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TRIGEMINAL SCHWANOMA AND ITS IMPACT ON CRANIAL NERVES

Medical Science

Karthik Chandran. K* Institute of Speech and Hearing, Madras Medical College, Chennai -03, TamilNadu, India, *Correspinding Author

Jaya. V Institute of Speech and Hearing, Madras Medical College, Chennai-03, TamilNadu, India,

Johnsi Rani Institute of Speech and Hearing, Madras Medical College, Chennai-03, TamilNadu, India

ABSTRACT

Aim: The aim of this study is to understand the effects of Trigeminal schwanoma in cranial nerves related to speech and hearing and to create awareness among professionals about the importance of speech and hearing evaluation.

Method: We report a case of 45 years old female who developed a multiple neuropathies in right cranial nerves due to Trigeminal schwanoma. Cranial nerve examination done by the Neurologist revealed that the cranial nerves II, III, IV, V, VII, VIII, IX, X were affected respectively. Detailed Audiological was done which revealed unilateral Hearing loss and Hyperacusis. Speech assessment was done in which SODA errors were observed. The individual also had difficulty in swallowing.

Conclusion: Significant speech and hearing deficits were identified for this patient with Trigeminal schwanoma. Hence speech and hearing assessment is essential to explore the available management options for the same.

KEYWORDS

trigeminal schwanoma, speech and hearing evaluation, cranial nerves

INTRODUCTION:

A Schwanoma which is also known as a Neuroma, is a benign tumor that develops in the protecting sheathing (which are called Schwann cells) which inturn helps for supporting the function of nerve cells. Schwanoma can develop where Schwann cells are present. Almost all Schwanomas are benign. However, even a benign tumor may need to be removed if it compresses the nerves aside causing pain or other symptoms. If left untreated, schwanoma can cause nerve damage.

Trigeminal schwanoma is a type of peripheral intracranial nerve sheath tumor that develops at the base of the skull and originates from the Schwann cells. This tumor can also harm other nerves when it grows in size and leads to multi cranial neuropathies. Exact cause of this tumor is not yet fully known. Prevalence of this tumor among all other intracranial tumors is 0.2%. In neurological clinical practice, prevalence rate of multiple cranial neuropathies due to trigeminal schwanoma is 25% (Azelaglady, Mohamed Zarfarullah 2015).Surgically this condition can be managed through tumor resection. Certain genetic conditions like neurofibromatosis may increase the likelihood of this condition, and it is also caused by abnormal cell multiplication. Symptoms include facial pain, numbness, headaches and hearing loss. This condition may be diagnosed after a review of the medical, physical, radiological and neurological examination.

AIM:

As this condition is a rare entity, the aim of this study is to understand the effects of Trigeminal schwanoma in cranial nerves related to speech and hearing and to create awareness among professionals about the importance of speech and hearing evaluation.

METHOD AND MATERIAL:

We report a case of 45 years old female with trigeminal schwanoma who developed multiple cranial neuropathies in right III,IV,V,VII, VIII,IX,X cranial nerves due to Trigeminal Schwanoma. She was referred from the Department of Neurology for Audiological and Speech evaluation in JUNE, 2016. The evaluation of this patient offers a unique challenge for diagnosis due to the vast complicated etiologies. The subject had a complaint of over sensitivity to loud sounds and hard of hearing in right ear, difficulty in appreciating taste sensation and deviated angle of mouth towards left side.

Her Magnetic Resonance Imaging scan reports revealed that the Trigeminal schwanoma of 3cm forming lesion occupying the right cavernous sinus with extension via the mandibular and rotundum foramina into the extracranial base of skull region. Cranial nerve examination by the Neurologist revealed that the cranial nerves III, IV, V, VII, VIII, IX, X are affected. The subject had corneal opacity in right eye, impaired corneal reflex, reduced eye ball movement, weakness in mastication, reduced sensation in cornea, cheek, jaw in right side , absence of forehead wrinkling, nasolabial fold in right side, impaired taste sensation in tongue and impaired gag reflex.As an effect of facial nerve palsy ,the client have been facing difficulty to close the lips which leads to inability in creating intra oral pressure which in turn causes the speech to get distorted.The client had repeated symptoms of tongue bite due to reduced sensation in right side of buccal cavity.

Detailed Audiological and Speech evaluation was carried out for the subject. Audiological Evaluation included Pure Tone Audiometry, Speech Audiometry, Immittance Audiometry, Distorted Product Oto Acoustic Emission (DPOAE) and Auditory Brainstem Response (ABR).

Pure Tone Audiometry was performed using Inventis Piano Audiometer with the frequency range between 250 Hz to 8 KHz for Air Conduction (AC) and with the frequency range between 250 Hz to 4 KHz for Bone Conduction (BC). Bone Vibrator could not be placed on the right mastoid since the patient complained of intolerable pain due to trigeminal neuralgia and hence BC threshold could not be obtained for right ear. Speech Audiometry was performed using Inventis Piano Audiometer. Immittance Audiometry was performed using Inventis Flute Audiometer. DPOAE and ABR were performed using Intelligent hearing systems.

Speech Evaluation included Oral Peripheral Mechanism (OPM) examination, Test of Articulation in Tamil (TAT) and Speech Intelligibility. Speech Intelligibility rating was calculated for spontaneous speech using the formula mentioned below:

$$\text{Speech Intelligibility:} \quad \frac{\text{Number of words understood}}{\text{Total Number of words}} \times 100$$

RESULTS:

AUDIOLOGICAL EVALUATION:

Pure tone Audiometry:

With the help of AC threshold she was diagnosed to have mild hearing loss in the right ear and normal hearing sensitivity in left ear.

Speech Audiometry:

The Speech Recognition Thresholds for Right Ear (RE) and Left Ear (LE) are 40 dB and 25 dB respectively. The Speech Intelligibility Scores (SIS) for RE and LE are 80% and 100% respectively. The Uncomfortable Loudness Level (UCL) for RE and LE are 100 dB and 120 dB respectively.

Immittance Audiometry:
TABLE - 1

Ear	Ear Canal Voloume (ml)	Static Compliance (ml)	Gradient (ml)	Peak Pressure (dapa)	Type of Tympanogram
Right ear	1.14	0.95	0.33	-3	'A'
Left ear	1.19	1.07	0.27	-12	'A'

Both Ipsilateral and Contralateral Stapedial reflexes were present only in the left ear and absent in the right ear (Jerger Box Pattern). Suggestive of no middle ear pathology in left ear and facial nerve palsy in right ear.

DPOAE:
Oto Acoustic Emission were present in both ears which revealed adequate outer hair cell functioning.

ABR:
ABR test were done with Neuro diagnostic protocol of 90dBnHL for click stimuli at both low and high repetition rate of 11.1and 81.1clicks per second respectively. The results revealed prolonged absolute and interpeak latencies in right ear **(TABLE – 2)** and normal absolute and interpeak latencies in left ear **(TABLE–3)** respectively.

TABLE – 2 PROLONGED LATENCIES IN RIGHT EAR

Wave	Absolute latencies	Wave	Interpeak latencies
I	2.32 ms	I-III	2.52 ms
III	4.84 ms	III-V	1.95 ms
V	6.79 ms	I-V	4.47 ms

TABLE – 3 NORMAL LATENCIES IN LEFT EAR

Wave	Absolute latencies	Wave	Interpeak latencies
I	1.42 ms	I-III	1.77 ms
III	3.19 ms	III-V	1.93 ms
V	5.12 ms	I-V	3.70 ms

SPEECH EVALUATION:
Oral Peripheral Mechanism (OPM):
OPM examination was done which revealed the following:

- The Lips were deviated towards the left side and asymmetrical movement was observed.
- The tongue appeared normal but elevation of the tongue was restricted.
- The jaw was deviated towards the left side and the movement of the jaw was restricted.
- All other structures and functions were found to be normal.

Test of Articulation in Tamil (TAT) -Given by D.USHA in 1986:
TAT was done and the following errors were observed.

- Distortion of |p|, |b|, |m|, |f|, |v|, |u| in initial, medial and final positions.

Speech Intelligibility:
She had fair speech intelligibility (75%).

DISCUSSION:
Cherkaoui et al, 1979, presented a case study of Trigeminal schwanoma with a progressive hearing loss ,right sided facial spasms ,facial numbness, hypoesthesia in right facial region and unintelligible speech. The results were similar to those of our study.

Ganesan et al, 2002, who presented a case study with the notable symptoms of headache, giddiness, tinnitus, left sided facial weakness, left side hearing loss and unintelligible speech. The results were similar to those of our study.

Yoshita, Azelaglady, Mohammed Zafrullah, Ahmed faried, Jafferson, 2015, classified Trigeminal schwanoma into four subtypes a) Tumor growth in middle fossa b) tumor growth in posterior fossa, c) Both middle and posterior fossa d) tumor as an extracranial extension .In our study, the tumor type was similar to extracranial extension.

CONCLUSION:
Significant speech and hearing deficits were identified for this patient with Trigeminal schwanoma. Hence the role of Audiologist and Speech Language pathologist in speech and hearing evaluation for subjects with Trigeminal schwanoma is essential, which will enable us to explore the available management options and to plan for rehabilitative strategies.

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