Dizziness

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RVI

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Hilton Newcastle Gateshead
Learning Objectives

1. Distinguish dangerous posterior circulation strokes from benign causes of acute dizziness using history & bedside examination

2. Start to think of Timing and Triggers

3. Recognize the clinical features of posterior canal BPPV and understand the bedside test - Hallpike test
Peripheral Vestibular System
Displacement of the cupula

- **Left Lateral Canal**
- **Head rotation**
- **Macula of the utricle**
- **Cupula resting position**
- **Relative endolymph flow**
- **Lateral semicircular canal**
- **Displaced cupula**
- **Depolarized hair cells**
## Timing and Triggers in Acute Dizziness

<table>
<thead>
<tr>
<th>Syndrome</th>
<th>Description</th>
<th>Common Benign Causes</th>
<th>Common Serious Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVS</td>
<td>Acute, continuous dizziness lasting days, with nausea, vomiting, head motion intolerance, nystagmus and gait unsteadiness</td>
<td>Vestibular neuritis</td>
<td>Posterior circulation ischaemic stroke</td>
</tr>
<tr>
<td>s-EVS</td>
<td>Episodic dizziness that occurs spontaneously, is not triggered and lasts minutes to hours</td>
<td>Vestibular migraine Meniere’s disease</td>
<td>TIA</td>
</tr>
<tr>
<td>t-EVS</td>
<td>Episodic dizziness brought on by a specific, obligate trigger (typically a change in head position or standing up) and lasting &lt; 1 minute</td>
<td>BPPV</td>
<td>Orthostatic Hypotension Central paroxysmal positional vertigo</td>
</tr>
</tbody>
</table>
Organisation of the medial vestibular nuclei

Compensatory eye movements

VOR pathways

Compensatory head/neck movements

Commissural inhibitory system
Origin of static vestibular symptoms after unilateral labyrinthection

Ocular nystagmus

VOR pathways

n. VII

VCR pathways

Silent Normal Hyperactive

Resting activity of MVN neurones

Head rotation (yaw and roll head tilt)
Saw-tooth or ‘jerk’ nystagmus

- Slow phase
- Fast phase

deg.
time
Recovery of vestibular function after unilateral labyrinthectomy: vestibular compensation

Compensatory eye movements, with dynamic deficits

VOR pathways

Compensatory head/neck movements, with dynamic deficits

VCR pathways

n. VIII

Resting activity of MVN neurones

Normal
Acute Vestibular Syndrome

(H.I.N.T.S. to I.N.F.A.R.C.T.)
Approach
Definition of AVS (Core Features)

• Acute Vestibular Syndrome (AVS)
  • rapid-onset dizziness or vertigo
  • nausea or vomiting
  • head motion intolerance
  • unsteady gait
  • usually nystagmus
  • symptoms last continuously for at least a day*

• “Isolated” AVS = no obvious neuro sx/signs

Adapted from Tarnutzer et al., CMAJ 2011
Prolonged Dizziness (days)

Neuritis vs. Stroke

- History (pain, auditory, neuro symptoms)
  - Exam (oculomotor signs)
Acute Vestibular Syndrome

History
Prolonged Dizziness (days)

Vestibular Neuritis

• *Classic Case*: A 45 year-old man comes to the ED complaining he has been continuously vertiginous for the past 3 days. He has been vomiting repeatedly. He is a bit unsteady on his feet, but he has experienced no neurologic symptoms such as numbness, weakness, slurred speech, or double vision. Moving his head even a little makes him violently ill, and he prefers to lie motionless on his right side. He had URI symptoms last week. There is no history of head or neck trauma.
Prolonged Dizziness (days)
Worrisome History Features in AVS

- Multiple prodromal episodes of brief dizziness
- Abrupt-onset dizziness/vertigo while awake
- Disproportionate vomiting or gait disturbance
- Craniocervical pain (headache or neck pain)
- Acute new hearing loss (except Menière’s)
- New neurologic symptoms (“Deadly D’s”)
Prolonged Dizziness (days)
The Deadly D’s of Central Dizziness

• Diplopia
• Dysarthria
• Dysphagia
• Dysphonia
• Dysmetria
• Dysesthesia
• Drop attacks* (sudden falls without syncope)
• Down-is-up distortions* (room tilt illusions)

Absence of these symptoms does NOT exclude stroke
Acute Vestibular Syndrome

Exam
Prolonged Dizziness (days)
H.I.N.T.S. to I.N.F.A.R.C.T.

AVS EXAM: 3-component “H.I.N.T.S.” Battery
- Head Impulse
- Nystagmus
- Test of Skew

STROKE FINDINGS: “I.N.F.A.R.C.T.”
- Impulse Normal
- Fast-phase Alternating
- Refixation on Cover Test

Any ONE of these points to stroke in AVS
H.I.N.T.S.
H.I.N.T.S.
Acute Vestibular Syndrome

Head Impulse
(H.I.N.T.S.)
h-HIT **ABNORMAL** is usu. **PERIPHERAL**

Acute Vestibular Syndrome

*Courtesy of David Zee, MD (video from Leigh & Zee, Neurology of Eye Movements)*
H.I.N.T.S.
Acute Vestibular Syndrome

Nystagmus

(N.I.T.S.)
**Direction-Changing Nystagmus is CENTRAL**

Acute Vestibular Syndrome

**Vestibular-Type Nystagmus**

- persistently present (at least so visual fix.)
- horizontal > torsional
- damps when looking towards slow phase and vice-versa
- never changes direction (e.g. always leftward, not rightward)
Peripheral Vestibular Nystagmus

Right Eye
Direction-Changing Nystagmus is CENTRAL
Acute Vestibular Syndrome

Acute, unilateral cerebellar or brainstem strokes may look like neuritis, but sometimes declare themselves with direction-changing nystagmus
Direction-Changing Nystagmus is CENTRAL
Acute Vestibular Syndrome
H.I.N.T.S.
Acute Vestibular Syndrome

Test of Skew

(H.I.N.T.S.)
Skew Deviation (vertical dev.) is CENTRAL
Acute Vestibular Syndrome
Diagnose neuritis if...

1. Max one prodromal spell (<48hrs)
2. No excessive vomiting, gait disorder
3. No pain, auditory, neuro symptoms
4. Stands and walks unassisted
5. None of the 3 Bad “H.I.N.T.S.” (i.e., abnormal impulse; unidirectional nystagmus; no skew)
## Prolonged Dizziness (days)
Acute Vestibular Syndrome

<table>
<thead>
<tr>
<th>Impulse Test</th>
<th>Nystagmus</th>
<th>Skew</th>
<th>DIAGNOSIS</th>
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<tbody>
<tr>
<td>Abnormal</td>
<td>Unidirectional</td>
<td>Absent</td>
<td>Neuritis</td>
</tr>
<tr>
<td>Abnormal</td>
<td>Unidirectional</td>
<td>Present</td>
<td>Stroke</td>
</tr>
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Take Home Messages
5 Exam Pearls to Remember

1) you can have a BIG STROKE without ANY lateralizing signs (including hemiataxia, etc.)
2) if you can’t stand, you can’t leave
3) vertical ocular misalignment (skew) is bad
4) nystagmus which changes direction in different directions of gaze is bad
5) a head thrust sign is necessary but not sufficient to diagnose a (benign) peripheral vestibulopathy
Positional Vertigo
Provoking Positions

• Getting out of bed
• Lying down from sit to supine
• Bending over
• Looking up or reaching overhead
• Rolling in bed
• Going from supine to sit
• An inability to sleep without the head of the bed raised
Movement of the otoconia during the canalith repositioning maneuver
Conclusions

Take Home Messages
You need a Framework
What are you going to do next week?

- Practice bedside examination
- Be clear about nystagmus maybe introduce using a grid to record into notes
- Teach anyone about BPPV and how to differentiate from AVS.