Uncommon Vestibular Disorders: Assessment and Intervention

Stacia Britton, PT, DPT
Certified Neurologic Clinical Specialist
Matthew Condo, PT, DPT, EdD

Prevalence of Vestibular Disorders

- 35% of adults aged 40 or older have vestibular dysfunction
- More common in women and older individuals
- Dizziness results in 2.5% of all PCP visits per year in the U.S.

Prevalence of Vestibular Disorders

- In UK 4% of all patients present with persistent vertigo symptoms
- In UK 2% of all neurology referrals were due to vertigo or dizziness
  - ½ deemed psychological/functional

Prevalence of Vestibular Disorders

- Common peripheral vertigo and vestibular labyrinth disorders comprise 47% of all vestibular disorders
- Example:
  - Of the uncommon causes of vertigo:
    - Vestibular paroxysmia accounted for 3.7% of
    - Superior Canal Dehiscence accounted for 0.6%

Vestibular System

Common Vestibular Disorders

- Peripheral Disorders (UUL or BVL)
  - Vestibular Neuritis or Labyrinthitis
  - Meniere’s Disease
  - Secondary Endolymphatic Hydrops
  - Acoustic Neuroma

- Benign Paroxysmal Positional Vertigo

- Central Disorders
  - Stroke / Vascular
  - TBI
  - Migraines
  - Disequilibrium of Aging
Common Vestibular Disorders

- Examination
  - Standard PT Exam
  - Standard Vestibular Exam
    - VOR testing
    - Balance testing
    - Gait

Examination

- History
  - Diagnosis/PMH
  - Vision/hearing
  - Medications/special Testing

- Symptom History
  - Sensation
  - Timeframe
  - Intensity
  - Provoking factors
  - Frequency / duration
  - Associated symptoms – nausea / vomiting, tinnitus, hearing loss, earache

- Observation
  - Posture assessment
  - Range of motion
  - Manual muscle testing
  - Neurological assessment
    - Coordination, tone, sensation

- Functional mobility assessment
- Gait assessment
- Vertical and horizontal head turning

Outcomes Measures

- Body Structure/Body Function
  - PT/Vestibular Exam
  - ABC
  - DHI
  - Perceived Handicap

- Activity
  - DGI/FGA/Berg
  - CTSIB/MCTSIB/Posturography
  - 6-minute

Examination

- Spontaneous Nystagmus
- Gaze Holding Nystagmus
- OMRON
- Convergence/Divergence
- Smooth Pursuits
- Saccades

- Head Thrust
- Head Shake Nystagmus
- DVA
- VOR Cancellation
- Dix Hallpike
- Horizontal Roll

Uncommon Vestibular Disorders

- Persistent Postural-Perceptual Dizziness (PPPD)
- Vestibular Hyperacusis
- Vestibular Paroxysimia
- Enlarged Vestibular Aqueduct Syndrome
- Superior Canal Dehiscence
Persistent Postural-Perceptual Dizziness (PPPD)\(^5\)

- Chronic in nature
- Functional disorder
- s/s include: non-spinning vertigo and perceived unsteadiness

PPPD

- Difficult to tell prevalence
  - Phobic postural vertigo and chronic subjective dizziness accounted for 15-20% of all cases in a tertiary clinic\(^6\)
  - Prospective studies revealed that 1/4 individuals who have acute or episodic vestibular disorders (neuritis or BPPV) will develop PPPD\(^5\).

PPPD

- Unified diagnosis\(^7,8\)
  - Phobic postural vertigo
  - Space-motion discomfort
  - Visual vertigo
  - Chronic subjective dizziness
  - Psychogenic gait disorder

PPPD Pathophysiology\(^9\)

- Trigger
- Acute Adaptation
- Recovery
- Re-adaptation
- Maladaptation

PPPD Diagnostic Criteria\(^5\)

- One or more symptoms of dizziness, unsteadiness or non-spinning vertigo on most days for at least 3 months
- Persistent symptoms without specific provocation
  - Exacerbated by: upright posture, active/passive motion, and exposure to moving visual stimuli or complex visual patterns
- Triggered by events that cause vertigo, unsteadiness, dizziness or problems with balance
- Symptoms limit function and cause significant distress
- Symptoms are not accounted for by another pathology

PPPD Evaluation\(^9\)

- Standard examination procedures
- Also assess for:
  - Anxiety disorder
  - Functional gait disorders
PPPD Treatment

- Vestibular habituation exercises
- Medications
- Cognitive-behavioural therapy

Vestibular Hyperacusis

- Significant sensitivity to some noises or tones
- Mild sense of unsteadiness to full loss of balance with ear pain

Vestibular Hyperacusis

- Associated with auto-immune disorders
- TBI
- Metabolic disorders
- Psychological conditions

Vestibular Hyperacusis

- Electrical signals generated by sound vibrations are misinterpreted, confused, or exaggerated
- Damage to the nerve cells

Vestibular Hyperacusis

- Cochlear
  - Ear pain, discomfort, annoyance and irritation with sounds
- Vestibular
  - Exposure to sound results in falling or loss of balance/postural control

Vestibular Hyperacusis

- Examination
  - Auditory test
  - Other standard vestibular testing
- Treatment
  - Medications
  - Ear plugs/sound maskers
  - Tinnitus Retraining Therapy
Vestibular Paroxysmia\textsuperscript{11,12}

- Falls under the umbrella term “vascular compression syndrome”
- Compression of the vascular component to CN XIII
- Most commonly caused by a compression of the Labrynthine artery (a branch off of the Basiliar Artery)
- Often associated tinnitus is present if the cochlear nerve is also compromised


Brandt, et al., 2014


Vestibular Paroxysmia Diagnostic Criteria\textsuperscript{13}

- Diagnostic Imaging best option: T2 weighted MRI
- Caloric testing was found to be mildly useful
- Nystagmus was induced in 70% of patients while hyperventilating
- Treatment requires surgical intervention to reduce vascular compression

Enlarged Vestibular Aqueduct Syndrome\textsuperscript{14}

- Congenital abnormality of malformed inner ear bone
- Highly correlated with hearing loss especially if bilateral
- 45% of patient had associated vestibular disorders (Zalewski, et al., 2015)
- Diagnosis usually occurs during vestibular disorders (Zalewski, et al., 2015)
- Diagnosis is confirmed with CT scan

Oh, et al., (2001)
Superior Canal Dehiscence

- Pathology: an opening in the bone covering the superior semicircular canal
- Hearing a balance are usually affected

Clinical signs and symptoms:
- Difficulty hearing
- Vertigo
- Oscillopsia
- Downbeating nystagmus
- Symptoms are increased with loud noises or the valsava maneuver
- Patients also complain of hearing their own voice as loud or distorted
- Diagnosis is confirmed with CT scan
  - Masaki (2010) found a false positive rate of 80% with CT scan alone

Case Study 1

- Patient is a 75 year old male with diagnosis of "recurrent vertigo". Patient reports that the mechanism of injury was a fall in the home in which the patient struck the right side of his head on the floor. The patient notes the following symptoms: vertigo while looking up towards the ceiling, tinnitus, and vertigo while transferring in and out of bed. The patient reports that each vertigo attack last approximately 3-5 minutes.
- Objective findings: nystagmus present during all positional testing, although no clear pattern of nystagmus was present. VOR normal, static balance and computerized posturography testing normal.

Initial thoughts?
- Is this person appropriate for physical therapy?
- Any additional testing warranted?
- Any "red flags"?
- Potential referral to another provider?
Case Study 2

- 56-year-old woman reports a 2 year history of dizziness, non-specific in nature. Started after feeling sick with the inability to get out of bed due to acute vertigo that decreased over several days.

- Examination
  - Lightheaded feeling with sway during standing and walking
  - Motion sensitivities
  - Feeling embarrassed about falling due to sway
  - Fatigue, poor concentration with work

Case Study

- 46-year-old male reporting a 1 year history of sound induced vibration, oscillopsia, mild imbalance and HA after a MVA.
- Denies vertigo or past history of dizziness
- Denies hearing loss

Conclusion

- The objective exam must be systematic with the goal of arriving at a definitive diagnosis
- Be suspicious and perform additional testing whenever symptoms do not match a pattern
  - Timing of symptoms
  - Associated symptoms
  - Positioning and movement
  - Progression of symptoms
  - Failure to improve with conservative treatment

Case Study 2

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References

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