



ROLE OF TRICHLOROACETIC ACID IN CLOSURE OF TYMPANIC MEMBRANE PERFORATIONS

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ABSTRACT

Objective: The aim was to study the closure of central type of small and medium sized tympanic membrane perforations by chemical cautery (TCA 50%) and improvement of symptoms, to analyse the effect of Gelfoam on small and medium sized tympanic membrane perforations, and to examine the closure of tympanic membrane perforations as an office procedure. **Materials and Methods:** In this study, 80 patients attending the ENT opd of civil hospital were enrolled. Cautery of dry perforation margin was carried out with 50% trichloroacetic acid (TCA). After TCA cautery, a piece of Gelfoam which was larger than the total size of perforation was taken and soaked with corticosteroid ointment and was carefully placed on the cauterized area of tympanic membrane under endoscopic visualization. In the perforations which was larger in size, after application of TCA to the margins of the perforation, a piece of Gelfoam was soaked with corticosteroid ointment and was placed in the middle ear cavity instead of over tympanic membrane with the help of endoscope. **Results:** Patients had relief from various symptoms, such as aural fullness, tinnitus, heaviness, discharge from ear, pain in ear and so on. There was some amount of auditory improvement in most the cases clinically. **Conclusions:** Chemical cautery with (TCA 50%) and patching up of perforated tympanic membrane with gel form could be tried as the first management in the small to medium sized perforations before attempting the surgical closure with myringoplasty.

KEYWORDS : Cautery, Gelfoam, Patching, Trichloroacetic Acid, Tympanic Membrane Perforation, endoscopic

INTRODUCTION

Tympanic membrane perforation has posed a challenge to medical science from very beginning due to persistence nature. The central perforation can be divided into two groups on the basis of the etiology: (1) traumatic and (2) inflammatory. It was Hippocrates (460-377 BC)[1] first to regard the tympanic membrane as a part of organ of hearing. The tympanic membrane was named by Gabriel Fallopius of Padua (1523-1562), who at first used the term "tympanum" to describe the organ of hearing. The tympanic membrane is frequently injured as a part of inflammatory disease or due to direct injury.[2] A perforation in the tympanic membrane makes it very difficult to take part in water sports due to vertigo. A person may be unfit for some jobs such as air pilot or scuba diving if he or she is having a perforated drum.[3] For the closure of tympanic membrane perforation, a number of methods have been used.[4,5,6] Surgical repair of the tympanic membrane using various types of tissue grafts[7] (e.g., skin, temporal fascia, vein graft and perichondrium) by various researchers by using various techniques is generally accepted. Cauterization helps in establishing the natural pattern of migration of epithelium of perforated tympanic membrane, hence helping to achieve healing.[8,9,11,12] Repeated cauterization[13] is required at the rim of the perforation to close it, which often results in a very thin atrophic scar due to thinning of the lamina propria.[14] Different patching materials[7] have also been used for promoting healing of tympanic membrane perforation, for example, absorbable gelatin sponge was introduced. Gelfoam is a porous gelatin sponge which is denatured and is nontoxic and nonallergic in nature and available easily.[6] The study of the closure of tympanic membrane perforation by repeated cautery with trichloroacetic acid (TCA) and Gelfoam was carried out in our rural health centers ENT department.

MATERIALS AND METHODS

This study was conducted among 80 patients attending the Outpatient Department of Otorhinolaryngology civil hospital jawalamukhi and nagrota bhagwan H.P India. These patients had small- and medium-sized dry central tympanic membrane perforations. A history about comorbid conditions was noted along with duration of symptoms and

a full examination of ENT was done. An approximate method was used to determine the size of the tympanic membrane perforation. A thorough cleaning of the external auditory meatus was performed, and a tiny scab or wax was carefully picked up from the meatus as well as tympanic membranes. For anesthesia, a cotton ball soaked in 4% xylocaine was applied in the external auditory canal and over the tympanic membrane.

Cautery of perforation margin - Cautery of perforation margin was carried out using a 0° endoscope with 50% TCA. A piece of cotton wick was attached to the end of a fine jobson probe and was slightly moistened with TCA. The excess of TCA was taken out from the probe by gently touching probe to an absorbent napkin or cotton ball. The TCA application was done over the epithelial lining of tympanic membrane in order to reduce epithelial progression and extend out on epithelial meatal surface for a minimum distance of 0.5-1 mm, in order to produce a solid white eschar. The applicator tip was stroked over the edge of perforation in an inward to outward direction.

Patching after TCA a piece of Gelfoam which was larger than the total size of perforation was taken and soaked with corticosteroid ointment and was carefully placed on the cauterized area of tympanic membrane under endoscopic visualization. In the perforations which was larger in size, after application of TCA to the margins of the perforation, a piece of Gelfoam was soaked with corticosteroid ointment and was placed in the middle ear cavity instead of over tympanic membrane with the help of endoscope. Ear canal was packed with Gelfoam soaked with corticosteroid and antibiotic ointment thus making a sandwich of tympanic membrane. Repeated cauterization, as described earlier, was carried out at weekly intervals for 4 weeks. After completion of the period, observations were made in regard to status of the tympanic membrane, any local complication and state of hearing.[10]

RESULTS

Patients had varying degree of relief from various symptoms, such as aural fullness, tinnitus, heaviness, ear discharge and so on. There was some amount of auditory

improvement in almost all the cases. The larger perforation healing was seen to have a higher gain in hearing than that of by healing of a smaller perforation. Of 80 cauterized perforations, 70% were closed with an average of 3.9 applications (range was 1-6 applications) [Table 2]. 1. Status of the tympanic membrane perforation, that is, whether there was a) complete closure of perforation. b) reduction in size of perforation. c) persistence of perforation d) recurrence of perforation after complete closure, if any. 2. Any local complication(s) of the cauterizing agent was recorded.

Table 1 Comparison Of Etiological Factors.

NameOfAuthor	TotalCases	Inflammatory	Traumatic
Derlacki(1953)	143	129	14
Uppal(1997)	50	33	17
Santhi(2012)	38	30	08
PresentStudy	80	62	18

Table 2 Number Of Treatment (range And Average) For Healing Of Perforation

Name Of Author	Number Of Tretment	Average
Derlacki (1953)	2-64	14.6
Uppal (1997)	1-6	2.8
Santhi (2012)	1-5	3.2
Present Study	1-6	3.9

Table3: Comparison Of Healing Of Present Study With Previous Studies

Nameofauthor (year)	Method	Totalcases	Healed	Percentage
Wright(1956)	50%Trichloroacetic acid, cottonpatch,neomycin drops	65	57	88.0
Mitchell(1958)	50%Trichloroacetic acid,gelatin spongesoaked in autogenous blood	50	36	72.0
Juers(1958)	Marginal eversion.Cottonpatch Boric acid in urea	15	10	66.0
Dragovich(1962)	50%of trichloroacetic acid Neosporin powder and cotton patch 5% urea and boric acid in isotonic saline	25	21	84.0
Juers(1963)	100%Trichloroacetic acid.Paperdisk, urea-borofax ointment	33	29	88.0
Sellars(1969)	100%Trichloroacetic acid Nopatching	23	16	69.5
Stenfors(1989)	Hyaluronic acid	15	14	93.0
Uppal(1997)	100%Trichloroacetic acid.Surgical patching	50	39	78
Santhi(2012)	50%Silver nitrate.Thin sterile aluminum foil as patch	49	36	73.75
Parmar(2015)	20%Trichloroacetic acid Gelfoam piece moistened by antibiotic solution	144	102	70
Presentstudy	50%Trichloroacetic acid with Gelfoam patching	80	61	76.25

DISCUSSION

It is well known that surgical closure of tympanic membrane perforation is an extensively tried method in most of health care facilities, but need of hospitalization and financial expense and fear of surgery make the closure by chemical cautery of perforation margins with TCA(50%) could be a favored method in the developing countries like India and mainly in the rural health care facilities where infrastructure is limited. In the present study, the following selection criteria was used for the cases to be selected in the study.

1. Central small- to medium-sized perforation of pars tensa with dry ear
2. Normal Eustachian tube function
3. Normal cochlear function
4. No active predisposing disease foci in nose and throat
5. Age more than 15 years.

In the present study, 50% of TCA was applied to the entire margin of perforation using the 0 endoscope. In the series published by Dunlap and Schuknecht,[5] in the average case it took 6 months to 1 year for closure. Of 80 cases studied here, 18 cases were of traumatic origin and 62 cases of inflammatory origin.

SUMMARY And CONCLUSION

A total of 80 cases of varying age groups and both sexes presenting with small- to medium-sized dry central tympanic membrane perforations were enrolled for the study. Out of 80 cases 54 were males with average age of 43 years and 26 were females with average age of 46. Of 80 cauterized perforations, 76.25 % were closed with an average of 3.9 applications (range was 1-6 applications). With the increase in the size of perforation, the average number of applications required was also higher. Healing was better observed in the younger age group of second and third decades (80% and 81.5%, respectively). The study concluded with a success rate of 76.25%.

Reviewing the various studies [Table 3], cautery and

patching of tympanic membrane perforation may be considered as the first-line management in the small- to medium-sized perforations before attempting the surgical closure. This study has led to the following conclusions:

1. The smaller the perforation, the better the closure rate.
2. Larger perforation may be reduced to a smaller one, thereby making surgical intervention easier.
3. The healing rate was better in patients with traumatic perforation.
4. Treatment of main etiological factors helps in achieving a better healing rate of ear drum.
5. Surgical complication of the middle ear can be avoided.
6. It may be safely tried among patients who are under control and in whom surgical intervention is contraindicated.

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