Vestibular Rehabilitation... What’s the Spin?

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Objectives

• Attendees demonstrate a basic understanding of the role of the vestibular system.
• Attendees will recognize basic signs of vestibular dysfunction.
• Attendees will be able to describe the role of rehabilitation for individuals with vestibular dysfunction.
Role of Vestibular System

- Gaze stability
- Postural control
- Motion detection
- Orientation in space
Symptoms of Dysfunction

- Dysequilibrium
- Dizziness with certain positions
- Motion sensitivity
- Nausea
- Unstable visual environment
- Gait ataxia
So Peripheral vs Central....

PERIPHERAL VESTIBULAR SYSTEM
- Semicircular canals
- Otolith organs
  - Utricle
  - Sacccule
- Vestibular nerve

CENTRAL VESTIBULAR SYSTEM
- Vestibular nuclei
- Vestibuloocular pathway
- Vestibulospinal pathway
- Vestibuloautonomic pathway
- Vestibulocerebral pathways
- Primary and secondary cortical areas
- Vestibulocerebellum
Incidence

• Nearly 7 million physician visits per year in the US (Gans 2002, McDonnell 2015)
• Estimated 42% of the adult population report dizziness or vertigo to their physician (Watson 1992)
  – Vestibular dysfunction is the cause in 85% of patients reporting these symptoms (Watson 1992)
  – Incidence increases with age
Dizziness....

- A vague term often further described as a sensation of movement
- Important to clarify the complaint
  - Vertigo: sensation of movement, spinning, twisting or turning
  - Lightheadedness: sensation of floating or woozy
  - Dysequilibrium: unbalanced, unsteady
Pathophysiology

• Peripheral vestibular disorders
  – Hypofunction
  – Distorted signals
  – Fluctuating function

• Central vestibular disorders
  – Stroke
  – TBI
  – Tumors
  – Demyelinating disease

• Other
  – Cardiogenic
  – Medication related
Vestibular Pathologies

• BPPV
  – “Benign paroxysmal positional vertigo”
  – Free floating debris (otoconia) in the semicircular canal
  – Semicircular canal system now sensitive to gravity
  – Symptoms: positional dizziness
Vestibular Pathologies

• Vestibular neuritis
  – Irritation of the vestibular nerve
  – Often preceded by an infection
  – Symptoms:
    • Acute onset of vertigo (can be severe, usually worse with head movement)
    • Horizontal nystagmus
    • Nausea
    • Oscillopsia
    • Decreased balance
Vestibular Pathologies

• Labyrinthitis
  – Infection of the labyrinth or inner ear
  – Symptoms similar to vestibular neuritis but hearing often involved
  – Tinnitus often present
Vestibular Pathologies

- Meniere’s disease
  - Endolymphatic hydrops
  - Fluctuating and disabling disease
  - May have some genetic factors associated
  - Cause is unknown
  - Rare

- Symptoms:
  - Sensation of fullness in the ear
  - Hearing loss, tinnitus
  - Vertigo
  - Nausea
  - Postural imbalance
  - Nystagmus
Vestibular Pathologies

• Bilateral Vestibular Loss
  – May be a result of certain medications, meningitis, any disease with bilateral hypofunction, some types of chemotherapy
  – No vertigo if both ears are affected equally
  – Symptoms:
    • Oscillopsia
    • Poor balance especially in the dark or on compliant surfaces
    • May complain of “lightheadedness”
    • Gait ataxia
Vestibular Pathologies

• Central Vestibular Disorders
  – Varied presentation and not clear cut
  – Often oculomotor exam reveals impaired smooth pursuit and saccades
  – May complain of double vision
  – Pure vertical nystagmus is a red flag for central disorders
Non-Vestibular Pathologies

- Other issues which result in patients feeling “dizzy” without a vestibular pathology:
  - Migraines
  - Cervicogenic dizziness
  - Peripheral neuropathy
  - Orthostatic hypotension
  - Vertebrobasilar insufficiency
  - Anxiety
  - Pharmacology
My head is spinning...now what?
Vestibular Rehabilitation

- Decrease dysequilibrium
- Decrease oscillupsia
- Improve functional balance
- Improve ability to see clearly with head movement
- Improve overall conditioning
- Enable a return to life roles
- Reduce social isolation
Vestibular Rehabilitation Approaches

• Gaze stabilization
  – Used to work to restore the VOR gain (Balaban 2012, Cullen 2009, McDonnell 2015)
  – Aim to induce long term changes in the error response of the vestibular system

• Habituation
  – Decrease symptoms by systematically provoking them

• Postural stability and balance retraining
• Repositioning maneuvers
General Rehabilitation Goals

• Unilateral vestibular hypofunction:
  – Gaze stability
    • Dynamic visual acuity (DVA)
  – Postural stability
    • Normal Romberg
    • Normal gait
    • Return to IADLs
Support for Vestibular Rehabilitation

• Unilateral peripheral vestibular dysfunction
  – 2015 Cochrane Review by McDonnell
    • *Moderate to strong evidence* that VR is safe and effective approach for unilateral peripheral vestibular disorders.
    • VR *more effective than control or sham* interventions for improving subjective reports of dizziness and improving participation in life roles
    • Support for VR to improve walking, balance, vision and ADLs
    • No evidence that one form of VR is superior to another
Support for Vestibular Rehabilitation

- McDonnell 2015 Review con’t
  - Moderate evidence that gains can be maintained post treatment
  - Post surgical- moderate evidence that VR is effective in improving function
  - Moderate evidence for support of VR in patients with vestibular neuritis or acute unilateral vestibular dysfunction
General Rehabilitation Goals

• Bilateral Vestibular Hypofunction
  – Gaze stability
    • Improved DVA
    • Rapid gaze shifts
  – Postural stability/balance
    • Improved Romberg
    • Independent ambulation
    • Return to IADLs
    • Safety
Support for Vestibular Rehabilitation

- Bilateral vestibular dysfunction
  - Individuals with BVH improved outcomes on DVA compared to controls (Herdman 2007)
    - Age did not appear to be a factor in improvement
    - Recovery of DVA occurred fairly rapidly (5 weeks of treatment)
  - Krebs found that pts performing customized vestibular and balance exercises had better stability with walking and stair climbing than pts performing isometric and conditioning exercises (Krebs 1993)
    - Using adaptation – eye-head exercises, balance and gait
  - Improvements in perception of dizziness and balance as well as outcome measure of gait and balance (Brown 2001)
    - Still fall risk
- Not all exercise approaches appropriate, found habituation to not be successful (Telian 1991)
BPPV Treatment

• Canalith repositioning maneuvers
  – Treatment technique varies depending:
    • Canal involved
    • Location of the debris
Support for Vestibular Rehabilitation

- **BPPV**
  - Canolith repositioning maneuver (CRM) well tolerated and effective for the posterior SCC (Hilton 2010)
  - CRM more effective than sham for treating posterior SCC canolithiasis (Helminski 2010)
  - Liberatory maneuver vs sham
    - Up to 86% improvement compared to 14% improvement in 2 recent studies (Mandala 2012, Chen 2012)
  - Weaker evidence for the horizontal SCC however still find that roll treatment and Gufoni have higher remission rate than sham (Kim 2010)
  - BPPV- Combining VR with repositioning maneuvers in people with BPPV improved functional recovery longer term (McDonnell 2015)
Who Can Benefit?

• Study by Herdman 2012 looked at factors impacting outcome for individuals with UVH
  – Age not a factor
  – Chronicity wasn’t a factor
  – Comorbidities didn’t impact improvement
    • Exception: Anxiety and/or depression
  – Patterns:
    • Poor subjective complaint at DC was associated with high anxiety
    • Slower gait speed at DC associated with slower initial gait speed and older subjects
    • Poorer fall risk scores were associated with subjects who were prior fallers
Non-Vestibular Dizziness

• “Efficacy of Gaze Stability Exercises in Older Adults with Dizziness” – Hall et al. 2010
  – RCT with placebo studied older adults with non-vestibular dizziness
  – 6-week rehab course
    • Control: placebo eye-exercises, balance and gait
    • Gaze group: vestibular adaptation and substitution exercises to improve gaze stability, balance and gait
  – Both groups improved in measures of dizziness, balance confidence, gait speed, fall risk and SOT
  – 90% of gaze group improved reduction of fall risk compared to 50% of control group
Take Home Points

• Dizziness and vestibular disorders are very common and incidence increases with age
• Vestibular rehabilitation is effective for managing a variety of different vestibular deficits
• Vestibular rehabilitation a high chance of improvement and low risk of injury treatment
• Vestibular rehabilitation can make a positive impact on a patient’s balance, perception of dizziness and thus an improved quality of life.
Resources

• Vestibular SIG for the Neurology section of the APTA
  – http://www.neuropt.org/special-interest-groups/vestibular-rehabilitation/
  – Working on clinical practice guideline currently for peripheral vestibular hypofunction...stay tuned!

• VEDA
  – http://vestibular.org/
Thank you!!


References


