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 (i.e.: 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
- Basilar meningitis
- 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 encephalopathy
- Herpes zoster oticus (Ramsay Hunt syndrome)
- Labyrinthine stroke
- Wernicke syndrome (vitamin B1 deficiency)
- Miller Fisher syndrome

COMMON DIZZINESS DISORDERS
- BPPV
- Meniere'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 (VBR) 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 (VBR) as needed

- **Prognosis**
  - 75% improve with treatment of the neck
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=D5AVkyQz588&list=PLDcUPccfQ0DZTYNCesQCT0bjNhAQ-xHLEt&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=8mNCEHnN61g&list=PLDcUPccfIgQ0DITY7NCoQCY0yNhAQ-xHLL1

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=d0HHU30U0eE&list=PLDcUPccfIgQ0DITY7NCoQCY0yNhAQ-xHLL1

BPPV: Positional Testing

- Dix-Hallpike test
- Roll test

- https://www.youtube.com/watch?v=kJEM9j4EX1j
- 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

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NOT BPPV: Nystagmus

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

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NYSTAGMUS CLASSIFICATION

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Treatment: Positional Maneuvers & Rehab

Maneuvers - BPPV
- https://www.youtube.com/watch?v=9SLm76jQg3g
- https://www.youtube.com/watch?v=3VfgHZlgx_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-its/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
- ttindell@sptny.com
Thank you!!!

REFERENCES