

Ayurvedic chemical cauterization in the management of Traumatic Tympanic Membrane Perforation - A Case Study

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DOI:10.21760/jaims.10.2.52

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Introduction: Traumatic Tympanic Membrane perforation (TTMP) which heals within 2-3 weeks doesn't heal after the squamous cell formation at the edges of the TMP. Such TTMPs are managed by surgical procedures such as myringoplasty which is costly and invasive. In recent advancements, trichloroacetic acid (TCA) cauterisation found effective as the first line of treatment in adults with small to medium-sized TMP. Such Non-Healing TTMP can be correlated with Dustavrana. Ksharajala is one such medicine indicated in the management of Dustavrana.

Methodology: A 33-year-old female patient presented to our OPD with a history of trauma to the left ear two months back complaining of mild reduction in hearing. On examination, the edges of TTMP were covered by squamous cells inhibiting the healing of TMP. Hence, the patient was recruited for the study and was subjected to Apamarga Ksharajala application followed by lemon juice application, and Karna Pichu with Jatyadi Taila was done for 5 alternative days. Orally Sarivadi Vati and Ashwagandha Gritha were advised.

Result: White eschar after every application of Ksharajala suggested cauterisation of edges of the TMP. Jatyadi Taila Karna Pichu helped in Vrana Shodhana. After 30 days of the last Ksharajala application, it was noticed that the complete TMP was healed without any complications.

Discussion: Ksharajala cauterizes the edges of the TMP destroying the squamous epithelium enabling the growth of fibroblastic proliferation and healing of the perforated tympanic membrane. Jatyadi Taila helps in Vrana Shodhana and Vranaropaka. Sarivadi Vati which is Vrana Shodhana and Kledashoshaka and Ashwagandha Gritha as Balya, Yogavahi and Rasayana help heal the TMP.

Keywords: Traumatic Tympanic Membrane Perforation, Myringoplasty, Trichloroacetic Acid, Cauterization, Apamarga Ksharajala, Dustavrana, Jatyadi Taila Karna Pichu, Sarivadi Vati, Ashwagandha Gritha

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How to Cite this Article

Bhandare AT, Hiremath VR, Shashikala DK, Kulkarni A, Gururaj N, Ayurvedic chemical cauterization in the management of Traumatic Tympanic Membrane Perforation - A Case Study. J Ayu Int Med Sci. 2025;10(2):359-366.
Available From
<https://jaims.in/jaims/article/view/3978/>

To Browse



Manuscript Received
2025-01-13

Review Round 1
2025-01-23

Review Round 2
2025-02-03

Review Round 3
2025-02-13

Accepted
2025-02-25

Conflict of Interest
None

Funding
Nil

Ethical Approval
Not required

Plagiarism X-checker
11.31

Note



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Introduction

The tympanic membrane (TM) forms the septum between the external auditory canal and the middle ear. It is positioned obliquely so that the posterior upper part is more lateral than the anterior lower part. It is 9–10 mm high, 8–9 mm wide, and 0.1 mm thick. The parts of the tympanic membrane are the part tensor and the part flaccid.[1]

Tympanic Membrane perforation (TMP) refers to the rupture of the tympanic membrane leading to the opening between the external and middle ear. The tympanic membrane is a cartilaginous connective tissue lined by skin on the outer surface and mucosa on the inner surface. The tympanic membrane separates the external ear from the middle ear. The tympanic membrane's function is to aid in hearing by creating vibrations whenever struck by sound waves and transmitting those vibrations to the inner ear.[2] Perforation of this membrane leads to hearing loss due to the loss of TM's ability to create vibrational patterns.

Ear, located within the craniofacial skeleton, gets traumatised due to blunt injuries like a contusion, concussions, decompression, and penetrating injuries such as fractures.[3] Injuries affecting the ear can lead to disturbances physiology of hearing and maintenance of balance.[4,5] Tympanic Membrane injury predisposes middle ear infection with grave consequences such as facial nerve paralysis, formation of cholesteatoma, perilymph fistula, and Intracranial infections and may require ear and intracranial exploration.[6]

Simple traumatic tympanic membrane perforation (TTMP) is the most common type of Trauma induced otologic dysfunction.[7] TTMP management includes inactive watchful waiting, active intervention and surgical intervention.[8] Otolaryngologists have however been advised to be reluctant in offering surgical intervention in cases of TTMP without significant symptoms as most patients will heal spontaneously within two months.[9]

Active interventions include topical application of substances like epidermal growth factor, enoxaparin, and ascorbic acid to stimulate epithelialization for quick closure or to prevent the formation of sclerotic plaques in the perforated membrane.[10–12] Non-healing perforations of the TM are taken up for surgical closure.[13]

Surgical treatment included exploration and tympanoplasties, closure of the perforation with stents in the form of simple patches,[14] or as patches laden with substances in the form of silk fibroin membranes,[15] or steri-strips patching.[16]

These technical surgeries require high expertise and necessary equipment which may not be readily available in the low socio-economic countries. In such less-ideal situations, it will be necessary to characterise traumatic tympanic membrane perforation if optimal treatment is desirable.

Recent advancements in research and the advent of newer treatment options have emphasized the role of cauterization which hastens the natural healing of TM perforation by the process of epithelialization. The principle of cauterization lies in the destruction of the outgrown squamous epithelium by repeatedly irritating the edges of Tm by using chemicals, thus enabling the growth of fibroblastic proliferation.[17]

Kshara Jala is the liquid retained when preparing *Pratisaraniya Kshara*, which has the basic quality of being alkaline in nature (pH value between 7–14). Applying this *Jala* on the tissue causes cauterization of the edges of TMP. *Prasaraniya Kshara* is indicated in *Dusta Vrana*,[18] tympanic membrane perforation which is non-healing in nature can be correlated to *Dusta Vrana*.

Jatyadi Taila contains *Tikta* and *Kashaya Rasa*, *Laghu* and *Ruksha Guna Dravyas* which help in *Vrana Shodana*, *Ropana*, *Pootihara* and *Vedanasthapana* property.

Hence the following study was taken up to find the Ayurvedic method of healing the non-healing TMP with *Kshara Jala Pratisarna* as a replacement of chemicals used in the cauterization of TMP followed by *Jatyadi Taila Pichu*.

Patient Information

A 33-year female patient came to our OPD with a history of trauma to the left ear 2 months back, presenting with complaints of reduced hearing and, a ringing sound in the left ear. The patient had visited a nearby ENT Specialist and was advised of Myringoplasty. The patient was not willing for surgery and hence came to our OPD for ayurvedic management

No previous history of systemic disorder, family history or any other relevant history.

Procedure:

After explaining the procedure informed consent was obtained from the patient. Clinical examination was done, and findings were recorded. Ear, nose, and throat examinations were done, and the patient was subjected to otoendoscopy. External auditory canal, tympanic membrane, site and size of perforation, and middle ear mucosa status were assessed. Otoendoscopic findings were correlated with history and otoscopic examination.

Clinical finding

Systemic Examination

Vitals Stable

BP: 110/70

Pulse: 79 bpm

RR: 18/min

Temp: 98.4°F

CNS: Conscious and oriented

CVS: S1 and S2 Heard Normally

RS: Air Entry Bilaterally Equal / Bronchial vascular Breath Sound Heard

P/A: Soft, Bowel sound Heard

Local Examination (Table. 1)

On examination, the left tympanic membrane was seen perforated measuring around 5mm in length and 3mm in width covering around 2/3rd part of the anterior-superior quadrant and 1/3rd part of the anterior-inferior part with the edges of perforation being round, soft and shiny. (Fig.1)



Figure 1: Before Treatment

Table 1: Examination

Ear Examination		
Ear	Right	Left
Pinna	Normal	Normal
EAC	Normal	Normal
TM	Normal	Perforation: 5X3 mm in size with round soft shiny edge (Fig. 1)
Tuning fork test	RINNE'S	AC>BC
	WEBER'S	BC>AC
Nose examination		
	Right	Left
Anterior Rhinoscopy	Normal	Normal
Posterior Rhinoscopy	Normal	Normal
Oral Cavity examination		
Lips	Normal	
Teeth	Normal	
Gums	Normal	
Tongue	Normal	
Pharynx	Normal	
Larynx	Normal	

Diagnosis: Traumatic Tympanic Perforation (Non-Healing)

Therapeutic Intervention

Apamarga Ksharajala application to the edges of tympanic membrane perforation followed by *Jatyadi Taila Karna Pichu* alternatively.

Then orally Tab *Sarivadi Vati* and *Ashwagandha Gritha* with milk as an adjunct was advised for 30 days to enhance the healing of TMP.

The procedure of *Ksharajala* Application to TMP

EAC was properly dry mopped, and under sterile precautions 2% xylocaine was sprayed in the affected ear. After 5 mins of spraying, under endoscopic guidance, the edges of TMP were cauterized with the Cotton, rolled to the jobsons probe, and dipped in *Apamarga Ksharajala*.

After 60 seconds of application, *Kshara* was neutralized using lemon juice applied to TMP edges in a similar pattern. Then ear wick dipped in *Jatyadi Taila* was placed. The patient was advised to remove the wick after 5 hours of insertion.

This procedure was done for 5 days alternatively alongside the procedure patient was advised *Sarivadi Vati* and *Ashwagandha Gritha* orally.

Timeline

24/6/24

1st sitting of *Ksharajala* application followed by *Jatyadi Taila Karna Pichu* and Oral medications advised (Fig.2)

26/6/24

2nd sitting of *Ksharajala* application followed by *Jatyadi Taila Karna Pichu*

28/6/24

3rd sitting of *Ksharajala* application followed by *Jatyadi Taila Karna Pichu* (Fig.3, Fig.4)

30/6/24

4th sitting of *Ksharajala* application followed by *Jatyadi Taila Karna Pichu*

02/7/24

5th sitting of *Ksharajala* application followed by *Jatyadi Taila Karna Pichu*
advised for review after 15 days

17/7/24

1st follow up (Fig.5)

01/8/24

2nd follow up (Fig.6, Fig.7)



Figure 2: After *Ksharakarma* 1st sitting

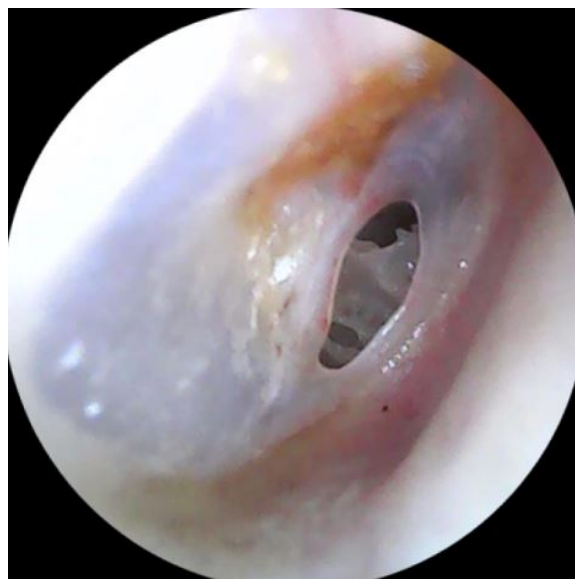


Figure 5: After 1st Follow-up



Figure 3: Before 3rd sitting of *Ksharakarma*



Figure 6: After 2nd Follow-up

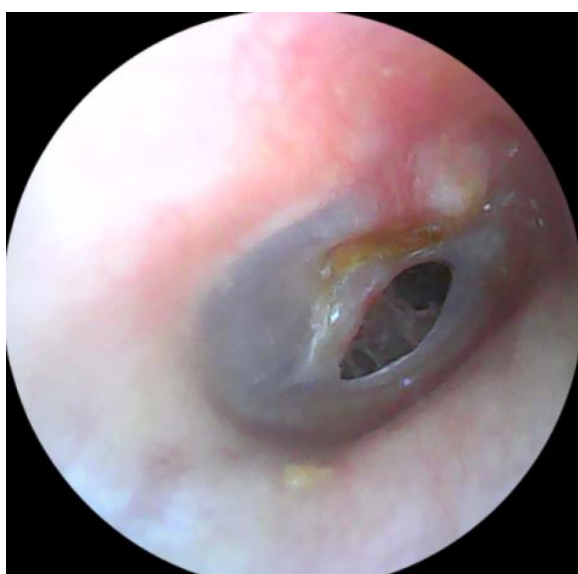


Figure 4: After 3rd sitting of *Ksharakarma*



Figure 7: After 2nd Follow-up

Observation and Result

White eschar of approx. 0.55mm thickness was noticed after every application of *Ksharajala* at the rim of TMP with mild congestion at the outer wall of the TM which eventually reduced after the application of lemon juice.

After the 5 sittings of application of *Ksharajala*, it was noticed that the rim of TMP became thin in size. after 15 days of the last application of *Ksharajala* size, the TM perforation was reduced to half the size of the original perforation. On the 2nd follow up it was noticed that the complete TMP was healed without any complication

Discussion

Most TM perforations tend to heal spontaneously, though in some cases (large perforations), intervention is essential to protect middle ear structures from repeated infections and entry of foreign substances.¹⁹ Recent research advances and the emergence of new treatment options have highlighted the role of cauterization in promoting the natural healing of TM perforations through epithelialization.^[17]

The pH value of prepared *Apamarga Ksharajala* was found to be 10.72, considered a moderate base, used in this study to heal the TMP. Application of *Apamarga Ksharajala* does the cauterization at the rim of the TMP, resulting in a very thin atrophic scar due to thinning of lamina propria. Thus, enabling the growth of fibroblastic proliferation leading to the healing of the perforated tympanic membrane

Jatyadi Taila has the properties of *Vrana Shodhana*, *Ropana*, and *Vedhanasthapana*. *Nimba* contains Nimbine which acts as an anti-inflammatory, and analgesic. *Yastimadhu* is considered to have active components which help in wound healing. *Haridra* over many studies has been established to be a good anti-inflammatory, anti-bacterial and anti-microbial. *Tutha* is considered to be *Lekhaniya* in property, as a result, it aids in the elimination of slough formation over the wound created by the cauterization of TMP after *Ksharajala* application. As *Jatyadi Taila* contains medicines which have both *Shodhana* and *Ropana* properties it aids in the healing of the TMP. *Sarivadi Vati* is mentioned in *Bhaishheja Ratnawali* under *Karnaroga Chikitsa*.^[20]

It is widely used in *Karnagata Rogas*. The contents include: *Sariva*, *Mulethi*, *Kushtha*, *Tvak*, *Ela*, *Tejapatra*, *Nagakesara*, *Priyangu*, *Neelotpala*, *Giloy*, *Lavanga*, *Haritaki*, *Vibhitaki*, *Amalaki*, *Abhraka Bhasma* and *Loha Bhasma*.

So probable mode of action of *Sarivadi Vati* can be said that all the contents are having mainly *Madhura* (sweet), *Kashaya* (astringent) and *Tikta* (bitter) *Rasa* and *Laghu* (easily digestible and causes lightness in the body) and *Ushna* (heat) *Guna*.

Therefore, it acts as *Vrana-Shodhaka* (wound purifier) and *Kleda-Shoshaka* (absorbs putrefaction). *Ashwagandha Gritha* contains *Ashwagandha Churna*, *Musta Churna*, *Rasasindhura*, *Tamra Bhasma*, *Go Ksheera* and *Go Gritha*.

Acharya Vagbhata explains it to be *Balya* in nature. *Ashwagandha Goksheera* and *Gogritha* have *Rasayana Property*. *Rasasindhura* has *Yogavahi*, *Nadibalya*, *Rasayana*, and *Vajeekarana* properties. *Tamra Bhasma* is considered to be *Nadi Balya* in nature.

Conclusion

Cauterization with the *Ksharajala* of tympanic membrane is a non-invasive technique that requires minimum resources, and instruments, and can be conducted in OPD as the procedure requires only local anaesthesia in adults making the treatment economical compared with other conventional ear surgeries such as myringoplasty.

The advantages of the adaption of ayurvedic chemical cauterization in the management of TTMP are as follows

1. Day care procedures
2. Simple and time saving
3. Less expensive
4. Avoids stress in patients due to hospitalization
5. No hampering in day-to-day work of patient

Hence, the *Ksharajala* cauterization can be performed as a first-line treatment in adults with small to medium-sized perforation.

Further, a case series can be conducted to find the efficacy of the *Ksharajala* cauterization as an alternative for the successful management of TMP.

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