

REHAB SUMMIT

**306: Vestibular Disorders
in an Aging Population: Treatment
Modification & Considerations**

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**306: Vestibular Disorders in an Aging Population:
Treatment Modification & Considerations**

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Financial: Jamie Miner has an employment relationship with Rehabcare, Galloway Ridge Facility. She is an Adjunct Associate Professor at Shenandoah University. Ms. Miner receives a speaking honorarium from PESI, Inc.
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Vestibular Disorders in an Aging
Population: Treatment and
Modification

Session 306
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Dizziness

- Prevalence of dizziness and vertigo has been estimated at 30% in people over the age of 60, and dizziness in the elderly is associated with a high risk of falls

BPPV in the elderly

- Most frequent peripheral vertigo in the elderly.
- Cause of dizziness in 10% of patients over 80
- Recommendation for routine testing in all dizzy patients over 60.
- Some elderly have no symptoms reported and still test positive.

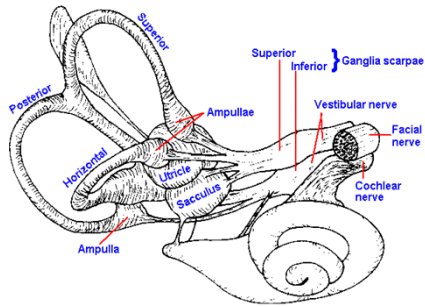
- Faldon 2008

Benign Paroxysmal Positional Vertigo (BPPV)

- Mechanism
 - The otolith organs (utricle and saccule) have calcium carbonate crystal stuck to the surface.
 - The semicircular canals are attached to the utricle.
 - Crystals break free from the utricle and fall into the canal. Normally, crystals are reabsorbed and then excreted.

- First described by Dr. Barany in 1920

BPPV



BPPV

- Pt will report dizziness when looking up, lying down and rolling over.
- Dizziness lasts only a few seconds(10-20 secs)
- Can be very frightening to pt. Often, pts will go to ER.
- It can occur spontaneously
- Can result from head trauma (head injury, whip lash injury, falls)

BPPV in the elderly

- Takes longer to get assessment and diagnosis. Batuecas-Caletrio
- Often presents as unsteadiness or imbalance without vertigo
- Dizziness is often dismissed as age related
- Dizziness has strong negative influence of QOL.

• Batuecas-Caletrio 2013

BPPV in the elderly

- Older patients with falls have more undiagnosed BPPV.
- Consecutive examinations in a geriatric population revealed 9% of those examined having unrecognized BPPV.
- More associated with depression, falls in prior 3 months, reduced ADLs
- Common comorbidities include arthritis, hypertension, diabetes and various metabolic disorders, osteoporosis and depression

Considerations in geriatric populations

- May have false negative Dix- hallpike
- Suggested DH, then roll, then repeat DH.
- May be more symptomatic earlier in the day
- Continuation of falls in the elderly, even after successful treatment of BPPV with CRPs is residual dizziness, which may be present at a rate reported to approach 61%.

BPPV in the elderly

- Common patient symptoms:
 - Poor balance, trouble walking, unsteadiness (Reported as main symptoms in 31% of pts over 70, compared to 10.6% in adult)
 - Lightheaded
 - Nausea

BPPV

- BPPV is usually a condition of the elderly; it is most commonly seen between the ages of 50 and 70 years.
- age-related degenerative changes causing otoconial debris, which float freely and find their way into the semicircular canals, causing BPPV.
- age is not a poor prognostic parameter for treatment success

BPPV

- Canalithiasis- the otoconia float in the canal and settle when the head movement stops. There is a latency while the crystals settle in the canal.
- Cupulolithiasis- the crystals adhere to the cupula. There is not a latency and nystagmus will occur immediately.

BPPV

- From history alone, BPPV is detected with a specificity of 92% and sensitivity of 88%.

- Von Brevern 2007

BPPV testing

- Dix-Hallpike test
- Always explain the procedure to the patient. Make sure that they understand that you expect to make them dizzy.
- Check neck ROM and back problems.
- Ask about nausea. (Occasionally, pt will need phenergan before treatment)

Dix-Hallpike test

- Gold Standard for diagnosis of posterior/anterior canal BPPV
- 79% - 82% sensitivity • 75% specificity

- Halker 2008

BPPV (R post canal)

- Test position (example for R post canal)
- Step 1
 - Position the pt in long sitting on mat.
 - Turn pt's head 45 degrees toward the side to be tested (R). Move the pt into supine with head hanging 30 degrees.
 - Watch the eyes for nystagmus. Keep patient in this position at least 30 sec or until nystagmus stops.
 - ❖ Positive test (R posterior canal): pt will have upbeat, rightward torsional nystagmus

BPPV treatment (R post canal) CRT

- Step 2 Canal repositioning technique
- After the test position, rotate the pt's head to position 45 degrees left with head hanging 30 degrees.
- Hold position 30 seconds or until dizziness abates.

BPPV treatment (R post canal) CRT

- Step 3
- Have pt roll onto left side while you turn the patient's head turned 45 degrees down toward the floor.

BPPV treatment (R post canal) CRT

- Step 4
- Assist the patient to return to sitting with the head still turned to the left 45 degrees.

Documentation

- Dix-Hallpike R positive for R upward beating rotational nystagmus.
- Treated with CRT. (mod Epley)
- Repeat Dix-hallpike R: negative. Retreated with CRT.

BPPV treatment

- I usually retest and repeat the maneuver after the first treatment.
- Some recommend repeated 3x.
- Some say repeat after 30 minutes.

• Korn 2007

Modifications

- Modifications
 - Across width of bed
 - Tilt table
 - Pillow

BPPV Anterior Canal

- With Dix-Hallpike test, pt will have downbeat, torsional nystagmus beating toward affected ear.
- Treat with CRT (same as posterior canal)

- Anterior Canal: 3% of BPPV
- (Anagnostou et al 2015)

BPPV horizontal canal (Roll Test)

- Have pt lie supine with their head elevated 20 degrees.
- Roll patients head to the right maintaining 20 degrees of flexion. Watch eyes for nystagmus.
- Roll the head to the left and watch for nystagmus.
- The effected side is the one that produces the most vertigo and nystagmus.
- No sensitivity and specificity established.

Horizontal Canal BPPV

- Canalithiasis- nystagmus with be geotropic (beating toward the earth)
- Cupulolithiasis- nystagmus with be ageotropic.
- Both are treated the same.

Horizontal Canal BPPV

- Treatment (Barbeque Roll)
 - Start with the patient in supine with neck flexed 20 degrees.
 - Turn head toward the affected side. Hold 30 sec
 - Turn the head to the center position. Hold 15 sec.
 - Turn the head to the unaffected side. Hold 30 sec.
 - Have the pt roll into prone with their head down. Hold 30 sec.
 - Then return to sit or stand (270 deg roll) or return to start position (360 deg roll).

Horizontal Canal treatment FPP

- Forced prolonged position (Vanuchi maneuver)
 - Instruct pt. to lie on affected side 30 to 60 seconds
 - Slowly roll to opposite side. Stay on this side all night.
 - If pt gets up, repeat maneuver.
- Ideal for elderly patients with limited neck ROM.

Horizontal Canal treatment FPP

- 86 H-BPPV
- Treated with FPP for 1 week
- 66.2% symptom free after 1st treatment
- 20% after second week and
- 13.8% 3 weeks or longer
- Last 13.9% converted from H-BPPV to PC-BPPV
- 86% effective
- Chu 2014

BPPV

- Patient does not need to wear neck collar or stay sitting upright.
- May need to sleep on 2 pillows.
- Vibration to canal is not needed.

BPPV

Retreatments

- Patients over 70 required 3 or more treatment 12.3% patients. Most resolved in 1 week.
- Patients under 70 only required multiple maneuvers in 5.7%

Reoccurrences

- Patients over 70 recurrences appeared 23.7% within 2 years.
- Patients under 70 appeared 15.5%

Causes of BPPV

- Idiopathic (50%)
- Head injury or trauma (falls)
- Immobilization (increased in older patients, e.g. surgery)
- Decreased activity

Geriatric BPPV

- Consecutive examinations in a geriatric population revealed 9% of those examined having unrecognized BPPV.
- More associated with depression, falls in prior 3 months, reduced ADLs
- Common comorbidities include arthritis, hypertension, diabetes and various metabolic disorders, osteoporosis and depression

Geriatric BPPV

- Symptoms of BPPV less typical
- Often complain of feeling off balance unsteady without vertigo even in the presence of BPPV
- Older patients with falls have more undiagnosed BPPV.

Otoconia

- Crystals are 10 to 25 μm .
- Calcium is required for turnover.
- Degeneration may be influenced by changes in pH and ionic shifts in the endolymph.
- With aging, otoconia become pitted, fissured, and broken.
- Decreased serum levels of vitamin D found in BPPV patients compared with healthy controls.
- Some benefit to vitamin D supplementation but need further validation.

• Jeong 2019 JNPT

BPPV and estrogen

- Estrogen regulates bone metabolism.
 - ↓ bone remodeling and bone reabsorption.
- Incidence of BPPV increases with age
- Women have increased BPPV around menopause.
- Less BPPV in women with hormone replacement therapy.

Otoconia

- Link between decreased bone density and BPPV in women over 50.
- Osteopenia and osteoporosis higher in men and women with BPPV.

- Jeong 2019 JNPT

Prevention

- Impaired Calcium metabolism found in pts with BPPV.
- Restoration of impaired calcium metabolism with supplementation of vitamin D or estrogen should be considered in the treatment of individuals with frequent recurrences of BPPV. Jeong 2019
- Future randomized controlled trials are mandatory to validate these supplementation therapies in individuals with recurrent BPPV. Jeong 2019

BPPV

- Many cases of BPPV resolve spontaneously within a few weeks or months. However, it should be treated, to limit dizziness and falls.
- Increased risk of falls.

BPPV treatment “red flags”

- Nystagmus that does not follow expected pattern.
- Failure to respond to treatment
- Hearing loss, aural fullness and tinnitus
- Sustained downbeat nystagmus
- ❖ May suggest problem of central origin such as intracranial tumor or Arnold-Chiari malformation. Arnold-Chiari can develop in older patients (rare).

BPPV management

- Can pre-medicate with valium in patients who are very anxious or have multi-canal BPPV.
- Do not leave patient immediately after treatment
- 13% experience a strong falling sensation during treatment.
- May use ice pack to the neck and room fan to reduce nausea and anxiety.
- AAO-HNS recommends against using any medication in treatment of BPPV.
 - Meclizine- suppresses reaction
 - Benzodiazepines- suppress vestibular compensation.

BPPV treatment

- May have loss of balance and increased risk of falls
- Will need falls risk assessment and treatment
- Bestest test
- Including Vestibular Rehab exercise is beneficial.
- Cochrane review evidence BPPV, physical (repositioning) maneuvers are more effective in the short term than exercise-based VR; although a combination of the two is effective for longer-term functional recovery.

Hillier, S.L., McDonnell, M.(2011)

Aging affects on vestibular system

- Vestibular hair cells are reduced in older adults compared to younger adults, independent of vestibular disease.
- Decline in hair cells is not uniform throughout the vestibular periphery. The saccule and utricle experience approximately a 25% reduction in hair cells, whereas semi-circular canals (SCCs) lose approximately 40% of their hair cells with age.

Aging affects on vestibular system

- The size and number of neurons that make up the vestibular nucleus decrease by 3% each decade beginning around age 40
- The number of vestibular nerve fibers also declines with increasing age
- Fewer vestibular sensory cells and neural pathways result in an age-related reduction in vestibular afferent signals to the central nervous system
- Most behavioral experiments have demonstrated a decline in functional vestibular tests, decreased VOR with increased age

Lopez 2005 Taylor2005

Implications

- 80% of fallers in a recent study were found to have a vestibular impairment Listen 2014
- Sensory reweighting involves prioritizing accurate and reliable sensory information over less reliable or less accurate sensory information for estimating body motion in space

Modified Clinical Test of sensory integration of balance (CtSib)

Test

- Firm eyes open (eo)
- Firm eyes closed (ec)
- Foam eo
- Foam ec

- Ability to maintain x 30 sec.

Senses tested

- All 3 senses
- Limited visual
- Limited proprioceptive
- Limited visual and proprioceptive-leaving only vestibular sense

Selection of sensory information

- In normal conditions, all systems contribute.
- Sensory reweighting occurs depend on circumstances

Selection of sensory information

- Older adults double their sway when changing from eyes open to eyes closed due to degenerating vestibular system.
- Older adults have greater reliance on visual input in studies that compare removal of visual input to proprioceptive.

Sensory Reweighting

- Treatment should include practice controlling standing balance under different circumstances with eyes open and closed.

Treatment UVL: Gaze stabilization/based on Adaptation

- VOR x 1
- Head moves while eyes focus on target. (large print playing card)
- Start standing or sitting
- Perform exercise 1 min or 30x 5x/day
- Causes dizziness
- Watch pt's eye when you teach them each exercise
- Do exercise at 1 foot away and 10 ft away

Vestibular therapy in Cognitive Decline

- Klatt, B.N., Ries, J.D., Dunlap, P.M., Whitney, S.L., Agrawal, Y. (2019). Vestibular Physical Therapy in Individuals with Cognitive Impairment: A Theoretical Framework. *Journal of Neurologic Physical Therapy*. 43(4):S14-S19.

Cognitive impairment

- Patients with Alzheimer's disease (AD) and other cognitive impairments have more falls.
- Individuals with cognitive impairment lwCI.
- Fall exercise programs can reduce falls in AD
- Evidence suggests that patients with AD have increased vestibular decline.
- Mechanism unknown
- Vestibular system has inputs to hippocampus, temporoparietal junction, insular cortex and anterior dorsal thalamus- all degraded in AD.

Cognitive impairment

- ½ patients with AD have vestibular impairment
- Vestibular therapy rarely offered.

- Not addressed in vestibular hypofunction guideline.

Cognitive impairment

- Specificity that mimics real life
- Best in home environment

- Use procedural/implicit learning rather than procedural

- Try to anticipate and minimize errors

Cognitive impairment

- Balance training should not be under dosed
- Visual training- avoid over taxing
 - Rest breaks
 - Watch for signs of mental fatigue (eye closure, facial tension, neck body guarding)

Cognitive impairment

- Establish personal connection
- Take time to learn personal and social history, work history, family members names, pets names, personal interest.
- Position at eye level, smile, keep it simple
- Positive reinforcement

Cognitive impairment

- Caregiver support and understanding of program
- Personal connection
- Smiling
- Clear and direct
- Confident tone (not questioning)
- Cueing with brevity
- Allowing for slowed response
- Establish therapy routines (keep sessions similar: same therapist, same time of day, same location)

Cognitive impairment

- Visual movements
- Use music for cadence for head movements
- Meaningful targets for eye movements like picture of pet, sports team logo, letter of their first name
- Could do “yes” movement for favorite team
- “No” movement of rival team

Cognitive impairment

- Balance
- Walk on uneven terrain to mailbox
 - Walk in house and look at pictures
 - Drop a letter and have patient pick it up
 - Light house keeping with reaching, dusting, sweeping (could use hole punch dots on the floor with vacuuming)

Cognitive impairment

- VOR training- verbal cues “eyes on prize”
- Physical guidance of head
- Habituation; practice task, therapist may do it with patient

- Sometimes grading or giving sticker for exercise performance, external rewards

Cognitive impairment

- Be creative
- Be patient
- Be kind

Evaluation of patient referred with dizziness

- Oculomotor evaluation
- Check for conjugate eye movement

Red Flags

- Numbness/tingling
- Weakness
- Unilat hearing loss
- Slurred speech
- Tremors
- Poor coordination
- Upper motor neuron signs: Babinski, clonus, spasticity
- Loss of consciousness
- Rigidity
- Cranial nerve dysfunction
- Spontaneous nystagmus in room light after 2 weeks
- Vertical nystagmus without torsional component

Urgent referral to MD

- Unexplained unilat hearing loss
- Orthostatic hypotension
- Unexplained drop attacks
- Cervical ligamentous instability
- Unexplained neuro sign or cranial nerve dysfunction
- Unexplained vertigo with vertical nystagmus on downward gaze, impaired smooth pursuit

Subjective Hx

- Time since onset, duration of symptoms, intensity
- Circumstances
- Vision/ glasses
- Past medical history: CA history, infection
- Medications: polypharmacopia
- # of falls, circumstances
- Use of assistive device

Cervical ROM

- Check for normal range
- Dizziness with active or passive head movement
- Check for history of neck problems

Check of orthostatic hypotension

- 1 Have the patient lie down for 5 minutes.
- 2 Measure blood pressure and pulse rate.
- 3 Have the patient stand.
- 4 Repeat blood pressure and pulse rate measurements after standing 1 and 3 minutes.

A drop in BP of ≥ 20 mm Hg, or in diastolic BP of ≥ 10 mm Hg, or experiencing lightheadedness or dizziness is considered abnormal
CDC Steady Toolkit

assessment

- Oculomotor: gaze, tracking, saccades
- Static acuity
- Glasses lens type

Sensory exam

- Shoe wear
- Vibration testing
- Light touch: monofilament or cue tip
- Proprioception
- Possible referral for NCV EMG

- Check pulse in feet for circulation problems

Proprioception

- Move great toe up or down
- Pt identifies direction
- Not very sensitive
- Should be small movement

Vibration testing

- 128 Hertz tuning fork
- Test at bony prominence of medial malleolus, great toe, 5th toe
- Check first without vibration
- Measure time that pt perceives vibration

- Norms
- Medial malleolus 12 sec
- Great toe 11 sec
- 5th toe 11 sec
- Takahara 2014

Dorsalis pedis artery

- artery usually lies near the center of the long axis of the foot, lateral to the extensor hallucis tendon
- it may be aberrant in location and often requires some searching.
- congenitally absent in approximately 10% of individuals.



Post Tib art

- artery usually lies near the center of the long axis of the foot, lateral to the extensor hallucis tendon
- may be aberrant in location and often requires some searching.
- congenitally absent in approximately 10% of individuals.



Pulse grading

intensity of the pulse graded on a scale of 0 to 4

- 0 indicating no palpable pulse
- 1 + indicating a faint, but detectable pulse
- 2 + suggesting a slightly more diminished pulse than normal
- 3 + is a normal pulse
- 4 + indicating a bounding pulse

Neurological Exam

- Cranial Nerve assessment
- DTR
- MMT
- Tone

Deep tendon reflexes

- Patella (L4)
- Medial Hamstring (L5)
- Achilles (S1)

Balance testing



balance

- Sitting balance usually not impaired in pt's with vestibular disorders

Functional reach

- Normal >12 inches
- Frail Elderly Patients:
- (Thomas et al, 2005; n = 30, fallers mean age = 79.7 (6.7) non-faller mean age = 81.4 (6.7) years, Frail Elderly Patients)
- < 7.3 inches indicates fall risk (75% Sensitivity, 67% Specificity)

Functional Reach test

- Looks at A/P control of balance
- Volitional control of COG

- Study by Wallmann suggest that SOT score better indicator of falls.

- Concludes PT/OT should work on leaning task rather than reach task for improve balance control

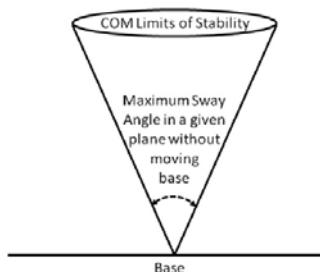
Names for sway testing

- Mod CtsIb
- Sensory organization test (SOT)
- Foam and dome
- Posturography

Limits of stability

- Usually tested on force platform
- Can be estimated with reach test.

Limits of stability



MDRT Multi directional reach test

- **Reference Values:** (mean age in study was 74)
- Forward 8.9 ± 3.4
- Backward 4.6 ± 3.1
- Right 6.2 ± 3.0 Left 6.6 ± 2.8

Romberg

- Feet together, eyes closed
- Not sensitive to detect vestibular problem

- Sharpened Romberg
- Observe amount of sway
- Should be able to hold 30 sec
- Difficulty in BVL
- Balance test for sensory conditions

Functional Gait assessment

- See form
- Reliable and Valid Wrisley
- Cut score 15/30
- Sensitivity 72% Specificity 78%

Gait speed

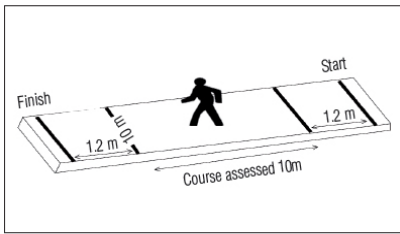


Figure 1. Representative diagram of the 10-meter walk test.

Gait Speed

- 10 foot path 3.048 / _____ sec = _____ m/s
- 20 foot path 6.096 / _____ sec = _____ m/s
- 30 foot path 10 / _____ sec = _____ m/s
- Tugt
- Tugt carry
- Tugt cog

Norms for age (Bohannon 1997)

Age	Male		Female	
	Comfortable	Fast	Comfortable	Fast
20's	1.39	2.53	1.41	2.47
30's	1.46	2.45	1.42	2.34
40's	1.46	2.46	1.39	2.12
50's	1.39	2.07	1.40	2.01
60's	1.36	1.93	1.30	1.77
70's	1.33	2.08	1.27	1.74

• Fritz S. Lusardi M. (2010). White Paper: Walking Speed: the Sixth Vital Sign. Journal of Geriatric Physical Therapy 32(2): 2-5.

Interpretation

- < .4 m/s household ambulatory only
- .4 to .8 m/s limited community ambulatory
- .8 to 1.2 m/s community ambulatory
- >1.2 m/s able to safely cross streets.

Predictive values:

- gait speed < .6 m/s more likely to be hospitalized, more likely to be dependent with ADLs
- < .8 m/s have higher fall risk
- Can be used for prediction of death

Gait speed

- Reliability ICC .88 in vestibular disorders (Hall)
- Gait speed will be slow in pt's with vestibular disorders
- Will respond to treatment.

- <.54 m/sec = **risk for recurrent falls**
(sensitivity 72%, specificity 74%)
-- Van Swearingon JM 1998
- <.579m/sec = would **benefit from PT** eval and possible treatment
(sensitivity 80%, specificity 89%)
-- Harada N 1995

Single leg stance.

- Difficult for older adults
- Test position with pt's arms folded across chest
- Norms
 - Age 60-69 22.5 sec
 - Age 70-79 14.2 sec
 - Bohannon
- Community adults able to hold 10 sec in 89% of pts
 - Rossier

TUG: Timed up and GO

- The TUG was able to correctly identify fallers and non-fallers (87% sensitivity and specificity)
- subtraction (cognitive task) or carrying a full glass of water (manual task) .
- cutoff point of 12 s can serve as a threshold for identifying persons with an increased risk of falling,
- Cut off score of 13.5 for vestibular patients
- Tugt
- Tugt carry
- Tugt cog

Mod 30 sec STS

- Allows use of UE on an armrest.
- Limits the score of 0 or no score.
- Cut off score of 7 reps for predicting falls
- Sensitivity 97% Specificity 35%
- Mean age 91 LTC facility
- Applebaum 2017

Study Mod 30 sec STS

- 80 pts at VA.
- Collected Mod 30 sec STS and TUGT
- Analyzed falls x 1 year
- Ave age: 91
- Ave mod30secSTS: 5x
- Ave TUGT: 26 sec

- Applebaum 2017

Study

- The optimal cut point for m30STS was 7 x
- Sensitivity of 0.97 and specificity of 0.35.

- Applebaum 2017

5x STS

- Measure how long it takes pt to stand up at sit down 5x without use of UE.
- Some pts can't complete 5x

- Chosen in Neurological Core tests.

Cerebellar test

- Finger to nose
 - Sensitivity 69% specificity 92%
- Rapid alternating movement
 - Sensitivity 52% specificity 82%

Minibestest Test

- See handout
- Developed by Fay Horak
- Cut score < 20/32
- sensitivity = 0.75, specificity = 0.79 (Duncan) for predicting falls

Equipment needed

- 60 cm x 60 cm block of 4" medium density Tempur foam (T41)
- Incline ramp of 10 degree slope (2 x 2 foot)
- Standard chair without arm rests or wheels
- Firm chair with arms
- Box that is 9 inches (23 cm) in height (~2 stacked shoeboxes)
- Stopwatch
- Masking tape marked on floor at 3 meters from front of chair

Grip strength

- muscle strength, measured by average of both hands grip strength, was the most significantly independent factor of one-year fall episode(s)
- There was a moderate positive correlation between knee flexion/extension strength and HGS.
- Alonso 2018

Considerations in geriatric populations

- Dizziness increases with age
- 30% prevalence in pts over 60
- 50% in pts over 85 Johesson 2018
- Study by Adkins found that 30% of pts with hip fracture had vestibular comorbidity.
- Dizziness increases odds of falling 12 x.
- Report more unsteadiness and non-specific dizziness

Considerations in geriatric populations

- Concurrent decrease in vision and sensation
- Leads to gait instability
- Require walker or cane use
- Impaired gait in the dark

Considerations in geriatric populations

- Jung reported that vestibular rehabilitation treatment was useful in decreasing dizziness even in the absence of a specific diagnosis.
- Most geriatric patients with balance impairments would benefit from vestibular rehab exercises.

Considerations in geriatric populations

Medications that may cause positional dizziness symptoms

- antidepressants
- anticonvulsants
- tranquilizers, anxiolytics
- Sedatives
- muscle relaxants
- strong analgesics
- antiarrhythmics

Considerations in geriatric populations

- Fear of falling
- Leads to reduced activity level
- Can be disabling
- When assessing falls, also check for near falls.

- Fear of falling questionnaire

Considerations in geriatric populations

- Shumway-Cook studied attention demands in older people
- Older adults allocate their resources differently than young people
- Dual tasking difficulty
- “walk and talk” more difficult

Considerations in geriatric populations

- Depression is a risk factor for falls.
- Anti depressants are a risk factor for falls.
- May appear to lack motivation
- Major depression is reported in 5-16% of community dwelling older adults
- up to 54% in the first year living in a nursing home
- 10-12% of hospitalized older adults

- Hodge 2020

Considerations in geriatric populations Depression

- Increased in those with multiple chronic conditions.
- not a natural part of aging.
- often reversible with prompt recognition and appropriate treatment.

Considerations in geriatric populations

Depression

- If left untreated, depression may result in the onset of physical, cognitive, functional, and social impairment, decreased quality of life, delayed recovery from medical illness and surgery, increased health care utilization, and suicide.
- Underreported and undertreated. Often medication under dosed.

- Geriatric Depression Screening

Central positional nystagmus without vertigo

- Central position nystagmus without vertigo
 - Nystagmus that persist as long as the head is in provoking position
 - One directional
 - Benign (in absence of other symptoms)
 - Doesn't fatigue
 - Often seen in elderly in supine

Geriatric evidence

- Sample of elderly adults with vestibular impairments, n=57
- Retrospective study
- Vestibular therapy delivered 10 sessions, 2x/week

- . Verdecchia 2018

Geriatric evidence Treatment program

- Vestibulo-ocular and oculomotor exercises: X1 and X2 viewing paradigm (near and far) with periods of stimulation 1 to 2 minutes 3-5 x daily.

Geriatric evidence Treatment program

- Oculomotor training for patients with BVL: two cards exercises (visualization of 2 targets) & remembered target (1 target), designed to challenge saccadic movements and gaze shifting

Geriatric evidence Treatment program

- Vestibulospinal exercises:
static balance with progressive reduction of BOS, eyes open and closed, and firm to soft surface, dynamic balance and gait tasks: walking with head and body turns, velocity changes, and walking with progressively narrower BOS.

Geriatric evidence

- had a significant positive change on balance, function and dizziness
- Outcomes:
 - TUG ↓ 0.96 sec
 - gait speed ↑ 0.09 m/sec
 - DHI ↓ 22 points after VR.

Sensory reweighting

- Appiah-Kubi KO, Wright WG. (2019). Vestibular training promotes adaptation of multisensory integration in postural control. *Gait Posture*. 73:215-220.

Sensory reweighting

- 33 healthy adults into 3 groups:
- 1) no training (control)
 - 2) visual feedback weight shift training (WST) coupled with an active horizontal headshake (HS) activity to elicit a vestibular perturbation
 - 3) visual feedback WST without HS (NoHS).

Sensory reweighting

- Six sessions were performed 2x/day every other day, (M-W-F).
- The Sensory Organization Test (SOT) was performed before and after the treatments.

Sensory reweighting

- The rhythmic headshake activity at 30° in each direction to the midline was performed in synchronization with a metronome at 80 or 100 beats/minute.

Sensory reweighting

- The WST included 15 one-minute limit of stability (LOS) exercises on a flat force-plate platform, rocker board or foam at three different levels.

Sensory reweighting

- The exercises entailed participants leaning towards a particular direction to reach a target that lights up randomly on the screen every 4 seconds.
- In nine of the exercises, the HS group was asked to perform the horizontal headshake activities concurrently.

Sensory reweighting



Fig. 1 Forward lean direction exercises (left). Screen interface showing four target trajectories (right)

Sensory reweighting

- Significant changes in the SOT were found with use of visual feedback training suggesting sensory reweighting adaptation had occurred with the training.

Foot concerns in the elderly

- Study at Temple Univ. found tht 75% of elderly have foot pain.
- Examine feet for pain, sensory loss, deformity and wounds
- Falls increase in barefoot or stocking feet
- Athletic shoes associated with low risk of falls.

Medications

- To treat vertigo
 - Meclizine (Antivert): meant to be short term treatment for severe dizziness, acute phase of vestibular neuritis. It suppresses the vestibular system and delays compensation. Pt needs to be off meclizine during vestibular rehab.
 - Sedating, may increase fall risk.
 - Vestibular suppressants in the elderly is potentially inappropriate because their adverse reactions include falls, urinary retention and confusion

Medications that may cause temporary Vestibular suppression

- Antihistamines such as meclizine, Dramamine and Phenergan.
- Antidepressants such as amitriptyline, especially tricyclic type antidepressants.
- Aspirin or NSAIDS in large doses
- Diazepam (Valium), alprazolam (Xanax), lorazepam (Ativan), clonazepam (Klonopin) and related drugs in the benzodiazepine family.
- calcium channel blockers

Medications (ototoxicity)

- Aspirin- may be associated with temporary tinnitus and hearing loss.
- NSAIDS and Tylenol- regular use up of 2 x/week associated with hearing loss.
- gentamicin- antibiotic associated with ototoxicity with damage to hair cells. Permanent damage.
- Cisplatin- cancer drug. Sometimes associated with hearing loss and tinnitus. Also associated with peripheral neuropathy.

Medications (ototoxicity)

- Lasix- (and other loop diuretics) may cause temporary tinnitus and hearing loss, especially when combined with certain antibiotics.
- Tamoxifen- sometimes associated with hearing loss or tinnitus. (not well researched).

Medication (postural hypotension)

- Diuretics
- Antihypertensive meds

Medications related to fall risk

- Psychotropic: antidepressants, hypnotics, antipsychotics
- Benzodiazepines
- NSAIDS (Hegeman et al)
- Cardiovascular meds: digoxin, 1a, anti-arrhythmics, diuretics
- Sleep aids

Continuing Education Credits

Access the Rehab Summit Evaluation on August 1st:

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