mild irritation.

Myringoplasty may be recommended as a first attempt for perforations involving more than 65% of the pars tensa.^(22,23) for narrow external canal preventing a view of the anterior edge of the perforation and for patients who refuse to come for repeated follow up.

In the literature, various methods have been used other than chemical cautery, in the non-surgical closure of perforations, like the irritant oil method, fibrin glue, fat plug, carbon dioxide laser trimming of the margins before applying paper patch etc.^(24,25)

Juers reported an 88% success with an average of 3.7 applications.^(26,27) He had further everted the margins of the perforation under the operating microscope, whereas Derlacki who reported 75% success in office treatment at biweekly intervals had used cautery alone.⁽⁸⁾ Dunlop had a 100% success with 3–33 treatment at biweekly intervals.⁽²⁸⁾

In the present study, it was noted that the highest success was seen among patients with traumatic perforations and in residual perforations, lowest in those patients with allergic rhinitis. This study gave an overall success rate of 77%, which is comparable with the previous studies documented in the literature and hearing improvement of about 5 to 6db.⁽²⁹⁾

CONCLUSION: Various studies on the subject of cauterizing of tympanic membrane perforations, it may be considered as a first line in the management of small to moderate sized perforation before attempting surgical closure. The present study with 77% success rate and 5-6dB hearing improvement has led to the following conclusions:

1. Smaller perforation without other ENT causes has better the closure rate.
2. Traumatic perforation, had a better healing rate.
3. Safely tried in patients with systemic medical conditions and in whom surgical intervention is contraindicated.

Apart from the fact that multiple sittings is required which is a disadvantage, this procedure of chemical cautery of the tympanic membrane perforation is a relatively safe, simple, and economical technique. As it can be done as an outpatient procedure with minimal sophisticated equipments.

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STATASTICS:

Age IN YEARS	Male	Female	Total	Closure	Percentage
15-20	16	8	24	19	79.2%
21-25	4	2	6	5	83.3%
26-30	4	10	14	11	78.6%
31-35	4	2	6	4	66.6%
	28	22	50	39	77%

Table 1: Age wise distribution and closure rate

Sex	No	Closure	Result
Male	28	21	75%
Female	22	18	81-8%

Table 2: Sex wise closure

Etiology	No. of patients	Closure	Result
Inflammatory	45	34	75.5%
Traumatic	3	3	100%
Residual perforation	2	2	100%

Table 3: Etiology wise closure rate

Cause	No. of patients	Closure	Result
Deviated nasal septum	8	6	75%
Allergic rhinitis	7	3	42.8%

Table 4: Closure rate associated with other ENT causes

Sex	Pre PTA	Post PTA	Improvement
Male	21db	16db	5db
Female	23db	17db	6db

Table 5: Pre and post audiometry