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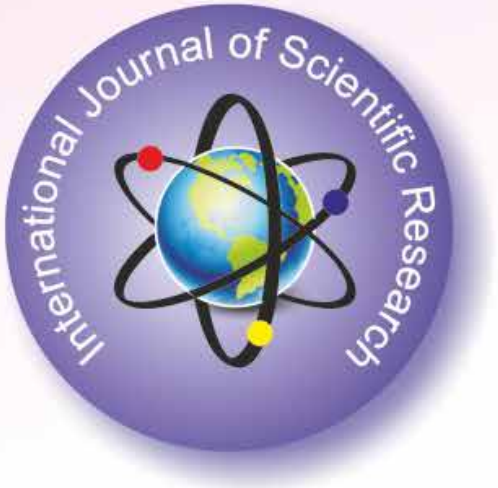


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Research Paper

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# Application Of Auditory Evoked Potentials In Differential Diagnosis Of Acoustic Schwannoma From Jugular Foramen Schwannoma –A Case Report

Medical Science

**KEYWORDS :** Jugular foramen,schwannoma,acoustic neuroma,

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## ABSTRACT

*The jugular foramen is a large aperture in the base of the skull which is located behind the carotid canal. It provides the passage for the lower cranial nerves (IXth,Xth and XIth cranial nerves).Tumors in this region are very rare and very few cases have been reported in the literature. The symptoms that are seen in this type of schwannoma are variable. It is also difficult to determine the exact location of the tumor within the foramen or the cranial nerve that it affects When the tumor is located in the intracranium, it maybe misdiagnosed as acoustic neuroma.So the present case study focused on importance of Audiological findings in differentiating acoustic neuroma from jugular foramen schwannoma further it helps n management of these conditions.*

**INTRODUCTION :**

The jugular foramen is a large aperture in the base of the skull which is located behind the carotid canal. It connects the posterior cranial fossa and the jugular fossa. It provides the passage for the lower cranial nerves that includes IXth,Xth and XIth cranial nerves.).It is divided into three compartments namely the anterior (provides the passage for IXth cranial nerve and inferior petrosal sinus), middle (for Xth and XIth cranial nerves) and posterior compartment (junction of the sigmoid sinus and the jugular bulb) Sanna, Bacciu,Falcioni andTaibah2006.The lesions observed in this region can be congenital, infectious or tumoral.

Tumors in this region are very rare and very few cases have been reported in the literature. It is also difficult to determine the exact location of the tumor within the foramen or the cranial nerve that it affects. Owing to this variation in the symptoms it has been also referred to as Jugular foramen syndrome (Vernett's Syndrome). Based on the site of lesion the classification system describes mainly four types: type A (tumour primarily in the intracranial enlargement with minimal enlargement of the jugular foramen), type B(tumors located mainly within the bone with or without intracranial component),type C(primarily extra cranial ) and type D(intracranial and extra cranial extensions, commonly the dumb-bell shaped tumours) (Samii Babu&Tatagiba,1995)Franklin , Moore andFisch 1989. The majority of jugular foramen schwannomas arise from the IX cranial nerve but they may also arisefrom the X or XI cranial nerve. Because of this uncertainty, most authors prefer the term 'jugular foramen schwannoma rather than naming by single nerve schwannoma. (Calenbergh ,Noens , Delaere , Desloovere , Loon &Goffin 2004 ).These are reported generally in females between 14 and 63 years (Kaye , Hahn , Kinney , Hardy &Bay 1984).When the tumouris located in the intracranium, it may be misdiagnosed as acoustic neuroma as similar symptoms can be exhibited in these individuals. Jugular schwannoma has been described to be a rare case in literature and it also manifests in a manner that is similar to the acoustic neuroma. There is no literature review on the profiling of the audiologicalfindings that would provide support in differentiating with respect to acoustic neuroma and thus helps in management. Thus present case study highlight the importance of Audiological findings in differentiating acoustic schwannoma from jugular foramen schwannoma.

**Method:**

Current study focused on a 31 year old female presenting with complaint of vertigo, headache which was intermittent and blurring of vision. She also reported of nausea and vomiting during the episode.Gaitdisturbances were also observed. Neurological evaluation was carried outfor Stelwag sign, Rhomberg's sign,and finger nose test. Nystagmus and dysdiadokinesia were alsoevaluated. Detailed audiological evaluations were carried out which includes,Pure tone audiometry: GSI-61 calibrated audiometer was used

Middle ear function assessment:Dully calibrated middle ear analyzer (GSI-Tympstar) was used for assessment of middle ear

**Auditory Evoked Potentials:**

Auditory brainstem responses were recorded for the subjects following natural sleep in an acoustically and electrically shielded room. Electrodes were placed on sites with Ten20 conductive gel. Absolute and inter electrode impedance were within 2 kOhms, .Ethmotic research ER-3 insert earphones were used for stimulus presentation. Obtained EEG was online filtered between 100Hz and 3000Hz with artifact rejection of 23.8 micro volts and were epoched between -12 msec and + 12 msec. A total 1000 stimulus was presented at a rate of 11.1/s with alternating polarity and recording was repeated 3 times at each intensity constituting three averaged waveforms of 1000 stimuli. ABR was recorded using IHS Smart EP Software, Version: 3.94.

**Otoacoustic Emissions:**

Transient Evoked Otoacoustic Emissions (TEOAE) was recorded in both the ears using ILO292 DP Echoport with V6 software. An SNR of 6dB and above was considered as presence of OAE.

**Results:**

Neurological assessment was done and the cerebellar signs were found to be present. The stelwag sign was present; bilateral nystagmus was present; finger nose test indicated clumsiness on the right side; Rhomberg sign was absent. Neuro imaging studies revealed (MRI) IXth and Xth nerve complex not seen separately from the mass lesion and beaking of mass into the jugular foramen. The VIIth and VIIth nerve complex seen separately from the lesion with no evidence of involvement of these nerves. Neuro imaging studies also given an impression of extra axial lesion in the right cerebellopontine angle and perimedullary cistern.

The conventional audiological evaluation(pure tone audiometry) revealed minimal hearing loss in the right ear and normal hearing in the left ear. Further, there was good PTA-SRT correlation and a 100% was obtained in the SDS scores. The transient –evoked otoacoustic emissions (TEOAEs) were also present bilaterally which was indicative of normal outer hair cell function.ABR testing revealed all peaks were present within normal latency in the left ear;initial peaks werepresent within normal

latencies while Vth peak wasabsent in the right ear (Figure: 1 & 2).Late Latency Responses (LLR) was also present with good amplitude, which was indicative of normal cortical functioning. A final impression of retrocochlear pathology was given for the right ear and normal hearing sensitivity in the left ear.

**Discussion:**

The jugular foramen schwannomas are extremely rare intracranial extraaxial tumours.The symptoms that the jugular foramen schwannoma exhibits are very similar to that of acoustic neuroma and they may emerge either with acoustic or cerebellar signs.

Keen observation of the symptoms presented alongwith the audiological findings and MRI will help to differentiate the jugular foramen schwannomas from the acoustic neuromas.The audiological evaluation revealed a minimal hearing loss in the right side and good PTA-SRT correlation along with 100% score in Speech discrimination task (SDS) unlike the acoustic neuromas. TheABR showed all peaks present on the left side; initial peaks were present and absent Vth peak on the right side indicativeof higher centre lesion (at the level of superior olivarycomplex or lateral lemniscus). This aided in differentiating the jugular foramen schwannoma from the acoustic neuroma. Based on the site of lesion and symptoms exhibited by the patient such as hearing loss, cerebellar signs, gait disturbances, vision deficits the present case maybe classified into type Atumor. This plays a role in deciding the best management option for the schwannoma. The patient exhibited minimal hearing loss with bilateral OAEs present .This hearing loss can be attributed to central lesion that is causing the impairment. This is also supported by theMRI findings that revealed obstructive hydrocephalus due to compression of the third and fourth ventricle.

**Conclusion:**

Jugular foramen schwannoma present with different types of symptoms. The clinical presentation maybe similar to the acoustic neuromas and hence a detailed evaluation is important for accurate identification and differentiation of these schwannomas. Neurological, audiological and radiological findings play an important role in confirming the schwannoma.

Figure1: ABR of Right and Left ear

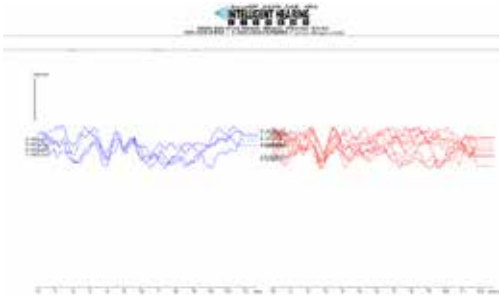
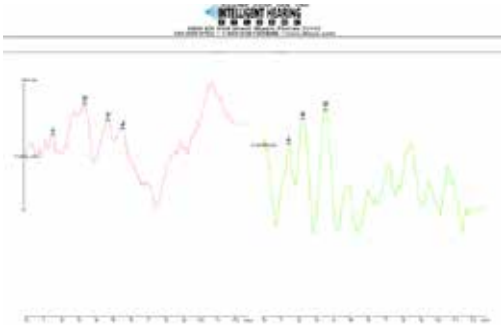


Figure 2: Added ABR of Right and Left



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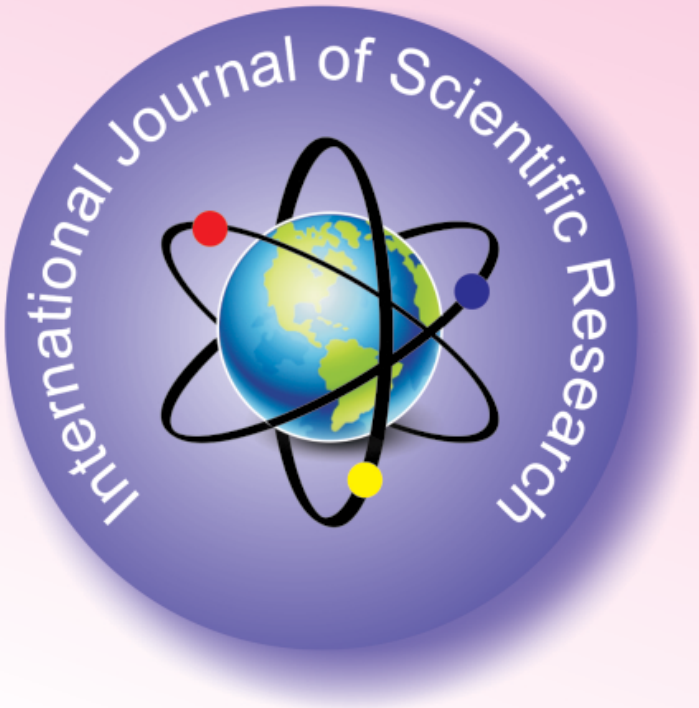


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