Dizziness and Vertigo: A Step-Wise Approach to Evaluation and Management

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Dr. Wipperman earned her medical degree from the University of Wisconsin School of Medicine and Public Health, Madison, and completed her Master of Public Health (MPH) degree at the KU School of Medicine. She has conducted research in health literacy and breastfeeding, and has published review articles on carpal tunnel syndrome, dizziness and vertigo, and corneal abrasions in peer-reviewed publications. She has partnered with public health departments and community programs in prior research activities, providing experience in a multi-sector approach to health promotion and research. In 2016, Dr. Wipperman received the Faculty Leadership Award in teaching and innovation from Via Christi Family Medicine Residency.

Learning Objectives

1. Narrow the differential diagnosis of dizziness with physical examination tests and appropriate history taking, including a medication review and anxiety disorder evaluation.
2. Treat vertigo using the Epley maneuver and vestibular rehabilitation for identified vestibular disorders.
3. Use evidence-based guidelines to select appropriate treatment of dizziness as appropriate per the etiology.
4. Develop collaborative care plans, including patient education, to help patients minimize reoccurrences of dizziness.

Audience Engagement System

Step 1 Step 2 Step 3
**Dizziness**

- Common medical complaint in primary care
- Most causes benign but can be serious
- Often frustrating
- Clinical diagnosis

**Case 1**

- 67 YOF with dizzy spells
- "I feel like the room is spinning."
- "Comes and goes", lasts only seconds
- Brought on by rolling over to get out of bed in the morning, looking up to a shelf
- No hearing loss or tinnitus
- Feels fine between these "spells"

**Case 1**

- Medications: HCTZ
- PMH: HTN
- FH: Mom had a stroke in her late 80s.
- SH: Quit smoking 20 years ago, no ETOH

**Describe “Dizziness”**

- Wait for it… let the patient describe
- What are the four types?
  - Presyncope
  - Vertigo
  - Dysequilibrium
  - Non-specific dizziness

**Vertigo**

- A false sense of motion
  - Self or environment
- Spinning
- Amusement park ride
- Swaying or tilting

**Causes of Vertigo**

**Peripheral "Benign"**

- BPPV
- Vestibular neuritis
- Meniere’s disease
- Perilymphatic fistula
- Herpes zoster oticus
- Acoustic neuroma
- Ototoxicity
- Otitis media
- Semicircular canal dehiscence syndrome

**Central "Serious"**

- Migrainous vertigo
- Intracranial mass
- Stroke
  - Cerebellar/brainstem
- Vertebrobasilar insufficiency
- Chiari malformation
- Multiple sclerosis
Narrowing Your Diagnosis

<table>
<thead>
<tr>
<th>Duration</th>
<th>Timing</th>
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<tbody>
<tr>
<td>Seconds</td>
<td>Episodic</td>
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<tr>
<td></td>
<td>Constant</td>
</tr>
<tr>
<td>Minutes-Hours</td>
<td>BPPV</td>
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<tr>
<td></td>
<td>Migraine</td>
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<tr>
<td>Days</td>
<td>Vestibular neuritis</td>
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<td>CVA</td>
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Historical Clues

- **Triggers:** position changes, head movement, pressure changes
- **Associated symptoms:** neurologic, hearing loss, tinnitus, headache
- **Comorbidities:** diabetes, CVD, HTN, head trauma
- **FH:** stroke, migraine, Meniere’s, BPPV
- **Medications:** antihypertensives, anticonvulsants

Physical Exam

- **Vitals:** BP/orthostatics
- **Ear:** cerumen, vesicles on TM, middle ear effusion, hearing
- **Eye:** nystagmus, ocular movements, vision
- **CV:** carotid bruises, murmur, arrhythmia, signs of PAD
- **Neurologic:** Romberg, cerebellar signs

Case 1

- **Vitals:** AF, HR 62, BP 145/92
- **HEENT:** some cerumen in canals bilaterally
- **Neck:** No carotid bruises
- **CV:** RRR, no murmurs
- **Ext:** DP +2 b/l, no edema
- **Neuro:** wnl, no nystagmus

AES Poll Question

What is characteristic of a positive Dix-Hallpike test?

A. Vertigo only if history is typical
B. Vertigo and torsional nystagmus
C. Vertigo and vertical nystagmus
D. Vertigo and nystagmus lasting longer than 60 sec

Dix-Hallpike Maneuver

https://www.youtube.com/watch?v=R-uVlxWDu4k

*Am Fam Phys. 2010. 82(4):361-8*
BPPV Torsional, Up-beating Nystagmus

https://www.youtube.com/watch?v=70F-2017n8

Dix-Hallpike Pearls

- Must have all 3:
  - Latency of 5-20 sec before onset of vertigo and nystagmus
  - Torsional, up-beating nystagmus
  - Nystagmus and vertigo < 60 sec
- Persistent or vertical nystagmus: central cause
- PPV 83%, NPV 52% -> repeat in 1 wk if need

Benign Paroxysmal Positional Vertigo

- Most common cause of vertigo
  - Increasing incidence with age
- Brief episodes lasting < 1 minute
- Triggered by head position changes
  - No vertigo between attacks

BPPV—Pathophysiology

- "Canaliths": calcium carbonate debris floating in semicircular canals
- Posterior SCC - 90%, horizontal SCC - 10% of cases
- Brief head movement causes canaliths to move freely, triggering hair cells and false sense of motion

Am Fam Phys. 2010. 82(4):361-8

BPPV—Diagnosis

- Posterior canal: Dix-Hallpike
- Horizontal canal: Supine Roll Maneuver
- Vestibular function testing can aid in uncertain cases.

AES Poll Question

You suspect your patient has BPPV, however the DH is negative. What is the next step in evaluation?

A. Repeat the DH now
B. Check basic labs (CBC, electrolytes, renal function) to rule out other causes
C. Perform the Supine Roll Test
D. Refer for vestibular function testing
Supine Roll Maneuver

http://youtu.be/U3SGJfjwJaw

BPPV—Treatment

• Canalith Repositioning Procedures
  – Epley OR of 4.42 (95% C.I., 2.6-7.4) for
    symptom resolution (SOR A), Cochrane 2014
  – CPT 95992: $45 per day CMS reimbursement
  – Barbecue Roll maneuver (horizontal SCC)
  – Home CRP – repeat every night for 1 week

BPPV—Treatment

• Observation alone
  – Must reassess in 1 month for improvement
• Avoid symptomatic medications
  – Meclizine, antiemetics, benzodiazepines
• Counsel about recurrence, evaluate fall risk
  – Elderly, comorbidities, post-traumatic BPPV
  – Offer vestibular rehabilitation
  – Home exercises

Epley Maneuver

https://youtu.be/9O9kqfEJ6eQ

Case 2

• 45 YOM has severe “dizziness” for 2 days
  – Nausea and vomiting
  – Whenever he opens his eyes, feels like
    everything is moving
    • Prefers to lie still with eyes closed
  – Recent URI
  – No hearing loss or tinnitus

Barbeque Roll

https://youtu.be/9O9kqfEJ6eQ
Case 2

- HEENT: TMs normal
- CV: RRR, no murmurs
- Neuro:
  - Spontaneous unilateral nystagmus to right
  - Gait - veers toward the left but can walk

AES Poll Question

In a patient without any additional focal neurologic deficits, what is your first choice to help rule out a central cause, such as stroke?

A. Non-contrast MRI brain
B. Non-contrast CT brain
C. Specialized physical exam tests
D. Vestibular function testing

HINTS exam

- Head Impulse
- Nystagmus
- Test of Skew (vertical strabismus)
- 1 or more = central cause → think CVA
- 96.5% sensitive and 84.4% specific for stroke
  - 96.8% sensitive and 98.5% specific for any central lesion (SOR A)
  - HINTS + (hearing loss) 99% sensitive, LR - 0.01

Head Impulse Test

Positive test
- Normal test

Visual Fixation

- Have a patient focus on a visual target.
  - Nystagmus stops if lesion is peripheral
- Place a blank sheet of paper in front of the patient’s face.
  - Nystagmus returns
- Central lesions will not be suppressed by visual fixation.

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<thead>
<tr>
<th>Peripheral</th>
<th>Vestibular Neuroma</th>
<th>Central</th>
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<tbody>
<tr>
<td>History</td>
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<td>MPV</td>
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<td>History</td>
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<tr>
<td>Nystagmus</td>
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<td>Gait</td>
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<td>Specialized physical exam tests</td>
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<tr>
<td>Additional Neurologic Signs</td>
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Newman-Toker et al 2013

Head Impulse Test (Adapted from Pract Neurol 2008; 8: 211–221.)
Imaging
• MRI brain – better visualization of posterior fossa
• Indications
  – Red flags
  – Abnormal HINTS exam
  – Multiple stroke risk factors

Vestibular Neuritis
• Second most common cause of vertigo
  – 50% have had recent URI
  – Hypothesized to be a viral infection (HSV) of CN8
• Sudden, constant severe vertigo
• Oscillopsia with spontaneous nystagmus
• May veer toward affected side

AES Poll Question
Your patient was diagnosed with vestibular neuritis in the ER last week. He has been taking antiemetics and antihistamines with some relief but limiting activity to avoid vertigo. You recommend:
A. Bed rest with pm symptomatic medications until vertigo is fully resolved
B. Increase activity and continue symptomatic medications
C. Increase activity and give one-time dose of IM dexamethasone
D. Increase activity and refer for vestibular rehabilitation

Vestibular Neuritis - Treatment
• Rest, gradually improves in a few weeks
• Vestibular suppressants for first few days ONLY
  – Antiemetics, antihistamines, benzodiazepines
• Vestibular rehabilitation
  – OR 2.67 for improvement of vertigo in unilateral vestibular dysfunction, Cochrane 2015

Vestibular Rehabilitation
• Facilitates "vestibular adaptation" - brain compensates for vestibular dysfunction
• Quicker recovery and decreased long-term sequelae
• Formal best, home exercises available
  – Cawthorne Cooksey: https://www.youtube.com/watch?v=epJ1luFyF2o

Vestibular Neuritis - Treatment
• Corticosteroids controversial
  – 2011 Cochrane review found insufficient evidence for routine use.
  – Studies show earlier return of vestibular function testing but mixed evidence for earlier recovery of symptoms.
  – Prednisone taper over 10 days
Case 3
- 15 YOF, missed school several times in the last few months due to severe dizziness
- Describes as spinning sensation, often triggered by movement
- Lasts hours, sometimes days
- Associated with nausea and vomiting and photophobia
- Often occurs around menstruation

Case 3
- PMH: Chronic headaches
- Meds: NSAIDs, APAP as needed
- FH: Migraines in mother, CVA in grandmother
- PE: No abnormal findings including neurologic exam and gait

Vestibular Migraine
- Common, unrecognized cause of vertigo
- Migraine variant
- History of migraine
- Vertigo may occur with headache
- Duration and triggers similar to migraine

Vestibular Migraine
- Exam usually normal
- Clinical diagnosis of exclusion
  - Obtain audiometry and vestibular function testing to exclude other etiologies
  - Consider MRI brain:
    - Red flags
    - Stroke risk factors
    - Unilateral hearing loss

Diagnostic Criteria for Vestibular Migraine, Lempert 2010
A. At least five episodes fulfilling criteria C and D
B. A current or past history of migraine without aura or migraine with aura
C. Vestibular symptoms of moderate or severe intensity, lasting between 5 minutes and 72 hours
D. At least 50% of episodes are associated with at least one of the following three migrainous features:
   1. Headache with at least two of the following four characteristics:
      a) Unilateral location
      b) Pulsating quality
      c) Moderate or severe intensity
      d) Aggravation by routine physical activity
   2. Photophobia and phonophobia
   3. Visual aura
E. Not better accounted for by another ICHD-3 diagnosis or by another vestibular disorder

Vestibular Migraine: Treatment
- Treat as migraine
  - Improvement of vertigo with triptans can be both therapeutic and diagnostic
  - Trigger avoidance
  - Prophylaxis if frequent or debilitating
- Vestibular suppressants
- Vestibular rehabilitation
Case 4
• 37 YOF with vertigo, nausea, and vomiting
  – Lasted 3-4 hours last week
  – Spontaneously resolved
• Recurred this morning
• Difficulty walking
• “Sounds like the ocean is in my left ear”

Case 4
• PMH: Hypertension
• Meds: HCTZ, OCP
• FH: Grandfather with a “dizziness problem”
• SH: Occasional ETOH, former smoker

Case 4
• Vitals: AF, BP 132/85, HR 77, RR 18
• General: Lying supine, uncomfortable appearing
• HEENT: Horizontal nystagmus with left gaze; decreased hearing in left ear
• CV: RRR, no murmurs, no bruits
• Neuro: + Romberg, mild gait ataxia

AES Poll Question
True or False? Audiometry is often helpful in the diagnosis of Meniere’s Disease:
A. True
B. False

Meniere’s Disease
• Classic triad of vertigo, hearing loss, and tinnitus/aural fullness
  – HL is fluctuating, occurs with vertigo, initially low frequency
  – Tinnitus - roaring, changes pitch and volume

Meniere’s Disease
• Overtime, can lead to permanent disability
  – Permanent hearing loss
  – Vestibular function loss leads to chronic imbalance and positional vertigo
Meniere’s Disease: Diagnosis

- Clinical diagnosis
- Audiometry
- MRI/MRA - rule out other causes
- +/- Vestibular function testing

Diagnostic Criteria

<table>
<thead>
<tr>
<th>Definite Meniere’s Disease</th>
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<tr>
<td>A. ≥ 2 definitive spontaneous episodes of vertigo 20 min or longer</td>
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<tr>
<td>B. Audiometrically documented hearing loss on at least one occasion</td>
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<tr>
<td>C. Tinnitus or aural fullness in the treated ear</td>
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<tr>
<td>D. Other causes excluded</td>
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Treatment - Goals

- Decrease frequency/severity of vertigo
- Improve balance
- Preserve hearing and QOL
- Educate: No “cure,” majority can get control of vertigo and improved quality of life

Non-interventional Treatment

- Acute: Symptomatic medications
- Prophylaxis – controls vertigo in up to 95%:
  - Diet: Decrease salt (2g/d), caffeine, alcohol, MSG, nicotine
  - Diuretics: triamterene-hydrochlorothiazide 37.5–25mg
- Vestibular rehab for persistent vertigo
- Hearing aids if bilateral HL

Interventional Treatment

- Consider if significant disability or impaired QOL
- Degree of vestibular function and hearing loss determine best treatment
  - Positive pressure pulse generator
  - Intratympanic gentamicin, glucocorticoids
  - Endolymphatic sac procedures, sacculotomy
  - Vestibular neurectomy
  - Labyrinthectomy

Case 5

- 72 YOF dizzy spells when putting away dishes
- Room spinning
- Lasts about a minute, resolves if she “holds still”
- Normal between episodes
Case 5
• Medications: Lisinopril-HCTZ, ibuprofen
• PMH: HTN
• SH: ½ ppd x 45 years, no ETOH
• FH: Father died of MI age 62

Case 5
• Vitals: BP 145/76, HR 89
• HEENT: TMIs clear, swollen turbinates
• Neck: Bilateral carotid bruits
• CV: RRR, no murmur
• Ext: DP 1+ B/L
• Neuro: WNL, no nystagmus

Case 5
• Orthostatics: BP → 145/76,↑ 113/68
  – Stopped diuretic - symptoms unchanged
• Dix-Hallpike: +vertigo on right, ? nystagmus
• Carotid Doppler
  – Right ICA 50%–69% stenosis
  – Reversal of flow in left vertebral artery:
  Subclavian Steal Syndrome

Vertebrobasilar insufficiency (TIAs)
• Brainstem ischemia
  – Embolic, atherosclerotic occlusions of vertebrobasilar arterial system
  – Subclavian steal syndrome
  – Rotational vertebral artery syndrome

Vertebrobasilar Insufficiency
• Recurrent, abrupt episodes lasting min–hours
• +/- Diplopia, ataxia, weakness, drop attacks, dysarthria
  – Isolated vertigo if ischemia is in the distribution of the vertebral artery
• Crescendo pattern
• KEY: Risk factors for cardiovascular disease

Vertigo: Indications for Further Testing
• Routine labs and imagining not indicated
• Obtain if:
  – Diagnosis uncertain or refractory BPPV
    • Vestibular function testing, audiometry
  – Red flags rule out central cause
    • Included are risk factors for CVD
    • MRI/MRA head/neck, CT if MRI unavailable
Best Practice Recommendations

- Treat BPPV with a canolith repositioning procedure (SOR A, Ref #4)
- Avoid symptomatic medications for BPPV (SOR C, Ref #1)
- Offer vestibular rehabilitation for patients with vestibular neuritis, including vestibular neuritis (SOR A, Ref #7)

Questions

Resources

- Home Epley maneuver (UTHealth)
- Vestibular Rehab for vestibular neuritis
  - Video: https://www.youtube.com/watch?v=epJ1luFyF2o

References