

Validation of Traumatic Effect on Vidhur Marma through Modern Parameters - A Case StudyNitin S. Madavi¹, Priti R. Desai², Sandeep V. Iratwar³¹PG Scholar, ²Professor and HOD, ³Associate Professor,

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Correspondence Author: Nitin S. Madavi, PG Scholar, Dept. of Rachana Sharir MGACH& RC, Salod (H) Wardha, Maharashtra, India.**Conflicts of interest:** None to Declare**Abstract**

The authors describe a rare case of validation the traumatic effect on Vidhur marma through modern parameters. A 35 years male who admitted after head injury which complaints of bilateral deafness, spoken language, was not able to follow verbal commands but could understand word meaning, slurred speech and was able to read & write correctly.

The CT Brain of the case subject revealed temporal contusion bilaterally. On clinical examination patient had deafness bilaterally. Pure tone audiogram showed bilateral profound sensori-neural hearing loss.

Modern investigations like CT Brain and other radiological investigations with audiometry investigations augment the dictum of *Sushruta Samhita*. Trauma to Vidhur Marma leads to deafness which is evaluated by the CT scan finding of trauma to Bilateral Herschel Gyrus (Boca's area 41-42) i.e. Vidhur Marma leads to cortical deafness.

Keywords- Cortical Deafness, *Karnabadhira*, Vidhur Marma.**Introduction**

The Marma Sharir is a unique concept of Ayurveda in pioneer of science of traumatology, which is widely explained by our mentors.¹ According to Sushruta &

Vagbhata dictum *Karnabadhira* (Deafness) is the *Viddha Lakshan* (symptoms appearing after stabbing to vital part) of Vidhur Marma (vital point) which is located behind and below the ear just below the mastoid bone, just postero-inferior side of external ear over the temporal lobe. Sushruta and Vagbhata had mentioned 'deafness' as a traumatic effect on Vidhur Marma.^{2,3,4,5} Post Traumatic deafness may be conductive, sensori-neural, mixed and central which can be diagnosed with the help of radiological & audiometry evaluations. The conduction pathways described in Ayurveda are named as *Nadis* which especially meant for conduction of vital energy in the body.⁶ The sensory loss of hearing after trauma over Vidhur Marma is related to this *Nadi* as per Ayurveda perspectives.

Post traumatic cortical deafness is a clinical rarity that presents unique evaluation and management challenges. But this study adds a new dimension to the causes of cortical deafness in term of presence of post traumatic hemorrhagic contusion in the temporal lobes bilaterally. The present case study validates the traumatic effect on Vidhur Marma which is stated as *Karnabadhira* by Acharya Sushruta by using modern investigative parameters for diagnosis.

Case Report

A 35 year old male met with a road traffic accident causing bilateral temporal hemorrhagic contusion with cerebral edema in the brain (Fig.1) which was managed conservatively with medication. Patient had recovered well but with difficulty in understanding spoken language, was not able to follow verbal commands but could understand word meaning, patient also had slurred speech and was able to read & write correctly. On clinical examination, it was found that no vision deficit, ambulant with support and on CNS examination had ataxia gait, no motor- sensory deficit in limbs with GCS 13/15 (E4V4M5). On consultation with ENT surgeon; patient had hearing loss (deafness). In view to rule out the cause of deafness, some radiological investigations were done like HRCT Temporal bone and X ray skull which revealed as bilateral hemorrhagic contusion of temporal lobe with no sign of any fracture respectively. Patient was advised MRI brain but he was not willing for it. On ENT examination patient was found to have normal auricles and tympanic membranes but not responding to tuning forks test; Pure tone audiogram showed a hearing threshold average (HTA) for frequencies 250- 4000 Hz at 90 dB hearing level in both ear no perception and it reported as bilateral profound sensori-neural hearing loss (Fig.2). Other Clinical and audiometric tests for malingering were done as per required but not found malingerers.

In the view of the bilateral ear deafness which was confirmed by modern investigative parameters and few clinical symptoms like sudden onset of deafness after injuries, it is often difficult since patient had exhibit inconsistent respond to sound and inordinately poor understanding and production of sounds otherwise he can respond to written commands. After differential diagnosis with deafness he diagnosed as cortical deafness.

Discussion

Cortical deafness is a rare auditory disorder, also sometimes called central hearing loss is a form of sensori-neural loss caused by damage to an area in the inner ear called as primary auditory cortex. It performs very important functions in listening process, and is where auditory information received via the ear is processed. In previous history of modern science the most cases of cortical deafness were caused by bilateral cortical lesion or bilateral embolic stroke. It was first reported and termed as “cortical deafness” by Wernicke and Friedlander in 1883 (Griffiths TD 2002).⁷ Jerger et al (1969) and Lowering and Wertz (1972) had reported two cases of bilateral temporal lobe damage causing cortical deafness. Bilateral temporal lobe damage can result in severely depressed psychophysical pure tone thresholds even though electrophysiologically the auditory pathways and brainstem respond normally (Graham, 1980; Ozdamar, 1981).^{8,9,10} And this case also found that he had bilateral temporal region contusion which caused damage to primary auditory cortex. Griffiths TD et al (2002) pure tone audiometry is an essential for the assessment of patients with suspected central auditory pathology.⁸ The auditory system has unique Neuro anatomy not present in other sensory modules of ear projecting information to the 2 cerebral hemispheres; the auditory system transmits information about sound in all parts of space to both hemispheres¹¹. E Ponzetto et al (2013) a Cortical deafness may be occurred due disappearance of right-left thalamic connections including a functional differentiation of the intact left thalamocortical tract.¹² Vasan Satish et al (2016); sensory deficit and expressive aphasia (Boca’s aphasia) whereas sensory aphasia (Wernicke’s aphasia) is frequent in case of a lesion of the inferior division of the dominant side.¹³

Often caused by a blow to the head, contusions commonly occur in coup or contre-coup injuries. In coup injuries, the brain is injured directly under the area of impact, while in contrecoup injuries it is injured on the side opposite the impact.

Rao V et al (2000), Contusions occur primarily in the cortical tissue, especially under the site of impact or in areas of the brain located near sharp ridges on the inside of the skull. Shepherd S. et al (2004) The brain may be contused when it collides with bony protuberances on the inside surface of the skull.¹⁴ The protuberances are located on the inside of the skull under the frontal and temporal lobes and on the roof of the ocular orbit.¹⁵ Thus, the tips of the frontal and temporal lobes located near the bony ridges in the skull are areas where contusions frequently occur and are most severe.¹⁶ Bigler ED et al (2000) for this reason, attention, emotional and memory problems, which are associated with damage to frontal and temporal lobes, are much more common in head trauma survivors than are syndromes associated with damage to other areas of the brain.¹⁷

Any kind of severe damage to the primary auditory cortex of nervous system may lead to complete hearing loss. Such an individual may not be aware of the different kind of sound in the surroundings. However, the ability to automatically respond to sound would still persist. This is due to the reason that both the ears are connected to the left and right auditory cortex. Thus, a person who has experienced a wound on one part of the auditory cortex can classify the different sound frequencies conveniently. Connections in the central auditory system are complex but simple summary is that information proceeds from the organ of corti to spiral ganglion cells and the 8th nerve afferent in the ear, to cochlear nuclei, many crossing in the trapezoid body to the superior olive in the brain stem. Then all ascending fibers stop in the inferior colliculus in

mid brain and the medial geniculate body in the thalamus, before reaching the cortex superior temporal gyrus. All auditory afferents synapse in the cochlear nuclei and in thalamus. Beyond that simplification, second order fibers from the cochlear nuclei precede rostrally in the several different pathways. Afferents are generally distributed bilaterally so unilateral damage at any level does not usually result in deafness in the ear. Primary auditory cortex or Heschl's Gyrus in insular cortex is tonotopically organized. Afferents from this longitudinal strip on the superior temporal gyrus diverge to a wide variety of other cortical processing areas; including Wernicke's area in the parietal lobe where speech is processed. Auditory afferents are tonotopically organized from the ear to the cortex. This starts with high frequency transduced at apex. Low frequency fibers then pass in the central core of the 8th nerve surrounded by high frequency fibers. This segregation of high and low frequencies persists throughout the CNS; low frequencies are more lateral in primary auditory cortex.^{18, 19, and 20}

In the present case, there was an obvious CT scan brain which revealed as bilaterally hemorrhagic contusion in temporal lobe with mass effect with cerebral edema. In pure tone audiometry verbal response to acoustic signals of different frequencies at threshold intensity is required. This would mean that either ear tested monaurally would show a similar type of deficit in frequency pattern perception. This can explain the bilateral profound hearing loss on pure tone audiometry and poor speech discrimination and BERA which do not working at this time.

The extent of bilateral damage to the white matter nearest to the posterior half of the putamen proved crucial in determining the severity of the hearing loss. Hearing loss was more severe when the white matter immediately

ventral and lateral to the posterior half of the putamen was involved bilaterally.

This case illustrates Sushrut considered *Vidhur* marma site the beneath ear area (temporal area) consisting the hearing ability; little injuries to these marma points or anatomical areas can be comparing with major injuries at anywhere else in the body so, detailed knowledge of this marma is very crucial for physician as well as surgeon also to avoid its fatality or disability. In ancient era, best treatment available at time, some sort disability remains at the end of therapy with supporting excellent modern equipment's and facility or disability; which previously mentioned by Sushrut in 5000 B.C whenever such modern facility not at available this periods in the regarding to *Vidhur* marma and which was seen our case study through modern parameters.

Conclusion

This case illustrates the highly complex functional traumatology of auditory system. To our knowledge, this is the first case to validate the traumatic effect of *Vidhur* marma with the help of modern parameters related to cortical deafness.

In the present case study his pure tone audiometry (Fig. 2) showed bilateral profound sensori-neural hearing loss. Special tests for localizing the lesion were advised. Functional MRI brain with few audiometry tests were advised, but patient relatives not willing for it. In view of the complaint of Deafness, no response to tuning fork tests, profound sensori-neural hearing loss on pure tone audiometry, poor speech discrimination with few clinical sign which founds in central hearing loss, patient was diagnosed as a case victim of cortical deafness.

The case subject was a of road traffic accident in which there was a trauma to the temporal region including the portion beneath the ear; which resulted in deafness. The finding of Bilateral temporal hemorrhagic contusion in CT

brain (Fig.1) and Pure tone audiogram (Fig.2) confirmed the bilateral deafness along with its side to which correlates with the dictum of Sushrutthat trauma to *Vidhur* Marma (Beneath The Ear) result in deafness in both ear.The traumatic effect on *Vidhur* Marmareresulting deafness; it may be temporary but not permanent in nature; hence it is treatable within time with a proper medication and supportive measures. Hence came for follow up OPD after treatment period of 6-8 months; a pure tone audiogram performed in which report showed resolved deafness (fig. 3).

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Abbreviations

AVBRH – Acharya Vinobha Bhave Rural Hospital, CT – Computed tomography, HRCT– high resolution Computed tomography, ENT – ear-nose-throat, MRI- magnetic resonance images, PTA- pure tone audiogram, GCS- Glasgow Coma Scale, HTA – hearing threshold average, dB-decibel , CNS –Central nervous system, BERA - brain evokes response of auditory system.

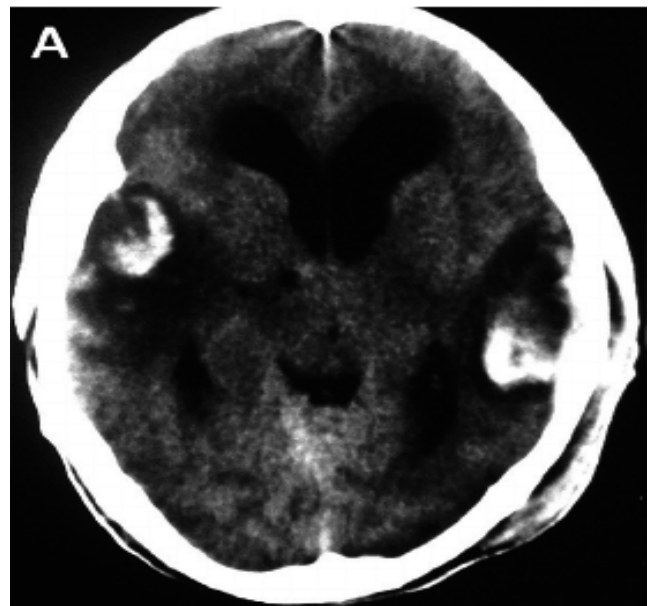


Fig. 1: CT brain showing- bilateral temporal contusion.

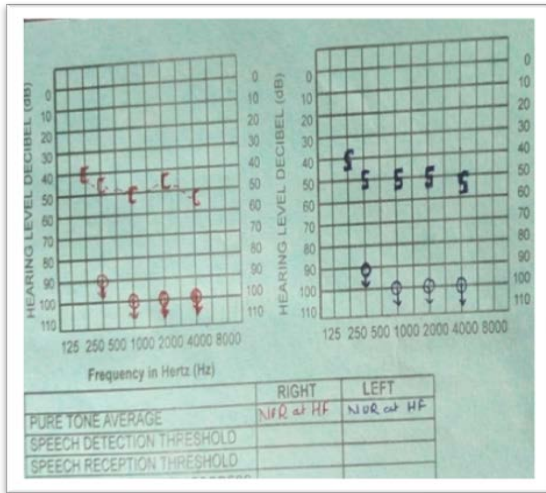


Fig. 2: Pure Tone Audiogram showed bilateral profound sensori-neural hearing loss.

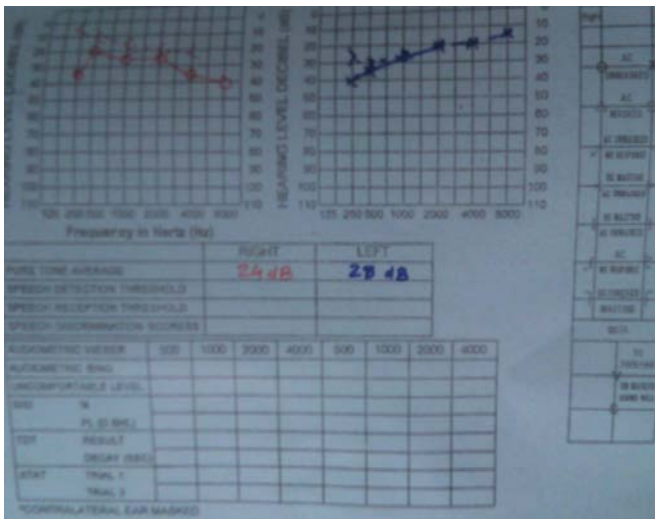


Fig. 3: Pure tone audiogram resolving deafness