

Audiological evaluation following snake bite - Case Report

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Abstract

We are reporting a case with hearing loss following krait snake bite. Case was diagnosed as snake bite and treated in the emergency department and after stabilising she was referred to the oto-rhinolaryngology department for evaluation of sudden hearing loss. Audiological evaluation was carried out to identify degree, type of hearing loss and site of lesion. Puretone audiometry showed bilateral moderate sensory neural hearing loss. The diagnosis was confirmed with Transient evoked otoacoustic emissions and Click evoked auditory brainstem response testing. From the above audiological tests it is evident that the snake bite victim has cochlear hearing loss. This could be due to the venom carried away from the wound by the lymphatics and then is circulated by the blood stream throughout the body.

Key words: Snakebite, Audiological evaluation, Puretone audiometry

Introduction

On June 9th, 2017 WHO categorized snakebite envenomation into the Category A of the Neglected Tropical Diseases. Rural population are the major victims of snake bites. Hearing loss is a rare symptom followed by snake bite [1]. Only few cases on hearing loss following snake bite are reported in the literature [2].

The venom of *Bungarus caeruleus* (krait) contains a mixture of alpha, beta-bungarotoxin and caeruleotoxin. Alpha-bungarotoxins cause failure of neuromuscular

transmission by binding to post synaptic nAChR at neuromuscular junction, Beta-bungarotoxins are pre-synaptically active neurotoxic phospholipases. Exposure to these toxins causes the failure of neuromuscular transmission and depletion of synaptic vesicles from the nerve terminal.

Caeruleotoxins a minor component of the venom and is found exclusively in kraits and are structurally similar to alpha-bungarotoxins. Alpha-bungarotoxin and caeruleotoxin acts on post synaptic membrane [2].

Case Presentation

48 year old female patient came to ENT Department for hearing loss evaluation following snake bite; she was treated in the emergency department for snake bite and identified the snake to be krait. She was referred to the Department of Otorhinolaryngology following her complaints of reduced hearing sensitivity and ear fullness. History revealed that patient was having normal hearing before snake bite and there was no history of ear discharge. Otoscopic examination revealed normal ear canal with intact tympanic membrane on both ears. Hearing assessment was carried out using audiological examination. Routine pure tone audiometry was done to check their conduction and bone conduction thresholds of the patient. Impedance audiometry was done to rule out any middle ear pathology. Otoacoustic emissions test was performed to check the function of outer hair cells. Auditory brainstem responses (ABR) were done to rule out the presence of retro cochlear pathology.

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Case Report

Pure tone audiometry shows bilateral moderate sensorineural hearing loss with pure tone average of 41.6 dBHL in right ear and 43.3 dBHL in left ear. Impedance audiometry shows ‘A’ type tympanogram showing no middle ear pathology. Both ears ipsilateral and contralateral acoustic reflex absent.

Auditory brainstem responses reveal that there is no auditory nerve dysfunction in both ears as the interpeak latencies and the interaural latencies are observed to be within normal limits. Results of Transient Evoked Otoacoustic Emission reveals absent otoacoustic emissions bilaterally.

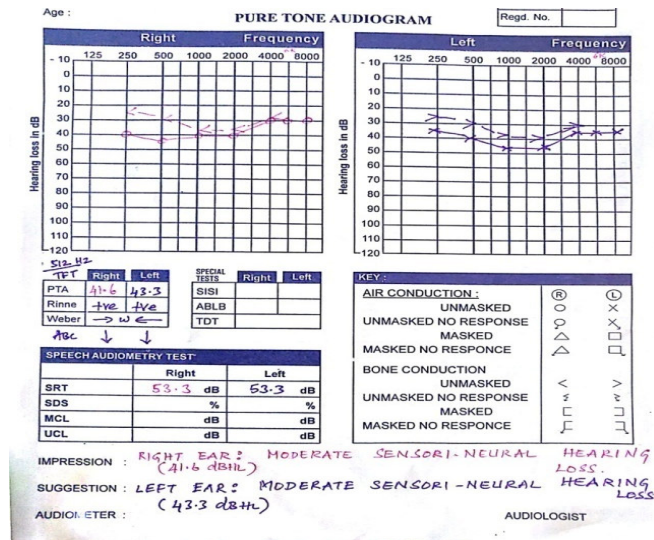


Figure-1: Shows results of pure tone audiometry

Figure 1.1 shows results of pure tone audiometry

Pure tone audiometry shows bilateral moderate sensorineural hearing loss

Pure tone average:

Right ear: 41.6 dBHL

Left ear: 43.3 dBHL

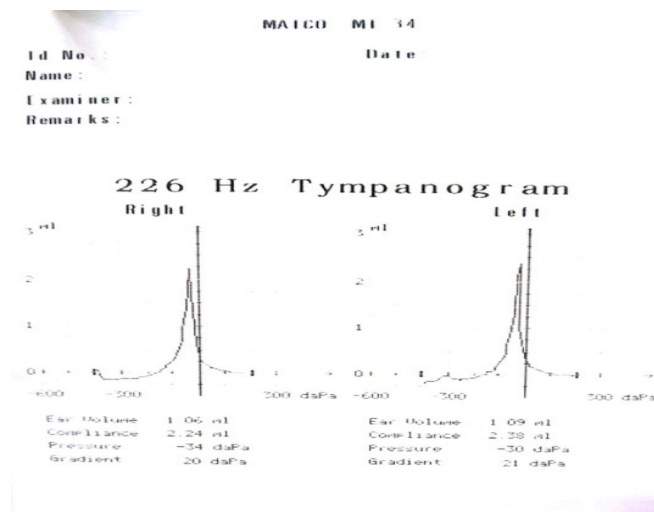


Figure-2: Shows impedance audiometry results of the patient

Impedance audiometry shows ‘A’ type tympanogram showing no middle ear pathology.

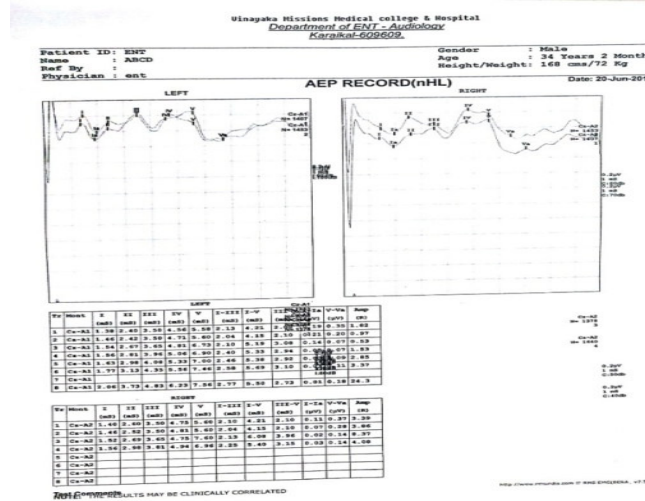


Figure-3: Shows auditory brainstem responses of the patient

Auditory brainstem responses reveals that there is no auditory nerve dysfunction in both ears as the interpeak latencies and the interaural latencies are observed to be within normal limits.

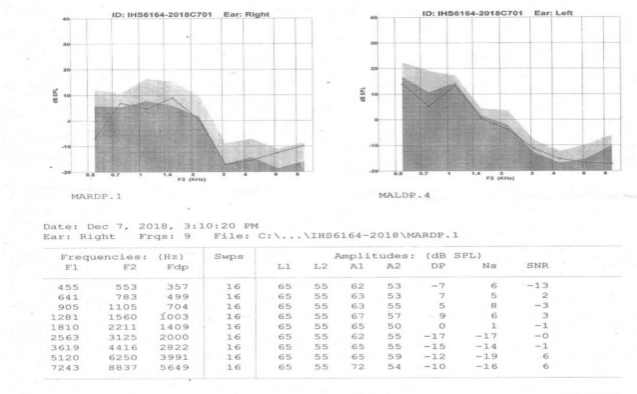


Figure-4: Shows transient evoked otoacoustic emissions of the patient

Results of Transient Evoked Otoacoustic Emission reveals absent otoacoustic emissions bilaterally

Discussion

Sudden bilateral hearing loss following snake bite has been reported by Sabharwal R.K, Sanchetee P.C, Sethi P.K, Gaudi S.C [5]. Documentation of hearing loss in a case with krait snake bite in the literature is rare [1]. We are reporting a case with a moderate degree of sensorineural hearing loss caused by cochlear damage due to snake bite.

Aftersnake bite venom quickly spreads throughout the body, is carried away from the wound by the lymphatics and then is circulated by the bloodstream and results in cochlear damage also [2]. The venom which is carried away by the bloodstream could have damaged the hair cells of the cochlea which has been proved in the transient evoked otoacoustic emission test that there has been

dysfunction in the cochlear hair cells. Pure tone audiometry shows bilateral moderate sensorineural hearing loss with pure tone average of 41.6 dBHL in right ear and 43.3 dBHL in left ear. Impedance audiometry shows ‘A’ type tympanogram showing no middle ear pathology. Both ears ipsilateral and contralateral acoustic reflex absent.

Auditory brainstem responses reveals that there is no auditory nerve dysfunction in both ears as the interpeak latencies and the interaural latencies are observed to be within normal limits.

Results of Transient Evoked Otoacoustic Emission reveals absent otoacoustic emissions bilaterally.

Also there is a possibility of having pre-synaptic or post-synaptic hearing loss which must be ruled out in individuals. The venom of *Bungarus caeruleus* (krait) contains a mixture of alpha, beta-bungarotoxin and caerulotoxin [3].

Alpha-bungarotoxins cause failure of neuromuscular transmission by binding to post synaptic nAChR at neuromuscular junction; Beta-bungarotoxins contains 20% protein content of the venom and are most toxic components of the venom.

They are pre-synaptically active neurotoxic phospholipases [2]. Exposure to these toxins in vivo and in vitro causes the failure of neuromuscular transmission for two to three hours and depletion of synaptic vesicles from the nerve terminal boutons.

Caerulotoxin is a minor component of the venom and is found exclusively in kraits and is structurally similar to alpha-bungarotoxins. Alpha-bungarotoxin and caerulotoxin acts on post synaptic membrane [3].

Conclusion

We tried to emphasize that any patients with history of snake bite should undergo hearing evaluation. Allotolaryngologists should be aware to elicit history of snakebite as a remote cause for sensorineural hearing loss.

In our case the victim of snake bite - krait has confirmed cochlear hearing loss which could be due to the impairment of outer hair cell function. Based on above observations we recommend all cases of snake bite should undergo audiological evaluation - pure tone audiometry, impedance audiometry, otoacoustic emissions and auditory brainstem response which would help in early diagnosis and treatment of hearing loss.

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References

1. Kularatne SA. Common krait (*Bungarus caeruleus*) bite in Anuradhapura, Sri Lanka: a prospective clinical study, 1996-98. *Postgrad Med J.* 2002 May;78(919): 276-80.
2. Russell FE: Snake venom poisoning. *Schloium Int* 3: 256, 1983
3. Bon C, Changeux JP. Chemical and pharmacological characterization of toxic polypeptides from the venom of *Bungarus caeruleus*. *Eur J Biochem.* 1977 Mar 15;74 (1):31-42.
4. Roeser RJ, Michael Valente, Dunn HH: *Audiology Diagnosis* 2:436, 2007
5. Sabharwal RK, Sanchette PC, Sethi PK, et al. Sudden bilateral deafness following snake bite. *J Assoc Physicians India.* 1987 Oct;35(10):735-6.
6. Warrell DA. Injuries, envenoming, poisoning, and allergic reactions caused by animal. In: Warrell DA, Cox TN, Firth JD, Benj J Jr, editors. *Oxford Textbook of Medicine.* Oxford: Oxford University Press; 2003. pp. 923–45.
7. Fernando P, Dias S. Indian krait bite poisoning. *Ceylon Med J.* 1982 Mar;27(1):39-41.
8. Prasad K, Singh B, Khan SA, Agarwala AK, et al. A case of bite by Krait snake. *J Assoc Physicians India.* 1979 Nov;27(11):1043-4.
9. Fernando P, Dias S. Indian krait bite poisoning. *Ceylon Med J.* 1982 Mar;27(1):39-41.
10. Thomas PP, Jacob J. Randomised trial of antivenom in snake envenomation with prolonged clotting time. *Br Med J (Clin Res Ed).* 1985 Jul 20;291(6489):177-8.