Working up the dizzy patient

Steve McGee, MD
Professor, University of Washington
Alaska ACP and AKOMA 2016
April 1, 2016

Evaluating dizziness....

- "...often after taking such a history the physician will be as dizzy as the patient..."

- "...there are few physicians so dedicated to their art that they do not experience a slight decline in spirits on learning their patient's complaint is of dizziness..."
Key points:

- Diagnosis made in 90%
  - What are the most common diagnoses?
- History and physical examination suffice
  - What are the key bedside findings?
  - Recent advances in diagnosis
    - Head impulse test
    - “HINTS” battery – to detect stroke in acute vestibular syndrome
- Treatment available, prognosis good
  - Epley maneuver for benign positional vertigo

Dizziness: Epidemiology

Common:

- 15% - 30% of patients will experience dizziness
- 2 out of 3 patients with dizziness are seen by general practitioners
- Few patients are referred to specialists

Dizziness: Etiology

<table>
<thead>
<tr>
<th>Setting</th>
<th>Adults in clinic</th>
<th>Elderly patients in clinic</th>
<th>Emergency department</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>2406</td>
<td>116</td>
<td>1138</td>
</tr>
<tr>
<td>Peripheral vestibular disease</td>
<td>33-36</td>
<td>46</td>
<td>10-44</td>
</tr>
<tr>
<td>Benign positional vertigo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vestibular neuritis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meniere's syndrome</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychiatric</td>
<td>17-33</td>
<td>9</td>
<td>3-17</td>
</tr>
<tr>
<td>Multiple Sence Deficit</td>
<td>13-19</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Central Vestibular Disturb</td>
<td>5-10</td>
<td>23</td>
<td>8</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>4-6</td>
<td>3</td>
<td>20-29</td>
</tr>
<tr>
<td>Unknown</td>
<td>9-19</td>
<td>14</td>
<td>5-25</td>
</tr>
</tbody>
</table>

References:

### Dizziness: Etiology

<table>
<thead>
<tr>
<th>Setting</th>
<th>Adults in clinic</th>
<th>Elderly patients in clinic</th>
<th>Emergency department</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>2426</td>
<td>116</td>
<td>1138</td>
</tr>
<tr>
<td>Peripheral vestibular disease</td>
<td>33-36</td>
<td>46</td>
<td>10-44</td>
</tr>
<tr>
<td>Benign positional vertigo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vestibular neuronitis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ménière's syndrome</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychiatric</td>
<td>17-33</td>
<td>9</td>
<td>3-17</td>
</tr>
<tr>
<td>Multiple Sensoric Deficit</td>
<td>13-19</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Central Vestibular Disorder</td>
<td>5-10</td>
<td>23</td>
<td>6</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>4-6</td>
<td>3</td>
<td>20-29</td>
</tr>
<tr>
<td>Unknown</td>
<td>9-19</td>
<td>14</td>
<td>5-25</td>
</tr>
</tbody>
</table>

Dizziness: Etiology

<table>
<thead>
<tr>
<th>Setting</th>
<th>Adults in clinic</th>
<th>Elderly patients in clinic</th>
<th>Emergency department</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>2426</td>
<td>116</td>
<td>1136</td>
</tr>
<tr>
<td>Peripheral vestibular disease</td>
<td>33-35</td>
<td>46</td>
<td>10-44</td>
</tr>
<tr>
<td>Benign positional vertigo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vestibular neuritis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meniere’s syndrome</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychiatric</td>
<td>17-33</td>
<td>9</td>
<td>3-17</td>
</tr>
<tr>
<td>Multiple Sensory Deficit</td>
<td>13-19</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Central Vestibular Disorder</td>
<td>5-10</td>
<td>23</td>
<td>6</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>4-6</td>
<td>3</td>
<td>20-25</td>
</tr>
<tr>
<td>Unknown</td>
<td>6-19</td>
<td>14</td>
<td>5-25</td>
</tr>
</tbody>
</table>


Dizziness: Case 1

A 69 year old man presents with a 2 day history of vertigo precipitated by rolling over on to his right side. The symptoms do not occur when rolling on to the left side. He has the tendency to stagger and fall forward and to the right, and occasionally he feels as if he is being pulled backwards. The episodes last only seconds, can be precipitated at will, and are not associated with auditory symptoms.

Diagnosis?
Dizziness: Case 1

A 69 year old man presents with a 2 day history of vertigo precipitated by rolling over on to his right side. The symptoms do not occur when rolling on to the left side. He has the tendency to stagger and fall forward and to the right, and occasionally he feels as if he is being pulled backwards. The episodes last only seconds, can be precipitated at will, and are not associated with auditory symptoms.

Diagnosis?

Benign Positional Vertigo

Case 1: Benign positional vertigo

- **Duration:** < 1 minute
- **Onset:** rapid changes position of head
  - turning over in bed
  - bending over, straightening up
- **Associated findings:**
  - ~50% prior ear trauma or infection
  - positive Hallpike-Dix maneuver

Hallpike-Dix Maneuver

Case 1, cont.

Examination: During Hallpike-Dix testing with the right ear down, the patient develops severe vertigo 2 seconds after lying down. This vertigo lasts 20 seconds and was associated with a rotatory nystagmus with the quick component of the upper limbus rotating toward the right ear.

Benign positional vertigo: Pathophysiology

Dizziness: Case 2

A 46 year old man presents with episodic vertigo. 6 months earlier he noticed the sensation of pressure in his left ear, as if water were in the canal after swimming. Afterwards his hearing in that ear was diminished. One week ago, he developed an aching, pulsating pain behind his left ear and within minutes developed the sensation of severe vertigo and nausea, causing him to stagger to his couch. The vertigo resolved after 2 hours.

Examination: No spontaneous, gaze-provoked, or positional nystagmus. Weber lateralizes to the right. Rinne "air > bone" in both ears.

Diagnosis?
Dizziness: Case 2

A 46 year old man presents with episodic vertigo. Six months earlier he noticed the sensation of pressure in his left ear, as if water were in the canal after swimming. Afterwards his hearing in that ear was diminished. One week ago, he developed an aching, pulsating pain behind his left ear and within minutes developed the sensation of severe vertigo and nausea, causing him to stagger to his couch. The vertigo resolved after 2 hours.

Examination: No spontaneous, gaze-provoked, or positional nystagmus. Weber lateralizes to the right. Rinne “air > bone” in both ears.

Diagnosis?

Meniere's Disease

Case 2: Meniere's Disease

- Duration: Severe vertigo > 20 minutes, often hours
- Disequilibrium may last days
- Onset: spontaneous
- Associated findings: Cochlear symptoms
  - Neurosensory hearing loss
  - Ear fullness and pressure
  - Tinnitus
  - Diplacusis

American Academy of Otolaryngology Head and Neck Surgery Committee. 1995

Dizziness: Case 3

A 25 year old previously healthy woman presents with the complaint of violent generalized rotatory spinning. 3 days previously, she and another family member developed low-grade fever, cough, and myalgia. 6 hours ago she developed the acute onset of nausea and dizziness, as if her “brain were rotating inside” her head. The dizziness was aggravated by head movements.

Examination: spontaneous rotatory nystagmus and unsteady gait

Diagnosis?
Dizziness: Case 3

A 25 year old previously healthy woman presents with the complaint of violent generalized rotatory spinning. 3 days previously, she and another family member developed low-grade fever, cough, and myalgia. 6 hours ago she developed the acute onset of nausea and dizziness, as if her “brain were rotating inside” her head. The dizziness was aggravated by head movements.

Examination: spontaneous rotatory nystagmus and unsteady gait

Diagnosis?

Vestibular neuronitis

Case 3: Vestibular neuronitis

- Many alternative names:
  - Acute vestibulopathy
  - Viral neuronitis
  - Epidemic vertigo
  - Acute labyrinthitis
- Duration: hours to days
- Onset: spontaneous
- Associated findings:
  - Nausea/vomiting
  - Prior URI, may occur in epidemics
  - Rotatory nystagmus
  - Unilateral hypofunction of vestibular system
  - Abnormal head-impulse test

Why is nystagmus rotatory?

from McGee SR Evidence-based Physical Diagnosis
Case 3: Vestibular neuronitis

- Many alternative names:
  - Acute vestibulopathy
  - Viral neuronitis
  - Epidemic vertigo
  - Acute labyrinthitis
- Duration: hours to days
- Onset: spontaneous
- Associated findings:
  - Nausea/vomiting
  - Prior URI, may occur in epidemics
  - Rotatory nystagmus
  - Unilateral hypofunction of vestibular system
    - Abnormal head-impulse test

Head Impulse Test

- A test of unilateral vestibular dysfunction

From Edlow J, Newman-Toker DE, Savitz SI. Diagnosis and initial management of cerebellar infarction. Lancet Neurol; 2008: Oct;7(10):951-64, with permission
Dizziness: Case 4

A 65 year old man with hypertension and diabetes presents after 3 episodes of severe spontaneous clockwise spinning dizziness over the last 24 hours, each episode lasting 1 to 3 minutes. The patient is dizzy when walking.

Twelve hours later, the patient developed an occipital headache and nausea. Examination: Horizontal nystagmus in the direction of gaze bilaterally (direction-changing nystagmus). There was a tendency to fall to the left when seated. The head impulse test is negative (no corrective saccade).

Course (over next 14 hours): Dysmetria left arm, coarse nystagmus on right lateral gaze, diminished left corneal reflex, left facial weakness, bilateral Babinski signs. MRI ....

Left cerebellar infarct

---

Detecting stroke in acute vestibular syndrome

<table>
<thead>
<tr>
<th>Finding</th>
<th>Present</th>
<th>Absent</th>
<th>Likelihood ratio if finding Present</th>
<th>Likelihood ratio if finding Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe truncal ataxia</td>
<td>17.6</td>
<td>0.7</td>
<td>30%</td>
<td>70%</td>
</tr>
<tr>
<td>Severe occipital headache</td>
<td>4.4</td>
<td>0.3</td>
<td>30%</td>
<td>70%</td>
</tr>
<tr>
<td>Direction-changing nystagmus</td>
<td>3.9</td>
<td>0.7</td>
<td>30%</td>
<td>70%</td>
</tr>
<tr>
<td>Normal head-impulse test</td>
<td>9.6</td>
<td>0.2</td>
<td>30%</td>
<td>70%</td>
</tr>
</tbody>
</table>

HINTS*: 1 or more of

- Head-impulse test, bidirectional
- Nystagmus
- Test of skew

*HINTS = 3 oculomotor signs: 1 or more

**LRs** = 51

---

Kattah JC. Stroke 2009; 40: 3504-3510
Cnyrim CD. J Neurol Neurosurg Psychiatry 2008; 79: 458
Chen L. J Neurol 2011; 258: 855-861
Skew deviation

Detecting stroke in acute vestibular syndrome

<table>
<thead>
<tr>
<th>Finding</th>
<th>Likelihood ratio of finding</th>
<th>Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe truncal ataxia</td>
<td>17.9</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Skew deviation present</td>
<td>1.0</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Saccadic pursuit</td>
<td>4.6</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Direction-changing nystagmus</td>
<td>3.6</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Normal head-impulse test</td>
<td>9.4</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>HINTS* battery</td>
<td>10.8</td>
<td>0.02</td>
<td></td>
</tr>
</tbody>
</table>

*HINTS is a composite sign; 1 or more of normal head-impulse test, bidirectional nystagmus, test of skew

Kattah JC. Stroke 2009; 40: 3504-3510

Cnyrim CD. J Neurol Neurosurg Psychiatry 2008; 79: 458

Chen L. J Neurol 2011; 258: 855-861

<table>
<thead>
<tr>
<th>Probability</th>
<th>LRs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>-45%</td>
</tr>
<tr>
<td>5%</td>
<td>-30%</td>
</tr>
<tr>
<td>10%</td>
<td>-15%</td>
</tr>
<tr>
<td>25%</td>
<td>+15%</td>
</tr>
<tr>
<td>50%</td>
<td>+30%</td>
</tr>
<tr>
<td>75%</td>
<td>+45%</td>
</tr>
</tbody>
</table>

Direction-changing nystagmus

Peripheral vestibular disease

Central vestibular disease

<table>
<thead>
<tr>
<th>Look straight ahead</th>
<th>Look to your left</th>
<th>Look to your right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quiet component of nystagmus</td>
<td>Direction-changing nystagmus</td>
<td>No nystagmus</td>
</tr>
</tbody>
</table>

From McGee SR Evidence-based Physical Diagnosis
Detecting stroke in acute vestibular syndrome

<table>
<thead>
<tr>
<th>Finding</th>
<th>Likelihood ratio if finding:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Present</td>
</tr>
<tr>
<td>Severe truncal ataxia</td>
<td>17.9</td>
</tr>
<tr>
<td>Skew deviation present</td>
<td>5.3</td>
</tr>
<tr>
<td>Saccadic pursuit</td>
<td>4.6</td>
</tr>
<tr>
<td>Direction-changing nystagmus</td>
<td>3.9</td>
</tr>
<tr>
<td>Normal head-impulse test</td>
<td>9.6</td>
</tr>
<tr>
<td>HINTS* battery</td>
<td>10.9</td>
</tr>
</tbody>
</table>

*“HINTS” 3 oculomotor signs: 1 or more of normal
  Head-impulse test, bidirectional Nystagmus, Test of Skew

**LRs**
-45%  -30%  -15%  +15%  +30%  +45%
Probability decrease increase

**LR = 0.02**
Dizziness: Case 4

A 65 year old man with hypertension and diabetes presents after 3 episodes of severe spontaneous clockwise spinning dizziness over the last 24 hours, each episode lasting 1 to 3 minutes. The patient is dizzy when walking. Twelve hours later, the patient developed a occipital headache and nausea.
Examination: Horizontal nystagmus in the direction of gaze bilaterally (direction-changing nystagmus). There was a tendency to fall to the left when seated. The head impulse test is negative (no corrective saccade).

Course (over next 14 hours): Dysmetria in left arm, coarse nystagmus on right lateral gaze, diminished left corneal reflex, left facial weakness, bilateral Babinski signs. MRI …..

Left cerebellar infarct

Dizziness: Case 5

A 65-year-old man with diabetes presents with chronic dizziness. Whenever he walks, he becomes unsteady, as if “drunk”. The sensation affects his whole body (legs and head). He denies light-headedness. The symptoms are worse in darkness, on uneven ground, or in unfamiliar territory.
Examination:
Gait: uses cane, slightly wide-based, uneven steps, no tandem 
Romberg: marked increased swaying with eyes closed
Sensory: diminished proprioception toes and ankles
Vision: bilateral cataracts, 20/80 both eyes
Extremities: right knee: crepitus and genu varum

Diagnosis?

Multiple sensory deficits
Case 5: Multiple Sensory Deficits

- Elderly
- 2 or more of the following:
  - Visual impairment
  - Neuropathy
  - Vestibular deficits
  - Orthopedic disorders interfering with ambulation
- Complaints of dizziness when walking, especially when executing a turn
  - Lightly touching the examiner’s finger provides sufficient additional sensory information to relieve the dizziness

Additional diagnoses

- Medications
- Rare critical diagnoses
  - Cervical spondylosis
  - Toxin exposure
    - Carbon monoxide poisoning
  - Intracranial lesion
    - Acoustic neuroma (vestibular schwannoma)
    - Subdural hematoma

Diagnosis: Patient Interview

- Categories of dizziness à la Drachman and Hart
  - Vertigo: sensation of movement within head → vestibular
  - Impending faint → hypotension
  - Disequilibrium, not in the head → cerebellar or proprioceptive problems
- Vertigo vs. Oscillopsia
Diagnosis: Examination and lab

- Physical examination
  - Special tests
    - Postural blood pressure measurements
    - Hallpike-Dix maneuver
    - Head impulse test
    - Careful neuroophthalmology exam (HINTS battery)
    - Sudden turn when walking
  - Romberg test: positive in proprioceptive disorders
- Laboratory testing
  - If hearing loss or tinnitus $\rightarrow$ audiogram

Management

- Multiple sensory deficits
  - Remove cataracts, provide appropriate spectacles
  - Physical therapy consultation, ambulatory aids
  - Nightlamps at home
- Vestibular neuronitis
  - Prednisone may increase recovery
- Antivertigo medications (all effective in randomized trials)
  - Severe vertigo: Benzodiazepines & antiemetics
  - Mild vertigo: Anticholinergics & antihistamines
- Principles of vertigo management
  - All vertigo is self-limited
  - Exercise (rehabilitation) accelerates recovery
  - Medications retard recovery
Epley maneuver for benign positional vertigo

Left sided BPV
- Begin with left ear down

Goal: head turned 180° from position 2

Wait 30 sec

1 2 3 4 5

Wait 30 sec

Wait 30 sec

Epley maneuver

Utricle

Utricle

Utricle

Goal: head turned 180° from position 2

Dizziness: Summary

- Diagnosis
  - Made in 90%
  - Patient interview: most important diagnostic tool
  - Positional vertigo
    - Hallpike-Dix maneuver
  - Sustained vertigo
  - Critical differential diagnosis: vestibular neuritis vs. vertebro-basilar ischemia
  - Head impulse test
    - "HINTS" neurologic battery
- Laboratory tests add little
- Treatment
  - Epley maneuver: cures benign positional vertigo
  - Rehabilitation exercises and tincture of time benefit most others
Thanks!