SAQs Team

CASE 2

Case Scenario:

A 45 years old american female teacher complains of progressive decrease in hearing within the last 5 months. She also complains of unsteadiness and rotation of her surroundings when she changes the position of her head (Vertigo) and numbness on the right side of the face. History reveals no trauma or chronic ear problem, no tobacco, alcohol, medication, or allergy. Ear wax is not the problem either. CNS examination reveals abnormalities in 5th,7th, and 8th cranial nerves

Regarding the case:

Q1 What is the most likely diagnosis?
Vestibular schwannoma.

Q2 What further investigations/tests can you do to assess the hearing of the patient? Audiometry of the Right Ear and MRI.

Q3 What are the most likely results of those tests/investigations?
Audiometry of the right ear shows evidence of high frequency of sensorineural hearing loss. MRI would most likely show a mass on the right side of the brain.

Q4 What is the most common site that can be affected by schwannoma? Cranial nerve 8 at cerebellopontine angle.

Q5 What is the type of this tumor ?
Benign tumor of schwann cells.

Q6 What is the familial disease that is associated with this condition?
Neurofibromatosis Type 2.

Q7 Mention the name of gena that can be affected in this patient?
Merlin gene on chromosome 22.

Mention the branches of the 5th cranial nerve?
1- Ophthalmic (pure sensory): which divides into 3 branches: frontal, lacrimal, and nasociliary.

2- Maxillary (pure sensory): which gives the superior alveolar nerves, zygomaticofacial and infraorbital nerves.

3- Mandibular (mixed): gives sensory **L**ingual, **I**nferior alveolar, **B**uccal, and **A**uriculotemporal branches **(LIBA)** and motor branches to 8 muscles.

Mention the muscles innervated by the mandibular motor branch of trigeminal nerve?
4 muscles of mastication (temporalis, masseter, medial and lateral pterygoid)

4 other muscles (posterior belly of digastric, mylohyoid, tensor tympani, and tensor palati.)

Mention 2 functions of cranial nerves 5,7 and 8 ?
Facial: Taste sensation of anterior ⅔ of tongue and supplies the muscle of the face.
Trigeminal: supplies muscles of mastication and sensation of most parts of the face.
Vestibulocochlear: Hearing and balance.

Treatment:
Either Stereotactic radiation therapy to stop the tumour from further growth.
Or Surgical intervention to remove the tumor.

General Questions (From theoretical lectures):

Mention the types of sound conduction?
1- Ossicular conduction.
2- Air conduction.
3- Bone conduction.

Mention 3 balance structures?
1- Dorsal column (spinal cord.)
2- Cerebellum.
3- Vestibular system.

Mention the two types of hearing loss?
1- Conductive Deafness.
2) Perceptive Deafness (Sensorineural Deafness.)

Mention the names of some tests used to distinguish between types of deafness?
1- Weber's Test
2- Rinnes Test
3- Schwabach Test
What are other possible causes of hearing loss?

1- Otitis media.
2- Ear wax.
3-Perforated eardrum.

What is the difference between Oligodendrocytes and Schwann cells?
Oligodendrocytes are myelinated nerve fibers within the CNS.
Schwann cells are myelinated nerve fibers in the periphery (outside CNS.)

Mention the composition of Myelin?
Lipids 80%, main component: Cerebrosides. other component: Sphingomyelin.
Proteins 20%: Myelin basic protein.

Where is the center of hearing located?
Superior temporal gyrus.

Further important information:

The anatomy of the ear:

1- External ear: composed of the auricle (elastic cartilage) and external auditory meatus (outer ⅓ elastic cartilage, inner ⅔ boney.)

2- Middle ear (air-filled cavity): contains the ossicles (malleus,incus, and stapes), 2 muscles (tensor tympani and stapedius), tympanic membrane, Eustachian tube (auditory tube.)

3- Internal ear (fluid-filled cavity): composed mainly of bony labyrinth surrounded by perilymph (cochlea, vestibule, and semicircular canals) and membranous labyrinth surrounded by endolymph (utricle, saccule, three semicircular ducts.)

Muscles of the ossicles :-

Tensor tympani:

Origin: Cartilage of the auditory tube and the bony walls of its own canal.
Insertion: into the handle of the malleus.
Nerve supply: Mandibular nerve.
Action: Contracts reflexly in response to loud sounds to limit the excursion of the tympanic membrane.

Stapedius (the smallest voluntary muscle):

Origin: Internal walls of the hollow pyramid.
Insertion: The tendon emerges from the apex of the pyramid and is inserted into the neck of the stapes.
Nerve supply: Facial nerve.
Action: Reflexly damps down the vibrations of the stapes by pulling on the neck of that bone.

Cranial Nerve	Fibres	Structures Innervated	Functions	Brainstem Nucleus
I Olfactory	Sensory	Olfactory epithelium (via olfactory bulb)	Olfaction	----------
II Optic	Sensory	Retina	Vision	----------
III Oculomotor	Motor	Superior/middle/inferior rectus, inferior oblique, levator palpebrae.	Movement of eye ball	Oculomotor nucleus
	Parasympathetic	Pupillary constrictor, cillary muscle of eyeball. Both via the ciliary ganglion	Pupillary constriction and accommodation	Oculomotor nucleus
IV Trochlear	Motor	Superior oblique	Movement of eyeball	Trochlear nucleus
V Trigeminal	Sensory	Face, scalp, cornea, nasal and oral cavities, cranial dura mater.	General sensation	Trigeminal sensory nucleus
	Motor	Muscles of mastication	Opening/closing mouth	Trigeminal Motor nucleus
		Tensor Tympani muscle	Tension of tympanic membrane	Trigeminal Motor nucleus
VI Abducens	Motor	Lateral rectus	Movement of eyeball	Abducens nucleus
VII Facial	Sensory	Anterior 2/3 of tongue	Taste	Nucleus Solitarius
	Motor	Muscles of facial expression	Facial Movement	Facial Motor nucleus
		Stapedius Muscle	Tension of ossicles	Facial Motor Nucleus
	Parasympathetic	Salivary and lacrimal glands via submandibular and pterygopalatine ganglia	Salivation and Lacrimation	Superior Salivaroty Nucleus
VIII Vestibulocochlear	Sensory	Cochlea	Hearing	Cochlear Nucleus
		Vestibular apparatus	Proriception of head, balance.	Vestibular nucleus
IX Glossopharyngeal	Sensory	Eustachian tube, middle ear	General Sensation,	Trigeminal Sensory nucleus
		Caroitd Body, and sinus	Chemo/baroreception	
		Pharynx, posterior 1/3 of tongue	Taste	Nucleus Solitarius
	Motor	Styropharyngeous	Swallowing	
	Parasympathetic	Salivary glands via the otic ganglion	Salivation	Inferior Salivatory nucleus
X Vagus	Sensory	Pharynx, larynx, oesophagus, external ear	General Sensation	Trigeminal Sensory nucleus
		Aortic bodies and arch	Chemo/baroreception	
		Thoracic and abdominal viscera	Visceral Sensation	Nucleus Solitarus
	Motor	Soft Palate, larynx, pharynx, upper oesophagus	Speech, swallowing	Nucleus Ambiguus
	Parasympathetic	Cardiovascular, respiratory and gastrointestinal systems.	Control of these systems	Dorsal Motor nucleus of Vagus
XI Accessory	Motor	Sternomastoid, trapezius	Movement of head and shoulders	Nucelus Ambiguus, cranial nerves
XII Hypoglossal	Motor	Intrinsic and extrinsic muscles of tongue	Movement of tongue	Hypoglossal nucleus

Done By:

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