Vestibular Differential Diagnosis

Presented by:
Shari Kicker, PT, MPT
Certificate in Vestibular Rehabilitation 2017
Lacey Hale, PT, DPT, LAT, ATC
Cole Darnel, PT, DPT

Vestibular System Function
- Senses head movement
- Senses linear and angular acceleration
- Senses gravity
  - What does it do with this information?
    - Gaze stability
    - Postural stability
    - Orientation in space

Peripheral Anatomy: Labyrinth
- Semicircular Canals
- Otolith Organs
  - Utricle
  - Saccule
- Cochlea

Vestibular Central Processing
- Input from peripheral vestibular system via CN VIII
- Process and relay information:
  - Neural outputs to control eye movements for gaze stability during movement
  - To the Cerebellum
  - To the Brainstem for postural movements
  - To the cortex for spatial orientation

The Vestibular System in Action
Central vs. Peripheral Vestibular Disorders
Differential Diagnosis

- Subjective History is most important
  - Detailed symptom descriptions
  - Timeline of events

Peripheral Labyrinthine/VIII In Symptoms

- Sudden memorable onset
- Slowly improving in days
- Typically true vertigo at onset
- (may not have vertigo if (B) involvement due to symmetrical damage)
- Paroxysmal (come and go) spontaneous events <24 hours
- Head movement provoked symptoms <2 min
- More likely to have auditory involvement

Vestibular Dysfunction Symptoms

- Symptoms other than "Dizziness"
  - Dysequilibrium/Unsteadiness
    - Possible falls or near falls
  - Vertigo-Abnormal sense of movement when you are stationary (spinning sensation)
  - Oscillopsia—blurring of visual world
  - Decreased Visual Acuity during head movements
  - Lightheadedness
  - Motion Sensitivity (“car sick”)

Vestibular Hypofunction

Alexander's Law
g. Neuritis/Labyrinthitis


Central Vestibular Symptoms

- Sudden onset of Vertigo but not memorable, lightheadedness, imbalance with one of the D’s
  - Diplopia, dysphagia, dysarthria, dysmetria, asymmetric arm weakness
- Slow onset of imbalance standing or walking
- Non-vertiginous dizziness
- Vague sensation of motion in the head 24/7 (>50% of the day)
Central Vestibular

- Direction changing nystagmus
- Nystagmus enhanced with fixation present
- Nystagmus pure vertical or pure torsional
- Nystagmus post head shake vertical
- Abnormal pursuit and or saccades
- Ocular lateralpulsion (close eyes, open and eye will be to side of lesion)
- If sudden onset likely not able to stand or walk even with assistance

Direction Changing Nystagmus Central

https://collections.lib.utah.edu/details?id=177176

Peripheral Differential Diagnosis

- **BPPV** - Benign Paroxysmal Positional Vertigo (most common cause of dizziness)
  - Otoconia break free from Utricle and fall into the SCC’s
    - Moves the endolymph which deflects the cilia in the cupula
  - Etiology (adapted from Baloh et.al. 1987 and Katsarkas & Kirkham, 1978)
    - Idiopathic 58%
    - Post traumatic 18.2%
    - Viral neurolabyrinthitis 8.5%

Peripheral Differential Diagnosis

- **BPPV**
  - Symptoms
    - Sudden onset (usually with first movement in the morning)
    - Vertigo of short duration (seconds) provoked by rolling from supine to position of sagittal plane head movements
    - Most describe general imbalance with standing and walking
    - May last for only a day or multiple days or weeks - natural history is to resolve spontaneously
  - Signs
    - Positive Dix-Hallpike and or Roll test

Peripheral Differential Diagnosis

- **Vestibular Neuritis**
  - Commonly Herpes Virus that has been dormant, or bacterial
  - Most often affects Superior vestibular nerve (which innervates AC, HC and utricle) therefore can develop PC BPPV due to intact
  - Nerve swells, occluding anterior vestibular artery
  - #4 most common

Peripheral Differential Diagnosis

- **Vestibular Neuritis**
  - Symptoms
    - Vestibular crisis improving over 1-4 days
    - Left with Head movement sensitivity
    - No sudden hearing loss or auditory symptoms
  - Signs
    - May have direction fixed nystagmus following Alexander’s Law
      - Dependent on timeframe from crisis event (how acute)
    - Positive Head Thrust
### Vestibular Labyrinthitis
- **Virus/Bacteria** has affected both the superior and inferior vestibular nerves (innervates entire Labyrinth including the Cochlea)
  - #5 most common
- **Symptoms**
  - Vestibular crisis improved 1-4 days
  - Head movement sensitivity
  - Sudden Change in Hearing with crisis event

### 3PD/ PPPD/ Persistent Positional- Perceptual Dizziness (formerly Chronic Subjective Dizziness)
- Onset shortly after an event causing acute vestibular symptoms
- Dizziness, unsteadiness on most days for 3 mth or more (>50% of the time)
- Symptoms are present w/o specific provocation but exacerbated by
  - Upright posture
  - A/P motion w/o regard to direction or position
  - Exposure to moving stimuli or complex visual patterns
  - Optokinetic intolerance
- Strong association with Anxiety
  - #2 most common

### Bilateral Peripheral Vestibulopathy
- One cause is following a treatment of Gentamicin antibiotic
- **Symptoms**
  - Onset of imbalance and oscillopsia –progressive or stationary
  - May not have vertigo if symmetrical loss
- **Signs**
  - Diagnose extent of lesion by rotational chair test

### Perilymphatic Fistula/ SSC Dehiscence
- Fistula near round or oval window
- Dehiscence temporal bone
- After CHI or severe whiplash event
- Spontaneous with temporal bone congenital deformity
- **Symptoms**
  - Sudden onset head movement symptoms
  - w or w/o fluctuating hearing
  - c/o Tullio (loud sounds cause dizzy symptoms)
  - Autophony (hear body sounds, ear, eye or bodily sounds)
- **Signs**
  - Valsalva or Bear down tests
  - High Resolution CT scan

### Vestibular Schwannoma/Acoustic Neuroma
- Lesion site-vestibular portion of VIII cranial nerve/ labyrinth/possible brainstem and cerebellum
- **Symptoms**
  - Typically hearing loss
  - Brief spell of imbalance or vertigo
  - Unilateral hypofunction
- **Signs**
  - Hyperventilation test

### Meniere’s
- Malabsorption of the endolymph in the Labyrinth
- **Symptoms**
  - Spontaneous event >20 min <24 hours (at least 2)
  - Fluctuating hearing with documented loss (progressive sensorineural hearing loss with fluctuations)
  - Tinnitus and aural fullness
Vestibular Differential Diagnosis

- **Vestibular Migraine (central)**
  - Symptoms/diagnostic criteria
    - 5 or more attacks of moderate vestibular symptoms (1 min – 72 hrs) minutes to days
    - Episodes of vertigo, positional vertigo, visual or head motion induced vertigo, nausea
    - History of Migraine with headache, photophobia, Phonophobia, visual aura
    - #3 most common in adults, #1 in children

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Questions?

Contact Information

- Shari Kicker, PT, MPT
  - skicker@crmc.org
  - 573-638-3400
- Lacey Hale, PT, DPT, LAT, ATC
  - lhale@crmc.org
  - 573-638-3400
- Cole Darnel, PT, DPT
  - cdarnel@crmc.org
  - 573-632-4990

Case 1

- 46 y.o. male
  - 3 weeks ago, reports sudden onset of the room spinning when he woke up and rolled over to turn the lamp on
  - Indicates the vertigo/dizziness has occurred every day since
  - With further questioning, he stated the vertigo is only when he after bending over, tilting head back in the shower, rolling over in bed and getting up in the morning. Symptoms go away after several seconds.
  - He reports imbalance and “feels off”
  - He has been avoiding any quick movements

Case 2

- 77 y.o. female
  - Chief complaint- sudden onset of extreme dizziness 8 months prior to severe dizziness and vomiting. Went to ER and was given Valium an antinausea medication
  - Symptoms lasting continuously for 2 days- slowly resolved except for spells of vertigo when looking up or down lasting seconds in duration
  - Now left with head and movement provoked imbalance and lightheadedness and brief vertigo with very rapid head movements
  - Denies hearing loss
Case 3
- 55 y.o. male
  - Sudden onset of room spinning when sitting in recliner.
  - Difficulty walking, when he tried to go to bathroom to throw up
  - Symptoms lasted over 3 days, then started to feel better
  - Reports sudden hearing loss on the left
  - Symptoms have now resolved, except for mild head movement intolerance
  - Had and MRI-Negative
  - Exam- ongoing right beating horizontal nystagmus with fixation removed

Case 4
- 28 y.o. female
  - 3 year history of increasing frequency of spontaneous events of vertigo
  - Duration of 1-4 hours- started a 4 per year, now 1-2 per month
  - Between events she returns to her normal baseline
  - Denies any hearing loss but reports tinnitus B with each of the vertigo events
  - With the events she reports > 70 percent of occurrence of focal headache with photophobia, phonophobia and osumphobia
  - PMH negative other than onset of headaches well diagnosed as migraine sufferer starting about 13 y.o.
  - Headaches are 1-2 per week, she uses only Tylenol to control headaches
  - Full work up, VNG, cardiac and neurology negative

Case 5
- 58 y.o. female
  - 1 year prior began with spontaneous spells of vertigo with nausea and vomiting lasting 1-6 hours
  - These are frequent as 1 time per week but no spells from 6 weeks prior to visit
  - Tinnitus, aural fullness and fluctuating hearing reported with the onset of the spells in the left
  - Denies neurological focal complaints
  - Strong history of migraines, with the head aches improving with menopause. Family hx of migraines with vertigo in her son and mother was born deaf

Case 6
- 54 y.o. female
  - Pt. states, she was hit on top of her head by the front panel of an ice machine.
  - She was diagnosed with a concussion.
  - Pt. reports neck pain, daily headaches, light sensitivity and dizziness when she rolls over and imbalance with walking. Pt. reports fatigue and unable to return to work due to symptoms.