

## **VERTIGO AND DIZZINESS**

- Vertigo is the perception of movement where no movement exists
- Syncope is a transient LOC that is accompanied by loss of postural tone with spontaneous recovery

### **PATHOPHYSIOLOGY:**

- Vertigo arises from a mismatch of information from two or more of the involved senses
  - IE visual, vestibular, proprioceptive
- The vestibular system, via the OTOLITHS, establishes the body's orientation with respect to gravity
- The CNS structures involved in integrating sensory input from all the three sensory modalities and include:
  - MLF
  - Red nuclei
  - Cerebellum
  - Parietal lobes
- Asymmetric activity may result in vertigo
  - Rapid head movements induce vertigo by accentuating the imbalance
- The most striking clinical sign associated with vertigo is NYSTAGMUS
  - Direction named by its fast component
  - The nystagmus of vestibular injury or dysfunction is provoked when the affected side is in the dependent position
  - Vertical nystagmus BY ITSELF usually indicates a brainstem abnormality

### **CLINICAL FEATURES:**

- CLASSIFICATION:
  - VESTIBULAR/OTOLOGIC:
    - BPPV
    - Traumatic
    - Infection (labyrinthitis, vestibular neuronitis, Ramsay-Hunt)
  - SYNDROME:
    - Meniere
    - Neoplastic
    - Vascular
    - Otosclerosis
    - Paget
    - Toxic/drugs→AMINOGLYCOSIDES
  - NEUROLOGIC:
    - VBI
    - Lateral WALLENBURG syndrome
    - AICA syndrome
    - Neoplastic→cerebellopontine angle tumours

- Cerebellar disorders→haemorrhage, degeneration
  - Basal ganglion diseases
  - MS
  - Infections→neurosyphilis, TB
  - Epilepsy
  - Migraines
  - CVA
- GENERAL:
  - Toxic→alcohol
  - CRF
  - Metabolic→thyroid, hypoglycaemia
  - Haematologic→anaemia, polycythaemia, hyperviscosity
- PERIPHERAL:
  - Classically caused by disorders affecting the vestibular apparatus and CN VIII
- CENTRAL:
  - Classically caused by disorders affecting central structures such as brainstem and cerebellum

## **DIAGNOSIS:**

### **HISTORY:**

- PERIPHERAL:
  - Sudden onset, intense, intermittent
  - Aggravated by movement
  - Frequently associated with nausea and diaphoresis
  - Rotatory-vertical and horizontal nystagmus
  - Symptoms and signs FATIGUE
  - Hearing loss/tinnitus
  - Abnormal TM may occur
  - CNS symptoms/signs ABSENT
- CENTRAL:
  - Onset can be sudden or slow and insidious
  - Less intense
  - CONSTANT
  - Can be aggravated by movement→more variable
  - Vertical nystagmus
  - NO FATIGUABILITY
  - CNS symptoms and signs present

### **PHYSICAL EXAMINATION:**

- All patients should have EAR, NEUROLOGIC AND VESTIBULAR EXAMINATIONS
- If central vertigo is considered, check for:
  - Absent corneal reflex
  - Facial paresis
  - Difficulty swallowing

- Dysphonia
- Depressed gag reflex
- Limb/truncal ataxia
- Diagnosis of BPPV involving the posterior canal is aided by the DIX-HALLPIKE POSITION:
  - Patients KEEP eyes open at all times and stare at the examiners nose/forehead
  - Rotate head to right, lower patient to level of examining table and extend head back an additional 20 degrees.
  - POSITIVE test is indicated by nystagmus following a latency of no longer than 30 seconds
  - 50-80% sensitive for BPPV
- ANCILLARY TESTS:
  - Bacterial labyrinthitis:
    - FBC, BC, CT/MRI/LP
  - Associated with head injury→CT
  - Near-syncope:
    - ECG, holter, FBC, glucose, electrolytes, renal function
  - Arrhythmia
    - ECG, holter
  - Suspected valvular heart disease,
    - Echo, ECG
  - Vertebral artery dissection:
    - Angiogram, MRA
  - VBI:
    - ECG, cardiac monitoring, echo, carotid doppler, MRI, MRA

### **SYMPTOMATIC TREATMENT:**

- DRUGS:
  - Drugs with anticholinergic effects
    - Transdermal scopolamine
    - ANTIHISTAMINES (H1 not H2)
    - Calcium channel blockers (NIMODIPINE)
  - Antidopaminergic agents (NEUROLEPTICS):
    - PROMETHAZINE
    - Metoclopramide
      - These agents reduce neurovegetative symptoms such as N+V
    - Prochlorperazine and chlorpromazine should NOT be used as they tend to cause excessive orthostatic hypotension
- VESTIBULAR REHABILITATION EXERCISES:
  - Principle is the fatiguing response observed with Dix-Hallpike

## **PERIPHERAL VERTIGO:**

### **BENIGN PAROXYSMAL POSITIONAL VERTIGO:**

- Mechanical disorder of the inner ear causing transient vertigo with autonomic symptoms and associated with nystagmus
- Mean duration 1-2 weeks
  - Annual incidence of 0.6%
  - 86% patients seek medical attention
- HYPOTHESIS:
  - CANALOLITHIASIS:
    - BPPV is caused by inappropriate activation of a semicircular canal (typically the posterior and unilateral) usually by the presence of OTOCONIA (floating particles)
    - Otoconia can become displaced from the utricular MACULA by aging, head trauma or labyrinthine disease
- BPPV can occur at any age, but the average age of onset is in the mid-50s
- Women 2x men
- Symptoms tend to be worse in morning (fatiguability)
- Treatment includes scopolamine and antihistamines
  - Also can use PARTICLE REPOSITIONING MANOEUVRE
    - Use gravity to induce particles to move along the semicircular canals until they end up inside the utricle
    - Administer meds prior to attempting
    - Rest head to 45 degrees in recumbent position and slowly bring past vertical to 45 degrees to opposite side and slowly roll onto opposite shoulder
    - EPLEY MANOEUVRE

### **MENIERE DISEASE:**

- A disorder associated with an INCREASED ENDOLYMPH within the cochlea and labyrinth
- Equal sex distribution
- Patients have difficulty regulating the volume, flow and composition of endolymph
- Onset of vertigo usually sudden
  - Duration lasts between 20mins-12 hours
- ASSOCIATED FEATURES:
  - Roaring TINNITUS
  - Diminished hearing
  - Fullness in one ear
- Diagnosis confirmed by glycerol testing and by vestibular-evoked myogenic potentials

### **PERILYMPH FISTULA:**

- An opening in the round or oval window the permits pneumatic changes in the middle ear to be transmitted to the vestibular apparatus
- Trauma, infection or sudden change in pressure may cause it
- Diagnosis is suggested by sudden onset vertigo associated with flying, scuba diving, heaving lifting, severe straining
- Diagnosis is confirmed by nystagmus elicited by PNEUMATIC OTOSCOPY (HENNEBERT SIGN)
- MANAGEMENT:
  - Symptomatic
  - Bed rest
  - ENT referral for surgical repair

### **VESTIBULAR NEURONITIS:**

- Suspected viral aetiology
- Typically lasts several days and DOES NOT RECUR
- Onset is usually sudden
- Patient usually well apart from possible viral prodrome
- Treated symptomatically

### **VESTIBULAR GANGLIONITIS:**

- Believed to be caused by neurotrophic virus e.g. VZV. Ramsay-Hunt (Herpes-Zoster Oticus) is a neuropathic disorder thought to be associated with vestibular ganglionitis
  - Characterised by deafness, vertigo, facial nerve palsy
  - Diagnosis confirmed by the presence of grouped vesicles on an erythematous base inside the external auditory canal
  - Treat with antivirals started within 72 hours of onset

### **LABYRINTHITIS:**

- Infection of the labyrinth that produces peripheral vertigo associated with hearing loss
- May be sequelae of OM
- Hallmarks include sudden onset vertigo, hearing loss and middle ear findings

### **OTOTOXICITY:**

- DOSE DEPENDENT:
  - Aminoglycosides → irreversible
  - NSAIDS → reversible

- NOT DOSE-DEPENDENT:
  - Erythromycin
  - Minocycline
  - Fluoroquinolones
  - Loop diuretics → IRREVERSIBLE
  - Antimalarials
- CEREBELLAR TOXICITY:
  - Phenytoin
  - Toluene
  - Cancer chemotherapy

### **EIGHTH NERVE LESIONS:**

- Meningiomas and acoustic SCHANNOMAS
  - Onset usually gradual, remaining constant until central compensation can occur
- Vertigo usually preceded by hearing loss
- NEUROSURGEONS

### **CEREBELLOPONTINE ANGLE TUMOURS:**

- CLUSTER OF FINDINGS:
  - Deafness
  - Ataxia
  - Ipsilateral facial weakness
  - Loss of corneal reflex
  - Cerebellar signs

### **POST-TRAUMATIC VERTIGO:**

- Acute post-traumatic vertigo is caused by direct injury to the labyrinthine membranes
- Vertigo associated with head injury warrants a CT scan or MRI to exclude and extradural or intradural haematoma
- Resolves within several weeks

### **CENTRAL VERTIGO:**

- Caused by disorders affecting the cerebellum and the brainstem
- GRADUAL IN ONSET
- Mild in intensity
- Nystagmus is more likely to be vertical than horizontal or rotatory and may be present in the absence of vertigo
- Accompanying signs of brainstem disease:
  - Ataxia
  - Blurred vision

- Long tract signs
- Dysphagia
- Dysarthria
- Diplopia

### **CEREBELLAR HAEMORRHAGE AND INFARCTION:**

- Usually causes acute vertigo and ataxia
  - Headache, N+V may be present
- Emergent neurosurgical consultation

### **WALLENBURG SYNDROME:**

- LATERAL MEDULLARY INFARCTION of the brainstem
- CLASSICAL FINDINGS:
  - Ipsilateral:
    - Facial numbness
    - Loss of corneal reflex
    - Horner syndrome
    - Paralysis of soft palate, pharynx and larynx (DYSPHONIA, DYSPHAGIA)
  - Contralateral:
    - Loss of pain and temperature in trunk and limbs

### **VERTEBROBASILAR INSUFFICIENCY:**

- TIAs of the brainstem due to VBI can produce vertigo
- RISK FACTORS for cerebrovascular disease
- VBI induced vertigo can present by itself or with:
  - Diplopia
  - Dysphagia
  - Dysarthria
  - Bilateral long tract signs
  - Bilateral loss of vision

### **VERTEBRAL ARTERY DISSECTION:**

- Symptoms and signs of vertebral artery dissection include:
  - HEADACHE AND VERTIGO
  - AND A UNILATERAL HORNER SYNDROME (maybe)
- Sudden (and often violent) rotation or extension of the neck may precipitate a dissection

### **MULTIPLE SCLEROSIS:**

- Can present with vertigo that tends to last several hours to days/weeks
- Usually non-recurrent

### **NEOPLASMS:**

- FOURTH VENTRICLE (ependymomas)
- Neurosurgeon

**MIGRAINE-RELATED DIZZINESS AND VERTIGO:**

- Can be a symptom of an AURA