CENTRAL VERTIGO

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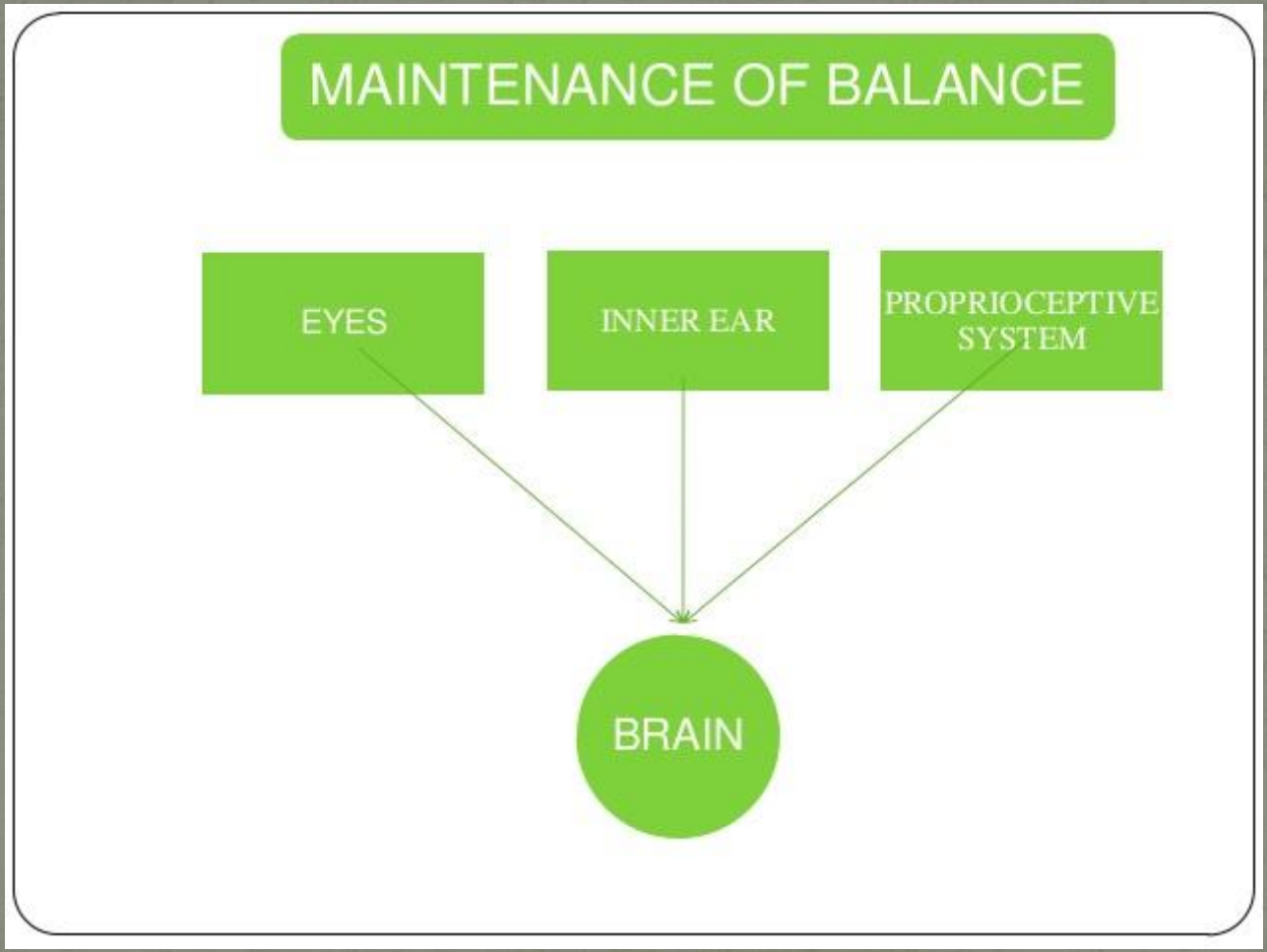
Dizziness

- Vertigo: illusion of movement
- Ataxia: inability to co-ordinate movements (walking or of extremities), “feel as if drunk”
- Dizziness
  - Non-specific term (lightheadedness, swimming sensation inside of head)


MAINTENANCE OF BALANCE
EYES
INNER EAR
PROPRIOCEPTIVE SYSTEM
BRAIN

CLASSIFICATION OF VERTIGO

- OTOLOGICAL
- CENTRAL
- SYSTEMIC
- UNKNOWN

- The peripheral vestibular system consists of the saccule, utricle, and semicircular canals. The neuroepithelial hair cells within the peripheral vestibular apparatus send projections to the vestibular nuclei in the caudal pons and rostral dorsolateral medulla by way of the vestibular division of the VIIIth cranial (vestibulocochlear nerve).

- The vestibular nucleus on each side is divided into 4 sub-nuclei , they are labeled as the superior vestibular nucleus, lateral vestibular nucleus, medial vestibular nucleus, and descending vestibular nucleus

- Some nuclei receive only primary vestibular afferents, but most receive afferents from the cerebellum, reticular formation, spinal cord, and contralateral vestibular nuclei. The projections from the vestibular nuclei extend to the cerebellum, extraocular nuclei, and spinal cord. With these neuroanatomic arrangements, it will be easy to understand the functions of the vestibular system i.e. maintaining visual fixation through the vestibulo-ocular reflex with changing head and body positions in space and extended or erect body posture.

- Central vertigo occurs when there is any lesion or dysfunction of the brainstem vestibular apparatus as described above. Peripheral vertigo may occur as a result of problems in the peripheral vestibular system from the inner ear to the vestibular division of the VIIIth cranial nerve.

- . Peripheral vertigo accounts for over 90% of all causes of vertigo. Central vertigo most commonly occurs as a result of ischemia of the central vestibular structures in the cerebellum, brainstem, or vestibular nuclei especially in the elderly with vascular risk factors. Acute demyelination such as multiple sclerosis is another relatively common cause of central vertigo in younger patients

- The other not so uncommon cause is medication-induced, especially toxicity due to common anticonvulsants such as phenytoin, phenobarbital, and carbamazepine. Other less common causes include infection, trauma, posterior fossa brain tumors, and migraine.

Vertigo-History

- Is it true vertigo?
- Autonomic symptoms?
- Pattern of onset and duration
- Auditory disturbances?
- Neurologic disturbances?
- Was there syncope?
- Unusual eye movements?
- Any past head or neck trauma?
- Past medical history?
- Previous symptoms?
- Prescribed and OTC medications?
- Drug and alcohol intake?

Vertigo-Physical Exam

- Cerumen/FB in EAC
- Otitis media
- Pneumatic otoscopy
- Tympanosclerosis or TM perforation
- Nystagmus
- Fundoscopic exam
- Pupillary abnormalities
- Extraocular muscles
- Cranial nerves
- Internuclear ophthalmoplegia
- Auscultate for carotid bruits
- Orthostatic vital signs
- BP and pulse in both arms
- Dix-Hallpike maneuver
- Gross hearing
- Weber-Rinne test
- External auditory canal vesicles
- Muscle strength
- Gait and Cerebellar function

	periheral	central
Vertigo and nausea	pronounced	mild
Direction of nystagmus	mixed	pure
Visual fixation	Inhibit	No affect
Latency following maneuver	Up to 20s	brief
Otologic symptom	yes	absent
Neurologic symptom	absent	yes
Alexander's law	yes	no

Nystagmus: Features of Peripheral

Alexander's law: Increased frequency and amplitude of nystagmus with gaze in direction of fast component, reverse effect with gaze opposite to the fast component.

Otologic Symptoms in the Dizzy Patient

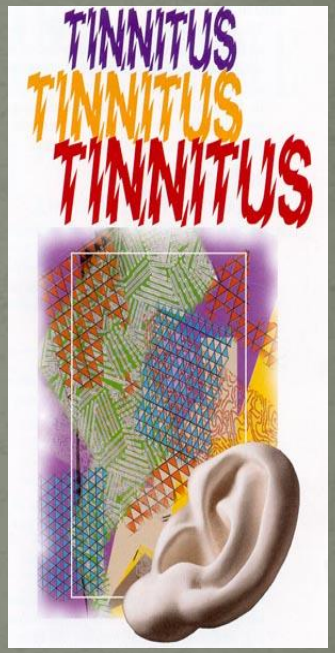
Hearing Loss: progressive, sudden fluctuating SNHL,congenital,

Tinnitus: continuous or episodic

Aural fullness

Ear pain, or chronic drainage

History of ear surgeries/infection



Focal Neurological Symptoms

Vertigo if secondary to cerebrovascular insufficiency is indicative of posterior circulatory problems

Visual loss

Loss of consciousness

Numbness especially if on one side

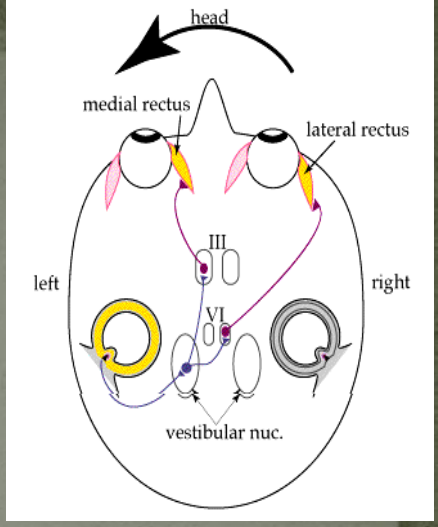
Weakness especially if on one side

Incoordination as if drunk

Difficulty swallowing

Slurring of the speech

Bedside Tests of Horizontal VOR: Head Thrust Test or HINT(HEAD IMPULSE,NYSTAGMUS,TEST OF SKEW)TEST



stands for head impulse test, nystagmus and skew deviation. This is the best bedside test to differentiate peripheral versus central vertigo. The head impulse (head thrust) test is performed by asking the patient to look at the examiner's nose. The examiner gently and quickly thrust the patient's head about 30 degrees to one side and try to look for any catch-up saccade.

- The test is positive when there is a catch-up saccade to one side. The side with a positive test is the side with peripheral vestibular dysfunction. It is important to note that positive head impulse test indicates a peripheral cause for vertigo and is generally not as serious prognostically.

The nystagmus in peripheral vertigo is always unidirectional often with a rotary element regardless of which direction of the gaze the patient has.

- On the other hand, the nystagmus in central vertigo will more commonly present with direction changing nystagmus. The nystagmus will be right beating when the patient looks to the right and change to left beating when the patient looks to the left.

- Any vertical nystagmus indicates a central cause for vertigo. The last part of the HINTS test is a skew deviation. Presence of a skew deviation (one eye higher than another eye) indicates a central cause for vertigo.

- When the examination findings suggest central vertigo, most of the time the patient will need to be further evaluated and very often requires hospitalization. Magnetic resonance imaging (MRI) is the imaging modality of choice for visualization of a potential infarction, tumor, hemorrhage, or evidence of demyelination that would reveal the cause of central vertigo

- Computed tomography (CT) may be employed if MRI is unavailable. CT angiogram and MR angiogram may be performed at the same time or sequentially to look for any occlusion of the vertebrobasilar arterial system which may be the cause of vertigo.

Central Vertigo-Differential

- Central Vertigo
  - Vertebrobasilar Insufficiency
    - Atheromatous plaque
    - Subclavian Steal Syndrome
    - Wallenberg Syndrome
  - Cerebellar Hemorrhage
  - Multiple Sclerosis
  - Head Trauma
  - Neck Injury
  - Temporal lobe seizure
  - Vertebral basilar migraine
  - Metabolic abnormalities
    - Hypoglycemia
    - Hypothyroidism

Positional and Spontaneous Vertigo: Multiple Sclerosis

- Vertigo is the initial symptom of MS in 5%, and presents in 50% of MS patients at some time in the course.
- 25% of patients with MS have caloric paresis
- 80% have eye movement abnormalities
- Oftentimes abnormalities on ABR and occasionally retrocochlear hearing loss from involvement at the root entry zone near pons
- May have any type of nystagmus

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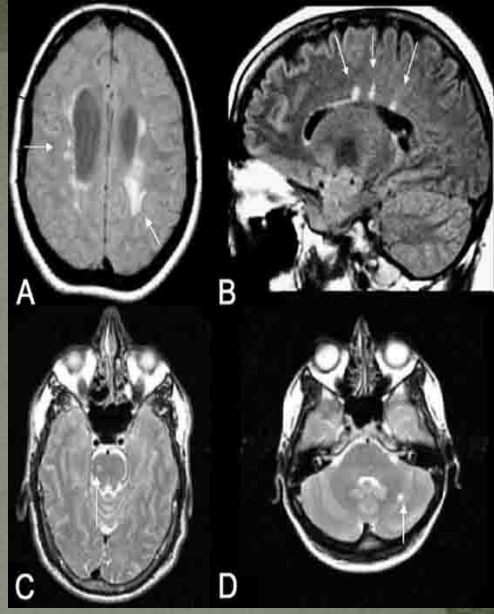

- Demyelinating disease of unknown etiology
- Onset usually in 3rd and 4th decade of life
- Common associated signs and symptoms: INO (internuclear ophthalmoplegia), optic neuritis, Llermitte's sign, vibratory loss, spasticity, sensitivity to temperature
- MRI with FLAIR: plaques

Migraine-associated Vertigo

Vestibular Meniere's, migraine-associated vestibulopathy, benign paroxysmal vertigo

25% of patients with migraine have vertigo spells

25% of patients with migraine have caloric paresis

Isolated vertigo without headache are termed migraine equivalent

Vertebrobasilar Insufficiency

- Important causes of central vertigo
- Related to decreased perfusion of vestibular nuclei in brain stem
- Vertigo may be a prominent symptom with ischemia in basilar artery territories
- Unusual for vertigo to be only symptom of ischemia

Vertebrobasilar Insufficiency

- Most commonly will also have:
  - -Dysarthria
  - -Ataxia
  - -Facial numbness
  - -Hemiparesis
  - -Diplopia
  - -Headache
- Tinnitus and hearing loss unlikely
- Vertical nystagmus is characteristic of a (superior colliculus) brain stem lesion

Vertebrobasilar insufficiency

20% of all strokes are in the vertebrobasilar distribution

Usually from atherosclerotic disease, but 1/5 of infarcts may be cardioembolic

Common cause of episodic, spontaneus vertigo of abrupt onset in older patients

Several minutes (3-4 min) duration is always suspicious for TIA

Wallenberg symptoms

Right Dorsolateral medullary stroke

- Nystagmus and vertigo (vestibular nuclei)
- Difficulty swallowing, hoarse voice, absent gag on R (nucleus ambiguus)
- Difficulty limb coordination on the right FTN, HTS (right cerebellum)
- On walking, veers and falls to the right
- Pain and temperature loss on right face and left leg, trunk, arm (spinothalamic)
- Right Horner's: ptosis, miosis, anhydrosis (reticulospinal fibers in lateral medulla)

Wallenberg Syndrome

- Occlusion of PICA
- Relatively common cause of central vertigo
- Associated Symptoms:

  -nausea -vomiting -nystagmus

  -ataxia -Horner syndrome

  -palate, pharynx and laryngeal paresis

  -loss of pain and temperature on ipsilateral face and contralateral body

Stroke syndrome with vertigo:
Anterior inferior cerebellar artery

Vertigo
Tinnitus, hearing loss secondary to infarct of cochlea/nerve or cochlear nucleus
Ataxia
Facial paralysis and numbness
Ispilateral Horner's

IF IMPAIR FLOCCULONODULAR LOBE CAN MIMICK PERIPHERAL VERTIGO