How to approach vertigo patient?

2010.10.29  R1黃彥傑
• Vertigo: a symptom of illusory movement
  – arises from asymmetry in the vestibular system
  – an illusion of motion
  – most common: spinning sensation
Nystagmus
Vertigo
Nausea, vomiting
Unsteady gait
Fall

Other Pathways
(not demonstrated)
- To Emetic Centers
- To Vestibulocerebellum
Vestibulo-ocular reflex
Cause of Vertigo

**Peripheral causes**
- Benign paroxysmal positional vertigo
- Vestibular neuritis
- Herpes zoster oticus (Ramsay Hunt syndrome)
- Meniere's disease
- Labyrinthine concussion
- Perilymphatic fistula
- Semicircular canal dehiscence syndrome
- Cogan's syndrome
- Recurrent vestibulopathy
- Acoustic neuroma
- Aminoglycoside toxicity
- Otitis media

**Central causes**
- Migrainous vertigo
- Brainstem ischemia
- Cerebellar infarction and hemorrhage
- Chiari malformation
- Multiple sclerosis
- Episodic ataxia type 2
• History
• Physical examination
• Diagnostic tests
History

- Vertigo
- Nausea and vomiting
- Postural instability
- Time course
- Aggravating factors
- Associated symptoms
- Prior medical history
• Vertigo:
  – Spinning quality of vertiginous sensations: Notoriously unreliable
  – Time course, provoking factors and aggravating factors: more useful
  – Severe vertigo: both acute peripheral or central
  – Nystagmus >>>symptoms: strongly suggested brainstem
History

• N/V
  – Severe N/V: more common with peripheral

• Postural instability
  – Vestibulospinal tract
  – Central:
    more unsteady (likely also impair other pathways?)
  – Peripheral: usually able to walk
History

• Time course
  – Vertigo is never continuous.
  – CNS adapts over several weeks
  – “constant” : Constant susceptibility to frequent episodic dizziness
History

• Time course
  – Recurrent, < 1min: BPPV
  – Single, minutes to hours:
    Migraine, transient ischemia of labyrinth or brainstem
  – Recurrent, last hours: Meniere’s disease
  – More prolonged, severe episodes, last for days:
    vestibular neuritis, multiple sclerosis, infarction to brainstem or cerebellum
<table>
<thead>
<tr>
<th>Condition</th>
<th>Time Course</th>
<th>Suggestive Clinical Setting</th>
<th>Characteristics of Nystagmus</th>
<th>Associated Neurologic Symptoms</th>
<th>Auditory Symptoms</th>
<th>Other Diagnostic Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benign Paroxysmal Positional Vertigo</td>
<td>Recurrent, brief (seconds)</td>
<td>Predictable head movements or positions precipitate symptoms</td>
<td>Peripheral characteristics</td>
<td>None</td>
<td>None</td>
<td>Dix-Hallpike maneuver shows characteristic findings</td>
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<tr>
<td>Vestibular Neuritis</td>
<td>Single episode, acute onset, lasts days to weeks</td>
<td>Viral syndrome may accompany or precede vertigo</td>
<td>Peripheral characteristics</td>
<td>Falls toward side of lesion, no brainstem symptoms</td>
<td>Usually none</td>
<td>Abnormal head thrust test</td>
</tr>
<tr>
<td>Meniere's disease</td>
<td>Recurrent episodes, last several hours to days</td>
<td>Spontaneous onset</td>
<td>Peripheral characteristics</td>
<td>None</td>
<td>Episodes preceded by ear fullness/pain, accompanied by unilateral hearing loss, tinnitus</td>
<td>Audiometry shows unilateral low frequency hearing loss</td>
</tr>
<tr>
<td>Migrainous vertigo</td>
<td>Recurrent episodes, last several minutes to hours</td>
<td>History of migraine</td>
<td>Central or peripheral characteristics</td>
<td>Migraine headache accompanying or following vertigo, positive visual phenomena</td>
<td>Usually none</td>
<td>All tests are normal</td>
</tr>
<tr>
<td>Vertebrobasilar TIA</td>
<td>Single or recurrent episodes lasting several minutes to hours</td>
<td>Older patient, vascular risk factors, and or cervical trauma</td>
<td>Central characteristics</td>
<td>Usually other brainstem symptoms</td>
<td>None</td>
<td>MRI + DWI may demonstrate vascular lesion</td>
</tr>
<tr>
<td>Brainstem infarction</td>
<td>Sudden onset, persistent symptoms over days to weeks</td>
<td>As above</td>
<td>Central characteristics</td>
<td>Usually other brainstem symptoms, especially lateral medullary signs</td>
<td>None</td>
<td>MRI will demonstrate lesion</td>
</tr>
<tr>
<td>Cerebellar infarction or hemorrhage</td>
<td>Sudden onset, persistent symptoms over days to weeks</td>
<td>Older patient, vascular risk factors, especially hypertension</td>
<td>Central characteristics</td>
<td>Gait impairment is prominent. Headache, limb dysmetria, dysphagia may occur</td>
<td>None</td>
<td>Urgent MRI, CT will demonstrate lesion</td>
</tr>
</tbody>
</table>

*Other diagnoses described in text "Pathophysiology and differential diagnosis of vertigo".
- Peripheral characteristics of nystagmus: horizontal or horizontal-torsional; suppresses with visual fixation, does not change direction with gaze. Central characteristics of nystagmus: may be horizontal, torsional, or vertical, does not suppress with visual fixation, may change direction with gaze.
History

• Aggravating factor
  – Some: spontaneously
  – Some: change head position
  – DDx of presyncope and vertigo
  – Lying down, rolling over in bed
• Aggravating factor
  – All vertigo is made worse by moving the head: can not distinguish causes
  – Provoked with specific head movements:
    BPPV(rolling over in bed, extending the neck)
  – By coughing, sneezing, exertion or loud noises:
    Perilymphatic fistula or superior canal dehiscence
  – Head trauma: multiple mechanism of vertigo
Associated signs and symptoms

• Vertebrobasilar stroke: always with other signs of brain ischemia (diplopia, dysarthria)
• Deafness and tinnitus: possible peripheral origin
• Aural fullness: Meniere’s disease
• Pressure sensation with high-tone SNHL: perilymphatic fistula
• Headache, photophobia, sonophobia: migraine
Associated signs and symptoms

• Prior medical history
  – Migraine
  – Stroke risk factors
    • HTN, DM, Smoking, Hx of vascular diseases: VBI
  – Past head trauma:
    BPPV or perilymphatic fistula
  – Family history of vertigo:
    rare hereditary channelopathy
  – Medication of ototoxicity:
    cisplatin, aminoglycosides
Other symptoms

• Vestibular dysfunction without vertigo
  – Chronic injury or acute bilateral symmetric injury
  – Tilt illusion: otolithic organ or central connection
  – Drop attacks: sudden loss of tone mediated by VSR (Pushed to the ground)
  – Spatial disorientation: recover from acute vertigo
  – Oscillopsia: impaired vestibuloocular reflex blurred vision when walking
  – Impaired balance without vertigo: aminoglycoside toxicity, acute midline cerebellar
Physical exam

• Nystagmus
• Gait instability
• Other neurologic signs
• Weber test and rinne test
• Dix-Hallpike maneuver
Physical exam

• Nystagmus
  – Maintain gaze during head movement by VOR
  – Slow drift from the target
  – Fast correct movement
  – Alexander’s law
    peripheral lesion:
    fast phase away from the lesion
Vestibulo-ocular reflex
Lesion in the LEFT vestibular nerve = RIGHT side "driving" = slow horizontal deviation of the eyes to the LEFT and fast snap back to the RIGHT = RIGHT NYSTAGMUS
Lesion of the LEFT vestibular nerve = RIGHT side "driving" = stumbling to the LEFT
### Nystagmus

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<tr>
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<th>Peripheral</th>
<th>Central</th>
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<td><strong>Direction</strong></td>
<td><strong>Unidirectional</strong>, fast phase toward the normal ear; never reverses direction</td>
<td>Sometimes <strong>reverses direction</strong> when patient looks in the direction of slow phase</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td><strong>Horizontal with a torsional</strong> component, never purely torsional or vertical</td>
<td>Can be any direction</td>
</tr>
<tr>
<td><strong>Effect of visual fixation</strong></td>
<td><strong>Suppressed</strong></td>
<td>Not suppressed</td>
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# Nystagmus

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<td>Other neurologic signs</td>
<td>Absent</td>
<td>Often <strong>present</strong></td>
</tr>
<tr>
<td>Postural instability</td>
<td>Unidirectional instability, <strong>walking preserved</strong></td>
<td><strong>Severe instability</strong>, patient often falls when walking</td>
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<tr>
<td>Deafness or tinnitus</td>
<td>May be present</td>
<td>Absent</td>
</tr>
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Gait instability

- Peripheral
  Fall toward the side of the lesion but can walk

- Central
  Unable to walk without falling
direction of Romberg: vary

- Other neurologic signs:
  Negative can not rule out central lesion
Office hearing tests

• Weber test
  – SNHL: shift to normal ear
  – Conductive: shift to affected ear

• Rinne test
  – SNHL or normal: AC>BC
  – Conductive: BC>AC
Dix-Hallpike maneuver
Other vestibular signs

• Dynamic vestibular imbalance
  – Head thrust test
    • Peripheral vestibular lesion
  – Head shaking visual acuity
  – Head shaking nystagmus
  – Caloric test: COWS
Diagnositic test

- Magnetic resonance imaging
  - For possible central lesion
- Electronystagmography (ENG)
- Vestibular evoked myogenic potentials (VEMPs)
- Audiometry
- Brainstem auditory evoked potentials (BAEPs) (Auditory brainstem response, ABR)
Diagnostictic test

- Magnetic resonance imaging
  - For possible central lesion
- Electronystagmography (ENG)
  - When symptoms persistent
- Vestibular evoked myogenic potentials (VEMPs)
  - Superior canal dehiscence syndrome
- Audiometry
  - Cochlear from retrocochlear
- Brainstem auditory evoked potentials (BAEPs)
  (Auditory brainstem response, ABR)
  - For acoustic neuroma
Thanks for your listening!