Dizziness: Differential Diagnosis

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“Is it in your feet or your head?”

- Imbalance: Perceived as “dizziness” to some people, but no lightheadedness or vertigo.
- Remember that blurred vision is often perceived as “dizziness.”
- If not “imbalance in the feet only”, or blurring of vision, differentiate between vertigo and lightheaded-type dizziness.
## DIZZINESS

<table>
<thead>
<tr>
<th>Vestibular</th>
<th>Non Vestibular</th>
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</thead>
<tbody>
<tr>
<td>Spinning</td>
<td>Lightheaded , floating</td>
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<tr>
<td>Episodic</td>
<td>Constant</td>
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<tr>
<td>Head movements exacerbate</td>
<td>Stress, hyperventilation</td>
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<tr>
<td>N/V unsteadiness, tinnitus, hearing loss</td>
<td>Perspiration, palpitations, Paresthesias</td>
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<tr>
<td>impaired vision</td>
<td></td>
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VERTIGO

Central

- Nystagmus
  - Bidirectional
  - not fatigued
  - not inhibited by fixation

Symptoms:
- Not as intense
- Slow onset
- Not positionally dependent
- Cerebellar/brain stem Signs

Peripheral

- Nystagmus
  - Unidirectional
  - Fatigued
  - Inhibited by fixation

Symptoms
- More intense
- Sudden onset
- Positionally dependent
- Hearing loss possible
CENTRAL VERTIGO

Causes

- Stroke and TIA
- Cerebellum
- AICA distribution
- PICA distribution
- Vertebrobasilar migraine
  - Adult form
- Childhood variant (benign paroxysmal vertigo of childhood)
- Seizure (temporal lobe)
- Multiple sclerosis,
- Post infectious demyelination
- Tumors of eight nerve, brain stem, or cerebellum
- Paraneoplastic
- Cerebellar degeneration
- Wernicke's syndrome
- TIA, transient ischemic attack;
- AICA, anterior inferior cerebellar artery; PICA, posterior inferior cerebellar artery.
- Arnold-Chiari malformation
VERTIGO - Triggers

- Changes in position of the head or body
- Standing up
- Rapid head movements
- Walking in a dark room
- Loud noises
- Coughing,
- Blowing the nose,
- Sneezing,
- Straining, or laughing
- Underwater diving,
- Elevators,
- Airplane Travel

- Exercise
- Shopping malls,
- Narrow or wide open spaces, grocery stores, escalators (visual sensitivity complex)
- Foods, not eating, salt, monosodium glutamate
- Alcohol
- Menstrual periods or hormonal manipulations
- Boat or car travel
- Anxiety or stress
VESTIBULAR OCULAR REFLEX

- **NORMAL** –
  - Cold water instillation, there should be a slow, tonic, conjugate deviation of the eyes toward the irrigated ear if the brain stem is intact

- **COWS**
  - Cold – opposite
  - Warm – Same
  - (Refers to the fast eye movement to the ear that has the water in it)

- **COMATOSE PT**
  - There is a loss of the past-phase nystagmus, and only tonic deviation of the eyes is seen if appropriate pontine-midbrain areas are intact. Thus, if nystagmus is noted in a seemingly unconscious patient, the patient is not truly comatose
The patient is first positioned on the examination table, so that when lying flat the head will extend over the end of the table.

The patient is moved backward rapidly to lie on the table in the head-hanging-down position. The eyes are observed for the development of nystagmus.

If no dizziness or nystagmus is appreciated after 20 seconds, the patient is returned to the sitting
VESTIBULAR NEURONITIS

DEF:
- Sudden spontaneous unilateral loss of vestibular function
- Acute unilateral peripheral vestibulopathy,
- Preserved hearing
- No other symptoms or signs of brainstem dysfunction,

Etiol:- Thought to be viral (HSV I)

Treatment – Symptomatic
Benign Positional Vertigo

- **Etiol -**
  - Free-floating calcium carbonate crystals (normally attached to the utricular macule) that inadvertently enter the long arm of the posterior semicircular canal.

- **Sx:**
  - Fatigable paroxysmal positional nystagmus after a rapid change from the sitting to the head-hanging position. No spontaneous nystagmus or hearing loss/tinnitus. Motion will worsen symptoms.
  - Very common in elderly

- **Tx:**
  - Remove crystals, or surgery to remove ampullary nerve.
  - Must be distinguished from other causes of positional vertigo that may occur with tumors or infarcts of the posterior fossa if the Sx or treatment resolution is atypical.
The procedure is reversed for treating the left ear.

The numbers in the posterior semicircular canal (PSC) correspond to the position of the calcium carbonate crystals in each head position as they are moved toward the utricle (UT).

Each position change is performed as rapidly as possible to accelerate the particles.

Positions 2 and 3 are the same except that the therapist has moved from the front to the back of the patient to continue the maneuver easily.

The entire sequence should be repeated until no nystagmus is elicited.
Meniere’s Disease

Classic Meniere's disease presents as a quadrad of paroxysmal symptoms, including

1. Tinnitus,
   - ringing noise between attacks - becomes a multifrequency noise such as a roar, hiss, or buzz.
   - monaural fullness, a sensation as if the ear were full of water, beginning a day or two before an attack
   - Hearing is normal at the onset of the condition, but with each attack a low-frequency sensorineural reduction in hearing appears and it resolves in 24 – 48 hrs. After many attacks, hearing will decline and involve the high frequencies. Permanent sensorineuronal deafness appears

2. Monaural fullness,
3. Fluctuating hearing,
4. Episodic vertigo.
MENIERE’S DISEASE

- This clinical picture is sometimes called the "hydrops" symptom complex, inferring that the mechanism is related to dilation and rupture of the endolymphatic compartment of the inner ear.

- TREATMENT:
  - Meds: Antivert, Lorazepam, Scopolamine patch, Valium
  - Some advocate diuretics
ALCOHOL USE AND ABUSE

- Major Depression
- Anxiety Disorders
- Psychosis

- ***alcohol affects the viscosity of perilymphatic (inner ear) fluid, inducing vertiginous-type dizziness (“the room is spinning”))
MIGRAINE HEADACHES

Specifically “basilar” migraines
MIGRAINE HEADACHE

- **DIAGNOSIS**
  - Five attacks with headache lasting 4 - 72 hrs
  - Headache with TWO of the following
    - Unilateral location
    - Intensity mod/severe
  - Plus one of the following
    - Nausea
    - Photophobia
  - Plus
    - Hx / PE / Neuro Exam not suggestive of any other disease
MIGRAINE HEADACHE

Treatment

- **Prophylaxis** - when 3 - 4 attacks / month occur

- **USEFUL AGENTS FOR MIGRAINE-RELATED DIZZINESS**
  - Ca Channel blockers
    (especially Verapamil SR)
  - Anti-epileptic drugs
    (Topamax and Depakote)
Seizure DISORDERS
Seizures
Classifications

- Partial Seizures
  - Simple Partial Seizures
    - Consciousness is preserved
    - Clinical manifestations are relatively simple
    - Motor, sensory, autonomic or psychic Sx, and yes, even dizziness!
  - Jacksonian March not unusual
  - Todds Paralysis
  - May last days - Epilepsia partialis continua
  - Aura may also occur
Seizures
Classifications

- Partial Seizures
  - Complex Partial Seizures
    - Focal partial seizures
    - Transient impairment of pt to deal with environment
    - Aura usually present
    - Start of ictal phase starts amnestic response
    - Automatism present
    - EEG - epileptiform spikes
SEIZURE MEDICAL THERAPY

- Selection of Antiepileptic Drugs

- FIRST LINE THERAPY

  - **Primary Generalized Tonic Clonic Seizure**
    - Valproic Acid
    - Lamotrigine

  - **Partial**
    - Carbamazepine
    - Dilantin
    - Valproic Acid
    - Lamotrigine

  - **Absence**
    - Ethosuximide
    - Valproic Acid

  - **Atypical Absence, Myoclonic, Atonic**
    - Valproic Acid
BELLS PALSY

- **DEF:** 7th Nerve paralysis – peripheral (will include forehead)
- **ETIOL:** herpes simplex infection.
- **CLIN SX**
  - Peripheral CN VII dysfunction involving all distal branches;
  - Sudden onset with maximal facial weakness usually reached within several days;
  - Impaired result on acoustic reflex test in 90 percent;
  - Viral prodrome in 60 percent;
  - Numbness or pain of the ear, tongue, or face in 50 percent;
  - Chorda tympani nerve appears red in 40 percent;
  - Reduction in ipsilateral tearing or salivary flow in 10 percent
  - Spontaneous improvement within 6 months.
- **REM:** Central lesions spare the frontalis muscle
- **TREATMENT:** Acyclovir and steroids,(hasten the recovery and to lessen the ultimate degree of dysfunction)
HEARING LOSS – 8th Nerve

- Etiol:
  - Mass Lesions:
    - Acoustic Schannoma
    - Cerebellopontine angle tumor (CPA)

- SYMPTOMS
  - Vertigo, Hearing loss, Ataxia

- TREATMENT
  - Treat underlying cause → Surgery
Cerebellopontine angle lesions (e.g., Meningioma)

- an extra-axial, homogeneously contrast-enhancing mass arising from the tentorium and compressing the cerebellar hemisphere.
- Also think schwannomas (AKA “acoustic neuroma”)

[Image of a brain scan]
MULTIPLE SCLEROSIS

- **Clin**
  - Onset between age 15 – 50
  - Relapsing intermittent course (usually)
  - **Optic Neuritis**
  - Lhermitte’s Sign (transient sensory symptoms usually precipitated by neck flexion)
  - Partial transverse myelitis
  - **INO (Internuclear Ophthalmoplegia)**
  - Sensory
  - urinary symptoms
  - *Can present with imbalance in feet if cord or cerebellum, or vertigo if in brainstem*
STROKE

**TYPES OF STROKES**

- Embolic -
  - RF - Afib, Mitral Stenosis, Endocarditis, Prosthesis, MI

- Hemorrhagic -
  - RF - AV malf, Aorta coarctation, Polycystic disease, HBP

- Ischemic –
  - RF:DM, Tobacco, HBP, Card Disease (BCP females)

**RISK FACTORS**
TRANSIENT ISCHEMIC ATTACK

- **TIA** -
  - **DEF:** Neuro deficit that resolves within 24 hrs (most do in < 1 hr)
  - Harbinger of stroke in < 5 yrs – 25%
  - Tx: Low dose Aspirin / Platelet inhibitors
- Vessels forming the circle of Willis are highlighted in dark red.
- Abbreviations for intracranial and extracranial arteries are as follows:
  - ACA = anterior cerebral artery;
  - MCA = middle cerebral artery;
  - PCA = posterior cerebral artery;
  - E-I anast = extral-intracranial anastomosis
  - ICA = internal carotid artery;
  - ECA = external carotid artery;
  - CCA = common carotid artery;
  - Ant. Comm. = anterior communicating artery;
  - Post. Comm. = posterior communicating artery;
  - SCA = superior cerebellar artery;
  - AICA = anterior inferior cerebellar artery;
  - PICA = posterior inferior cerebellar artery. 

(For image content and labels)
BLOOD FLOW TO THE HEAD

Anterior cerebral artery
Anterior communicating artery
Middle cerebral artery
Internal carotid artery
Posterior communicating artery
3rd nerve
Posterior cerebral artery
Superior cerebellar artery
Basilar artery
Anterior inferior cerebellar artery
Vertebral artery
Posterior inferior cerebellar artery
BASILAR ATERY

ANATOMY; The basilar artery gives rise to perforating branches as it spans the ventral midline pons and midbrain. These short perpendicular branches distribute blood to the paramedian structures, including the corticospinal tracts, the pontine reticular nuclei, the medial lemnisci, the medial longitudinal fasciculi, and the pontine reticular nuclei.
Blood Cross-section of the medulla oblongata at the level of the hypoglossal nuclei (XII)

Cross-section of the midpons. The medial portion receives the blood supply from short, perforating basilar artery branches. More laterally, the blood supply comes from lateral basilar artery branches.
SUPERIOR CEREBELLAR ARTERY

- Supplies: most of the cerebellar cortex.
- Occlusion of this vessel is the most common cause of cerebellar infarction,
- CLIN:
  - gait ataxia, headache,
  - nausea, vomiting, dizziness,
  - ipsilateral clumsiness, dysarthria.
  - ipsilateral gaze paresis and/or nystagmus toward the side of the infarction;
  - Cerebellar edema formation can obstruct the fourth ventricle, producing hydrocephalus, and can result in herniation of the cerebellum either upward across the tentorium or downward through the foramen magnum.
  - *also think anterior inferior cerebellar artery (AICA) and posterior inferior cerebellar artery (PICA)
MAJOR DEPRESSION

DIFFERENTIAL DX
- Bereavement
- Adjustment Disorder with depressed mood
- Alcohol Dependence
- Cocaine / Amphetamine Dependence
- Personality Disorder
- Somatization Disorder
- Obsessive Compulsive Disorder (OCD)
- Panic Disorder

TREATMENT
- Regardless of the cause (or the explainability) patients who meet criteria for a major depressive episode should receive antidepressant therapy
PANIC DISORDER

- Disorder consists of recurrent panic attacks
- Can be associated with agoraphobia
- Diagnostic Criteria
  - Recurrent unexpected panic attacks
PANIC DISORDER

- **Age of onset**
  - From the late adolescence through the mid 30’s
  - Prevalence
    - 3 - 5 % lifetime prevalence
    - Women are 2 - 3 x more likely to be affected than men
  - Natural history - chronic illness that waxes and wanes

- **Other psychiatric Disturbances**
  - 1. Major Depression
  - 2. Substance Dependence
  - 3. Substance withdrawal (Alcohol, Benzodiazepines)
  - 4. Social phobia
  - 5. Generalized anxiety disorder

- 6. OCD
- 7. Post traumatic stress Disorder (PTSD)
- 8. Separation Anxiety Disorder (SAD)
- 9. Hyperthyroidism
- 10. Hypoglycemia
- 11. Hypoxia
- 12. Medication/substance induced (e.g. caffeine,)
- 13. Myocardial ischemia
OBSESSIVE COMPULSIVE DISORDER (OCD)

- **Age of onset**
  - Usually in adolescence or early adulthood
    - May begin in childhood
    - Earlier in males than in females

- **Prevalence**
  - 2.5% (lifetime) but his might be substantially higher than reality because of poor validity

- **Natural Hx**
  - Typically, onset is gradual but acute onset has been noted in some cases
  - The majority of individuals have a chronic waxing and waning course with exacerbation of symptoms that may be related to stress
OBSESSIVE COMPULSIVE DISORDER - DIFF Dx

- Major Depression
- Panic Disorder
- Generalized Anxiety Disorder
- Trichotillomania
- Anorexia Nervosa
- Impulse Control Disorder
- Tourette’s Disorder

- Bilateral Globus Pallidus lesions
- Carbon Monoxide Poisoning
- Manganese Poisoning
- Encephalitis lethargica
- Sydenham’s Chorea
NORMAL PRESSURE HYDROCELEPHALUS (NPH)

- Clinical Triad
  - Wide gait disturbance (ataxia)
  - Dementia
  - Urinary Incontinence

- LABS:
  - Dilated ventricles on CT
  - LP has high opening pressure
  - No Cortical atrophy

- Brain: Communicating hydrocephalus and patent Aqueduct of Sylvius

- TREATMENT: Shunt placement
  - Gait may improve more than memory
Neuropathies

“dizziness” is actually imbalance

*diabetes and etoh account for about 90% of chronic neuropathies in North America

*also think B12 deficiency and tertiary syphilis
GUILLIAN-BARRE (GB) SYNDROME

- General
  - Acute, severe, progressive, fulminant polyradiculopathy
  - Autoimmune – results from immune responses against various components of peripheral nerve fibers
  - Demyelinating disease causes conduction block of nerves
summary

- Differentiate between head and feet, then light-headedness vs. vertigo (versus simple visual blurring)
- Keep a wide differential diagnosis
- Treat causes that can be treated