Physical Therapist Management of the Dizzy Patient

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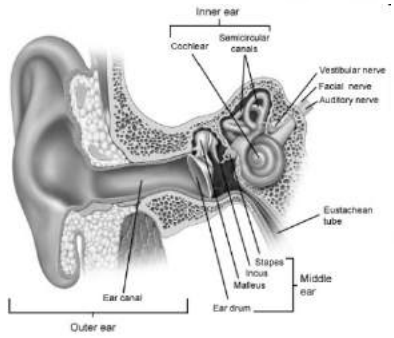
OBJECTIVES

- Review vestibular anatomy and physiology
- Identify common vestibular symptoms
- Discuss common vestibular disorders
- Discuss diagnosis and treatment of vestibular disorders



VESTIBULAR LABYRINTH

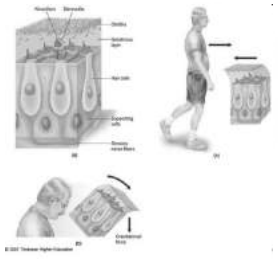
- Contains two structures:
  - Semicircular canals- three directionally-sensitive ducts (anterior, posterior, and horizontal)
  - Otolith organs- a pair of saclike swellings called the utricle and saccule
- Sensory receptors detect movements of the head and changes in acceleration
- Information travels from the end organs to the vestibular portion of CN VIII→brain stem (vestibular nuclei)→cerebellum (flocculonodular lobe)

FUNCTION OF THE SEMICIRCULAR CANALS

- Detect angular velocity- ex: right/left head turns, cartwheels
  - Faster velocity→more hair cells bending→increased firing rate
- Predictive properties- ex: turning corners
- Compensatory eye movements- vestibular ocular reflex (VOR)
  - Eye movements occur equal and opposite in direction to head rotation to maintain stable gaze
  - Eye movements match the velocity of head movements

FUNCTION OF THE OTOLITH ORGANS

- Detect linear acceleration (utricle)- ex: walking, driving a car, starting/ stopping on a TM
- Detect head tilt (utricle)- counter roll of the eyes to keep the visual world level



Diagnosing the Cause of Dizziness

DIFFERENTIAL FOR DIZZINESS

- Benign Paroxysmal Positional Vertigo
- Unilateral Vestibular Hypofunction
- Bilateral Peripheral Vestibulopathy
- Labyrinthitis
- Vestibular Neuritis
- Meniere's Disease
- Migrainous vertigo
- Acoustic Neuroma
- Cerebral Vascular Accident (all types)
- Orthostatic Hypotension
- High Blood Pressure
- Multiple Sclerosis
- Cardiomyopathy
- Arrhythmias
- Medications (ie: blood pressure)
- Anxiety/Depression
- Cervicogenic Dizziness
- Upper Cervical Spine Instability
- Labyrinthine Concussion
- Cervical Spine Herniated Nucleus Pulposus
- Temporomandibular Joint Dysfunction
- Traumatic Brain Injury
- Vertebrobasilar Insufficiency
- Cervical Spine Fracture
- Tension Headache
- Hydrocephalus
- Brain Tumor/Schwannoma
- Anemia
- Dehydration
- Pregnancy
- Panic disorder
- Hyperventilation
- Hypoxia
- Hypoglycemia
- Hypothyroidism
- Altitude sickness or hypoxia
- Hyperthyroidism
- Pituitary Disorder
- Dementia
- Effects of aging
- Internal bleeding
- Prolonged bed rest
- Heat stroke
- Heat Exhaustion
- Gastroenteritis
- Angina
- Diabetes Type I and II
- Parkinson's Disease
- Addison's Disease
- Fever
- Motion sickness
- Pulmonary Hypertension
- Chronic Fatigue Syndrome
- Toxic Shock Syndrome
- Transient Ischemic Attack
- Tachycardia
- Bradycardia
- Vasovagal Syncope
- Mal de debarquement
- Superior canal dehiscence
- Oscillopsia
- CNS inflammation (Sarcodosis)
- Prolonged attack of episodic Ataxia syndrome
- Traumatic vestibulopathy
- Otosyphilis
- Lyme disease
- Celiac disease
- Degenerative cerebellar ataxia
- Drug intoxication, illicit and alcohol
- Bacterial mastoiditis
- Brainstem encephalitis (e.g., listeria, paraneoplastic)
- Brainstem hypertensive ncephalopathy
- Herpes zoster oticus (Ramsay Hunt syndrome)
- Labyrinthine stroke
- Wernicke syndrome (vitamin B1 deficiency)
- Miller Fisher syndrome)

COMMON DIZZINESS DISORDERS

- BPPV
- Menière's Disease
- Labyrinthitis/Vestibular neuritis
- Central vestibular dysfunction
- Vertiginous Migraine
- Cervicogenic Dizziness

BPPV

- Etiology
  - Otoconia (crystals) from Utricle fall into the semicircular canals
  - Most common cause of dizziness in adults
- History
  - Spinning sensation when getting up, turning over, or bending forward
  - Short duration (30 sec or less)
- Signs
  - Positional nystagmus
- Treatment
  - Canalith repositioning techniques – there are five
- Prognosis
  - Excellent (with CRM symptoms resolve in 67-94 % of pts.)

Meniere's Disease

- Etiology
  - Endolymphatic hydrops present which increase pressure in the inner ear and cause inappropriate nerve excitation
- History
  - Episodes of severe vertigo, aural fullness, fluctuating hearing loss, tinnitus, often vomiting
  - Attacks are intense and last minutes to hours
- Signs
  - Vestibular and audiological testing may be abnormal
- Treatment
  - Low sodium diet, diuretics, symptom management
- Prognosis
  - No cure. May result in long term hearing loss

Labrynthitis/Vestibular Neuritis

- Etiology
  - Virus or bacteria infects one or both vestibular nerves
- History
  - Often preceded by illness
  - Sudden onset of severe vertigo, imbalance, vomiting
- Signs
  - Acute nystagmus
  - Imbalance and vestibular loss persists
- Treatment
  - Initial high does steroid
  - *Vestibular rehabilitation
- Prognosis
  - Good with vestibular rehab

Central Vestibular Dysfunction

- Etiology
  - Lesion, Injury to the Brain
- History
  - Dizziness and imbalance
  - May know cause of the injury, may not
- Signs
  - Significant imbalance and gait impairments
  - Abnormal findings, direction changing or atypical nystagmus
- Treatment
  - Need to refer out for appropriate diagnosis
  - Compensatory rehab, balance and gait retraining
- Prognosis
  - Fair. Dysfunction still present

Vertiginous Migraine

- Etiology
  - Unknown, but labyrinth and vestibular nuclei with other areas of the brainstem and midbrain may be involved
  - Second most common cause of dizziness in adults and most common in children
- History
  - Pt. is determined as a migraineur
  - Variety of symptoms from true vertigo to chronic motion sensitivity
- Signs
  - No specific pattern – diagnosis of exclusion
- Treatment
  - Primary treatment is for migraine
  - Vestibular Rehabilitation (VBRT) does help as long as migraine also treated
- Prognosis
  - Good for reduction or elimination of dizziness with control of migraine events

Cervicogenic Dizziness

- Etiology
  - Altered sensation from cervical mechanoreceptors
  - Caused by trauma or degenerative changes
- History
  - Dizziness, disequilibrium, and sometimes vertigo
  - Worse with head movement or prolonged posture, associated with neck pain and sometimes headache
- Signs
  - Reproduction of dizziness symptoms with head movement
- Treatment
  - Primary treatment is restoring normal C-spine mechanics
  - Vestibular Rehabilitation (VBRT) as needed
- Prognosis
  - 75% improve with treatment of the neck

- Vestibular Examination: Basic

VESTIBULAR EXAM: SUBJECTIVE

Key Questions:

- When did it start?
- How did it start?
- Recent illness?
- Triggers?*
- Recent medication changes?

- Get more specific as pt leads you to a dx

VESTIBULAR EXAM: OBJECTIVE

- My exam order:
  - Central signs
  - Balance Assessment
  - Peripheral Vestibular Testing
  - Positional Testing

Central Signs

- Smooth pursuits
- Saccades
- Limb Coordination
- Gait

Balance Testing

- Tandem Walk
- Walk with head turns
- Walk with turn around and stop
- TUG test
- Rhomberg test
- Functional Reach
- Berg, Tinetti etc.

Motion Sensitivity: VOR Cancellation

- Sit patient on stool with arm outstretched and thumb up
- Rotate patient back and forth while fixating vision on thumb
- Indicative of central dysfunction, motion sensitivity
- https://www.youtube.com/watch?v=D5AVkyQzZ58&list=PLDcUPccfQ0DZTYNCaQCY0vjNhAQ-xHLLt&index=11

Peripheral Vestibular Testing: VOR and Head Thrust

- Have patient fixate on a target
- Tilt head down 30 deg.
- Rotate head horizontally repetitively
- VOR performed at 180 bpm
- Add thrust movement to specify side
- https://www.youtube.com/watch?v=BmNCEhN61gM&list=PLDcUPccfQ0DZTYNCaQCY0vjNhAQ-xHLLt

Peripheral Vestibular Testing:DVA

- Ask the patient to read the lowest (smallest) line possible on a Snellen eye chart with best corrected vision (glasses, contact lenses).
- Repeat the maneuver while passively shaking the patient's head at 2 Hz.
- Record the number of lines of acuity "lost" during the headshake.
- https://www.youtube.com/watch?v=doHHU30U0eE&index=5&list=PLDcUPccfQ0DZTYNCaQCY0vjNhAQ-xHLLt

BPPV: Positional Testing


- Dix-Hallpike test
- Roll test
  - https://www.youtube.com/watch?v=kEM9p4EX1jk
  - https://www.youtube.com/watch?v=Tjpcua7hGHs

BPPV: Nystagmus

- Nystagmus
  - Latency- up to 30 sec
  - Direction- typically multi-axial, indicates which canal is involved
  - Duration- usually several seconds up to 2 min, indicates what type of BPPV
  - Fatigues
  - Posterior canal
  - Horizontal Canal

NOT BPPV: Nystagmus

- Downbeating: RED flag. Could indicate cerebellar lesion, Arnold-Chiari, stroke, MS
- https://www.youtube.com/watch?v=d0Kfr2mF0Bg

NYSTAGMUS CLASSIFICATION

	RIGHT	LEFT	CANALITHIASIS	CUPULOLITHIASIS
ANTERIOR SCC	Right torsion	Left torsion	Latency	No latency
	Down beating	Down beating	Fatigues	Sustained
POSTERIOR SCC	Right torsion	Left torsion	Latency	No latency
	Up beating	Up beating	Fatigues	Sustained
HORIZONTAL SCC			Geotropic, latency, fatigues	Apogeotropic, sustained

Treatment: Positional Maneuvers & Rehab

Maneuvers- BPPV

- https://www.youtube.com/watch?v=9SLm76jQg3g
- https://www.youtube.com/watch?v=3VfgHZtgx_s

OUTCOMES- CRM

- CRM and Semont Maneuver have success rates of 70-90% with one treatment session
- Success rate increases with subsequent treatments
- Barbecue Roll and Gufoni Maneuver can be successful in ~75% of cases
- Brandt-Daroff- resolution of symptoms may occur in 3-14 days

Treatment: Vestibular Rehab

- Treat the impairments/do what makes them dizzy and do it more
  - VOR dysfunction
  - Gait dysfunction
  - Proprioceptive retraining
  - Graded return to activity
- Exercise Rx: to dizziness, but not beyond
- Increase difficulty as improvement occurs
- Pt's system will habituate and compensate

VOR dysfunction: treatment

- VOR progression
  - Pt only does to a 2-3/10
  - Try to last 30-60 sec, increase speed to 180 bpm
  - Add patterns/backgrounds
- VOR x 2
- Walking VOR
- Ball follows
- Post-its

***Meclizine will inhibit

Gait dysfunction

- Tandem Walks: progressions
- High knees and hold
- Walk with head turns
- Hurdles
- Post-it/fixations
- Spot and turn

Proprioceptive retraining

- SLB
- Balance boards/Bosu etc
- Limb positioning
- Rhomberg

Graded activities

- Shopping trips
- Driving
- You Tube videos: driving on the 90, shopping at Wegmans
- Eyecanlearn.com

Questions? More Info

- Medbridge- Jeff Walter's Courses
- Continuing Ed courses
- Shadow vestibular clinician
- tlindell@sptny.com

Thank you!!!

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