Navigating the Dizzy Patient:  
Ready, Set, Treat!  
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Prevalence and Incidence

- 35% of adults aged 40 years or older in the US - approximately 69 million Americans - have experienced some form of vestibular dysfunction. A further 4% (8 million) American adults report chronic balance problems.
- An additional 1.1% (2.4 million) report a chronic problem with dizziness alone.
- 80% of adults aged 65 years and older have experienced dizziness.
- BPPV, the most common vestibular disorder, is the cause of approximately 50% of dizziness in older people.
- Overall, vertigo from a vestibular problem accounts for 1/3rd of all dizziness and vertigo symptoms reported.

Balance - Sensory Input Systems

- 3 Equilibrium/Sensory Systems:
  - Vestibular System
  - Visual System
  - Somatosensory System/Proprioception
- CNS - integrates sensory input and produces motor control response
Anatomy of Vestibular System

- Labyrinth
  - Cochlea
  - Vestibular organs
    1. Semicircular Canals
    2. Otolith organ
       a. Utricle
       b. Saccule
Function of the Vestibular System

- **Sensory**
  - One’s perception of motion and orientation
  - Angular acceleration
  - Linear acceleration
  - Positional sense in relation to gravity
- **Motor**
  - Providing a clear visual image of surroundings by controlling eye movement
  - Equilibrium and postural maintenance

Input Involved

- Vestibular System
  - Provides internal reference, telling brain where head is in space, direction of motion, and acceleration.
  - Gravity is detected by the Otolith organs
  - Otolith: Utricle and Saccule - both gravity detectors sensitive to linear acceleration
  - Velocity detection by the Semicircular Canals
  - Semicircular Canals (SCC): Anterior (Superior), Horizontal (Lateral), and Posterior
Vestibular System (cont)

- Vestibular system includes parts of inner ear and brain that process sensory info involved with controlling balance and eye movements. If disease or injury damages these processing areas, vestibular disorders can result.

- Consider Reflexes: VOR and VSR

Vestibular Disorders
Most Common Diagnoses

- BPPV: Posterior and Horizontal (Anterior)
- Vestibular Neuritis/Labyrinthitis
- Meniere’s Disease
- Vestibular Migraine
- Superior Canal Dehiscence (SCD)/Perilymph Fistula
- Vestibular Schwannoma/Acoustic Neuroma

Clinical Testing

- In therapy clinic and in home
- Vertebal Artery Test - screen
- Balance/Gait/Sensory Integration: Romberg/Sharpened Romberg, mCTSIB, BERG, DGI, 5 Rep Sit to Stand, 30 secs Sit-> Stand, TUG, BEST test, Fukuda Stepping Test
- Vestibular/Central testing at MABI
- VNG, VEMP, DVA, ECochG, Posturography - Audiology and/or ENT
- Other: Rotary Chair, ENG
Romberg/Sharpened Romberg

- **Romberg's Test:** Ask the patient to stand with their feet together (touching if possible). Then ask the patient to close their eyes. Remain close to the patient and prepare to catch them if they begin to sway or demonstrate loss of spatial orientation.

<table>
<thead>
<tr>
<th>Test</th>
<th>Difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feet Together Eyes Open</td>
<td>Easy</td>
</tr>
<tr>
<td>Feet Together Eyes Closed</td>
<td>Harder</td>
</tr>
<tr>
<td><strong>Sharpened</strong></td>
<td></td>
</tr>
<tr>
<td>Tandem Stance Eyes Open</td>
<td>Harder</td>
</tr>
<tr>
<td>Tandem Stance Eyes Closed</td>
<td>Most Difficult</td>
</tr>
</tbody>
</table>

This test is designed to assess how well an individual is utilizing sensory inputs when one or more sensory systems are compromised, restricted or impaired.

- **4 conditions to test**

Modified Clinical Test for Sensory Interaction on Balance (mCTSIB)

- This test is designed to assess how well an individual is utilizing sensory inputs when one or more sensory systems are compromised, restricted or impaired.

| Condition One: All sensory systems (i.e., vision, somatosensory, and vestibular) are available for maintaining balance. |
| Eyes Open, Firm Surface        |
| 3 Trials                       |
| Time: __/30 seconds            |
mCTSIB Condition Two

- Condition Two: Vision has been removed and the older adult must rely on the somatosensory and vestibular systems to balance.
  - Eyes Closed, Firm Surface
  - 3 Trials
  - Time: ___/30secs

mCTSIB Condition Three

- Condition Three: Input from the somatosensory system has been compromised, which requires reliance on the use of vision and the vestibular system to balance.
  - Eyes Open, Foam Surface
  - 3 Trials
  - Time: ___/30secs

mCTSIB Condition Four

- Condition Four: Both vision and somatosensory systems have been restricted, which requires reliance on the vestibular inputs to maintain postural stability/balance.
  - Eyes Closed, Foam Surface
  - 3 Trials
  - Time: ___/30 secs
Fukuda Stepping Test

- To start the test, stand in the middle of a room. Place a small piece of tape on the floor in front of your toes to mark your starting position.
- Close both eyes, hold your arms outstretched directly in front of you, start stepping in place as if you were taking a brisk walk. Make sure someone is watching you so you do not bump into anything in the room.
- Remain walking in place for 50 to 100 steps. After stepping, open your eyes and determine how much your body rotated to one side or the other.

Fukuda (cont)

- Assessing the Results
  - Place a small piece of tape on the floor along the front of your toes, and compare the angle of this line with your original line.
  - If you have taken only 50 steps, then an angle of 30 degrees or more may indicate vestibular weakness toward the side your body deviated.
  - If you performed for 100 steps, an angle greater than 45 degrees indicates single-sided vestibular weakness on the side to which your body turned while doing the test.

Benign Paroxysmal Positional Vertigo

- Benign Paroxysmal Positional Vertigo
- Most common cause of vertigo, a false sensation of spinning, #1 cause of dizziness in 60+yo
- Key Symptoms:
  - Sudden, intense vertigo with head motions
  - Short duration, yet latent onset
  - Rotary-torsional nystagmus beating upward and towards affected ear in posterior BPPV
  - Diaphoresis and emesis
  - Mild postural instability between attacks
BPPV (cont)

Dix-Hallpike Test can be performed to determine the presence of posterior canal Benign Paroxysmal Positional Vertigo (BPPV).

- Observe Nystagmus
  - Negative result: no nystagmus
  - Positive result: torsional nystagmus
  - Horizontal nystagmus can indicate horizontal canal BPPV
- Treat with maneuvers: Semont Liberatory, Epley Canalith Repositioning for posterior, Gans; Hybrid for horizontal

- The presence of vertigo alone does not suggest a positive finding

Nystagmus

- Torsional
- Horizontal
- Up/Down beating

Epley Maneuver for Posterior BPPV
Supine Roll for Horizontal BPPV

Indications for other testing

- History of falls
- Imbalance/unsteadiness
- Visual-Spatial deficits
- Vertigo
- Recurrent dizziness
- Tests offered at MABI: VNG, ENG, DVA, Calorics, VEMP, ECochG
- Other Tests available: vHIT, Rotary Chair

While VNG is considered the primary test of vestibular function, VNG alone is not enough to assess the etiology of dizzy/imbalance symptoms. Instead, VNG should be used in conjunction with a complete medical evaluation to rule out other co-morbidities including cardiovascular, metabolic, neurologic and neuromuscular dysfunction.

Videonystagmography (VNG)
VBRT - Vestibular and Balance Rehabilitation Therapy

* Treatment for Unilateral and Bilateral Peripheral Vestibular Dysfunctions (better than for Meniere’s, MAV, CNS disorders)

* Recommend VBRT for 2-3x/week for 8-12 weeks

Vestibular and Balance Treatments

* Gaze Stabilization - VOR
  * Other: smooth pursuit, saccades, VOR opposition, VOR cancelation
* Balance
  * Static: ft apart, together, partial tandem, full tandem, SLB -on varied surfaces (foam, pebbles, mulch)
  * Dynamic: moving surfaces (rocker boards, mini-trampoline), with UE motions (magnet moving, Body Blade, pick up items)
  * LE strength/coordination
    * Step taps, step ups, stairs, ramps, 4 square stepping

VBRT Treatments (cont)

* Gait
  * Gaze stabilization, head/eye turns (horiz and vertical), cognitive tasking, obstacles (over, around, tapping)
* Cognitive Tasking
  * Letter reading, puzzles (word search, mazes, hidden objects)
* Visual Perturbations
  * Lasers, black and white pattern boards, glasses (red/green, holy, patched)
When to Refer Out

- Unrelenting and/or worsening symptoms, changes in symptoms (severe vertigo, oscillopsia)
- Need MD Rx like any outpatient referral – prefer evaluate and treat for Dizziness/Balance/Vertigo orders for testing and treatment.

References

- Ator GA. Vertigo-Evaluation and Treatment in the Elderly.

References (cont)

References (cont)


Questions?

- Thank you for allowing me to come and speak on Vestibular Disorders and Treatments!

- Andréea Kristoff, MPT

- Certified Vestibular Rehabilitation Therapist

- Mid America Balance Institute