Good News, Bad News: A Case of Peripheral and Central Impairment

Devin L. McCaslin, PhD
Associate Professor
Vanderbilt University Medical Center
Division of Vestibular Sciences

Symptoms

- 57-year old female
- First noted non-rotational dizziness August 18th 2013 - “as if being on a boat”.
  - Husband stated that it was his impression that her balance is getting worse and is progressively deteriorating. She has not had any falls but there is concern.
Symptoms

• B.H. said that shortly after moving to Nashville from Illinois in April of this year she developed a gastrointestinal upset with reflux, decreased appetite, and weight loss of about 10 pounds.
• She had a gastroenterology evaluation, including an endoscopy, and her symptoms were attributed to stress.
• She continues to have a poor appetite but attributes it to the constant nausea associated with her dizziness.

Symptoms

• In July she had pneumonia vaccine, about 6 weeks before the onset of her dizziness, and said that she had a localized erythematous rash on her upper left arm and was concerned for cellulitis at the time but it cleared.

Symptoms

• August 18th of this year she began to have dizziness that she describes as a non-rotational vertigo, as if being on a boat, associated with nausea and poor appetite
• These symptoms seem to be getting better if she is still but sometimes can occur spontaneously.
Symptoms

- Occasionally she has some trouble in the mornings and feelings like her eyes are shifting and has trouble focusing.
- Also complained about ringing and hearing loss in her left ear.

Past History

- Hyperlipidemia
- Chronic renal failure stage III
- Gastroesophageal reflux disease
- Anemia of chronic disorder
- Vesicoureteric reflux
- Depression

Medications

- Myfortic 360 mg
- Fluoxetine 40 mg capsule (Prozac) 1 capsule by mouth daily
- Alprazolam 0.25 mg tablet (Xanax) 1 tablet by mouth every evening at bedtime
- Cephalexin 500 mg capsule (Keflex) 1 capsule by mouth twice per
- Zolpidem 5mg at bedtime as needed
Family History

- Significant for:
  - Seizures
  - Migraine
  - Hypertension
  - High cholesterol
  - Heart disease
  - Diabetes
  - Thyroid disease
  - Arthritis

Referral from Otolaryngology

- Assessment:
  - Sensory-neural hearing loss.
  - Tinnitus
  - Nystagmus.

- Plan:
  - MRI of the brain
  - Balance Function Testing
  - Neurology appointment

MRI

- Radiology Report:
  - The internal auditory canals and their contents, membranous labyrinths, and cerebellopontine angle structures are unremarkable.
  - Remainder of extra-axial space, brain parenchyma, and ventricular system is unremarkable. No untoward enhancement.
  - IMPRESSION: Normal exam.
Audiogram

Tympanograms: Normal
Acoustic Reflexes: Absent
Word Discrimination:
Right ear (105 dB) = 2%
Left ear (90 dB) = 4%

Balance Function Assessment

Anxiety and Depression
- Hospital Anxiety and Depression Scale (HADS)
  - Anxiety value: 7 points - Within normal limits.
  - Depression value: 8 points - Within normal limits.
Saccades and Tracking

Gaze Testing
- Gaze Left
- Gaze Right

Positional Testing
- Right-beating spontaneous nystagmus
- Ocular flutter
Caloric Responses

- Unilateral weakness: 55% (abnormal > 22%)
- Bilateral weakness?
- Uncompensated?

Cervical Vestibular Evoked Myogenic Potentials

Balance Function Testing

- Unilateral peripheral vestibular weakness
- Caloric Responses:
  - Total SPV: 13 degrees/second
- Rotational testing was not completed
- cVEMP responses were symmetrical
Referred to Neuro-opthalmology

Neuro-opthalmology Assessment

- Her appearance was normal. She was alert and oriented with normal affect.
- Normal mental status.
- Cranial nerve examination 2 through 12 was normal except for her eye movements (i.e. ocular flutter).

Neuro-opthalmology Assessment

- Ocular motility:
  - hypometric saccades centripetally to the right and left.
  - superimposed bursts of horizontal ocular flutter aggravated by attempted fixation.
  - No nystagmus observed.
Ocular Flutter

- Ocular flutter consists of
  - back-to-back horizontal conjugate saccades without an ISI, limited to one
  - plane (usually horizontal)
  - amplitude ranging from 18 to 58 degrees
  - rate 10–25 Hz


Causes of Ocular Flutter

- Parainfectious brainstem encephalitis
- Metabolic toxic states
- Demyelinating diseases
- Inherited disorders and paraneoplastic conditions
- Small cell lung carcinoma
- Breast carcinoma or ovarian carcinoma


Saccade Eye System

<table>
<thead>
<tr>
<th>Name</th>
<th>Response Property</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>OKM motor neurons</td>
<td></td>
<td>Uses position and velocity signals to drive EOMs.</td>
</tr>
<tr>
<td>Tic neurons</td>
<td></td>
<td>Has eye position information</td>
</tr>
<tr>
<td>burst neurons</td>
<td></td>
<td>Has eye velocity information</td>
</tr>
<tr>
<td>Onspike neurons</td>
<td></td>
<td>Keeps unwanted saccades from being generated</td>
</tr>
</tbody>
</table>
Pathophysiology of Ocular Flutter

• Brainstem Theory
  – Abnormal alterations in the cell membrane properties of saccadic burst neurons
  – May lead to excessive post-inhibitory rebound excitation after sustained inhibition from OPN
  – Another theory suggests there is an impairment in the glycine receptors of OPNs resulting in a reduction in efficacy of OPN inhibition.

• Cerebellar Theory
  – Purkinje cells in the cerebellum are impaired resulting in the cells being incapable of exerting inhibitory influence on the fastigial nucleus.


Computerized Tomography

- Radiologist report:
  - No acute or neoplastic intrathoracic process apparent.
  - Right pelvic transplant kidney with cortical scarring, mild pelvicaliectasis and small cystic lesions.

Paraneoplastic Autoantibodies

No informative autoantibodies were detected in this evaluation. However, a negative result does not exclude neurological autoimmunity with or without associated neoplasia.

GAD Antibody Test

NEGATIVE

This test did not detect abnormal levels of anti-GAD65 antibodies.

Treatment of Ocular Flutter

- Medications:
  - Propanolol, Clonazepam, Gabapentin, Topiramate.
  - Reported to diminish ocular flutter by enhancing GABAergic transmission of Purkinje cells over the fastigial nucleus.
  - Blocks the saccadic burst neurons calcium channels.
Causes of Ocular Flutter

- Para-infectious brainstem encephalitis
- Metabolic toxic states
- Demyelinating diseases
- Inherited disorders and paraneoplastic conditions
- Small cell lung carcinoma
- Breast carcinoma or ovarian carcinoma

Neuro-ophthalmology Final Report

- Her CT series revealed no evidence of malignancy.
- Her balance overall is improving although still fluctuates from day to day.
- Husband believes her eye movements have improved. He has not noticed the flutter recently.
- Could be a Postviral or vaccinial syndrome.

Thank you!

Andrea Green
Jill Gruenwald, AuD
Q&A

To ask a question, please type your question into the chat box in the lower left corner of the screen and click on the “Send” button located right below the box.

Central Pathology: Diagnosis?
AMY LAHR, AUD, MBA
ARIZONA STATE UNIVERSITY

Patient History

- 79 year old female
- Prior history of breast cancer
- Scoliosis and spinal fusion
- Peripheral neuropathy and pain in toes 3, 4, & 5 (right worse than left)
- Mild, bilateral, high frequency hearing loss
Patient History

- Vertiginous episode 2 years ago
- Denies antecedent URI/illness
- Denies ototoxic medication exposure
- Denies trauma

Chief Complaints: First Neurologist

- Dysesthesias of both legs
- Parasthesias of both legs
- Severe dizziness and imbalance
  - "Feels like my legs don’t belong to me."
- Visual changes
  - "I can’t follow a line as I read down a page"
- Tinnitus
  - "Like steam escaping from an old train"

Recommendations and Plan

- MRI of brain without contrast
- Vestibular therapy
- Medications
  - Meclizine- not helping
  - Metoprolol
  - Ambien
  - Tramadol
MRI Results

- Mild to moderate diffuse cerebral and cerebellar volume loss
- No evidence of ischemic event
- Elongation and tortuosity of vertebrobasilar system
  - Ruled insignificant

Vestibular Therapy

- Vestibular therapy consisted of in-clinic sessions and at home exercises.
- Continues to be highly symptomatic despite exercises.
- She stopped vestibular therapy after attending 3 sessions.
- Patient also described having treatment for benign paroxysmal positional vertigo (BPPV)

Oto-neurology Examination

- Tuning fork test: Decreased sensitivity 2-4 kHz (worse in right ear)
- Repetitive movements in hands: normal
- Coordination (finger to nose, heel to shin, rapid alternating movements)
  - Finger to nose: normal
  - Heel to shin: abnormal on left
  - Rapid alternating movements: dysdiadochokinesia
- Walking
  - Uses cane, veers back and forth, subtle ataxia on the left
Otoneurology Examination

- Spontaneous and gaze nystagmus
- Downbeating nystagmus that does not suppress with fixation
- Normal vestibulo-ocular reflex (VOR)
- Vibration Induced Nystagmus
  - Downbeat nystagmus present
- Dynamic Visual Acuity
  - 20/25 to 20/200
- VOR suppression - Abnormal
- No tremor

VNG Results

- Saccades: Normal
- Tracking: Normal
- OPK: Abnormal
- Spontaneous nystagmus: Downbeating nystagmus with and without fixation
- Gain: No significant nystagmus
- Active Head Rotation: Normal
- Body Torsion Testing: Normal
- Dix-Hallpike: Normal
- Positional testing: 1-3 degrees/second left beating and 4-7 degrees/second down beating during supine, head/body right and head/body left
- Caloric Evaluation: 34% left caloric weakness

Downbeating Nystagmus

- Indicative of central pathology
- Possible causes
  - Cervicovestibular anomalies
  - Brainstem infarction
  - Demyelination
  - Posterior fossa tumor
  - Cerebellar disorders
  - Toxicity
  - Undetermined
**Differential Diagnosis**

- Paraneoplastic syndrome of the cerebellum
- Cerebellar degeneration
- Dolichoectasia of vertebral artery

**Paraneoplastic syndrome of the cerebellum**

- Rare group of disorders which develop in patients with cancer
- Cancer-fighting agents of the immune system attack nerve and/or muscle cells
- Damage cannot be reversed but the cancer can be treated and further damage can be prevented

**Paraneoplastic Syndrome: Symptoms**

- Difficulty walking
- Difficulty maintaining balance
- Loss of muscle coordination/tone
- Loss of fine motor skills
- Difficulty swallowing
- Slurred speech
- Memory loss
- Vision problems
- Dizziness/vertigo
- Sleep disturbances
- Dementia
- Seizures
- Numbness, tingling in arms/legs
Paraneoplastic Syndrome:
Diagnosis

- Evidence of underlying cancer
- Clinical presentation
- Medical imaging
  - To locate cancerous tumors and/or rule out other potential causes
- Laboratory tests
  - Identify antibodies common to paraneoplastic syndromes
  - Rule out hormone, nutrient processing and/or metabolic disorders

Paraneoplastic Syndrome:
Correct Diagnosis??

- Patient was tested for Purkinje cells cytoplasmic antibody
- Serological Results: Negative

Differential Diagnosis

- Paraneoplastic syndrome of the cerebellum
- Cerebellar degeneration
- Dolichoectasia of vertebrobasilar artery
Cerebellar Degeneration

- Cerebellum is responsible primarily for coordination.
- Process in which neurons in the cerebellum deteriorate and die.
- Diseases can also affect spinal cord, brainstem and cerebral cortex.
- Associated diseases:
  - Ischemic/hemorrhagic stroke
  - Progressive degenerative disorders
  - Spinocerebellar ataxias
  - Chronic alcohol abuse
  - Paraneoplastic syndromes (already ruled out)

Cerebellar Degeneration: Symptoms

- Wide-based, unsteady, lurching walk
- Back and forth tremor in the trunk of the body
- Slow, jerky movement of arms or legs
- Slurred and thickened speech
- Nystagmus

Cerebellar Degeneration: Diagnosis

- MRI of brain
- Genetic testing often inconclusive
- Some vestibular disorders can mimic cerebellar disorders
  - Bilateral vestibular loss may present some of the same symptoms
Cerebellar Degeneration: Is it a diagnosis?

- Patient has nystagmus and unsteadiness
- MRI did not show significantly low cerebellar volume
- Cerebellar degeneration: ruled out

Possible Diagnoses

- Paraneoplastic syndrome of the cerebellum
- Cerebellar degeneration
- Dolichoectasia of vertebrobasilar artery

Dolichoectasia of the Vertebrobasilar Artery

- Dolichoectasia is the occurrence of ectatic and tortuous arteries
- When this occurs in the vertebrobasilar system the caudal brainstem may compress:
  - Vessel is unusually wide and/or,
  - Basilar artery bifurcates at an abnormally high level (the floor of the third ventricle) and/or,
  - Vessel is increased in length
- This can laterally displace the medulla and/or compress cranial nerves and lead to CNS deficits
Dolichoectasia of the Vertebrobasilar Artery: Symptoms
- Progressive oscillopsia
- Gait disturbance
- Tinnitus
- Vertigo
- Hemifacial spams
- Facial palsy or paresis

Dolichoectasia of the Vertebrobasilar Artery: Is it a diagnosis?
- Further review of MRI revealed rare vascular abnormality called dolichoectasia
- Left vertebral artery demonstrates a mass effect on the left ventral medulla
- Dolichoectasia of the vertebrobasilar artery is the cause of nystagmus and symptoms of oscillopsia and imbalance

Dolichoectasia
- An elongated and tortuous vertebrobasilar artery
- Patients present with transient or permanent deficits
- Motor and vestibular or cerebellar features are common clinical presentations
- Poor correlation between radiographic studies and symptoms
- Surgery may provide only temporary symptom relief and cause other complications
Clinical Presentation

- Compressive symptoms are caused by enlarged vessels exerting pressure against surrounding structures.
- Cranial nerve roots: VIII most common, followed by VII and X.
- Ophthalmoplegia, diplopia, multidirectional nystagmus, facial palsy, dizziness, tinnitus, hearing loss, dysarthria, trigeminal neuralgia.
- Hydrocephalus.

Diagnosis

- Magnetic resonance imagine (MRI)
  - Look for compression of brainstem structures and cranial nerves.
- Magnetic resonance angiography (MRA)
  - Look for abnormal diameter, length and/or position of the arteries.
Treatment Options

- No standard treatment currently exists
- If asymptomatic, conservative management
- Anticoagulation agents and management of hypertension
- Surgical options
  - Lateral/suboccipital approach
Patient Update

- Memantine (Namenda) trial
- Most common use is for Alzheimer’s
- Patient has scheduled a surgical consult
- Referred to physical therapy for fall prevention and vestibular therapy

Special Thanks: Contributors

- Michael J. A. Robb, M.D. - Robb Oto-Neurology Clinic
- Oscillopsia from downbeat nystagmus associated with dolichoectasia of the vertebrobasilar artery (ABS, 2013)
  Authors: Michael J. A. Robb, M.D., Mia R. Pozzanghera, Amy L. Ariss, Au.D. & Andre Hagevik, M.D., Ph.D.
- Mia Pozzanghera, B.A. Doctor of Audiology Student, A.T. Still University, Arizona School of Health Sciences, Presentation Contributor

References

- http://www.indkc.org/neurodegenerative.html

Vestibular Grand Rounds 2013
Recorded November 7, 2013
INTERPROFESSIONAL EVALUATION OF FALL RISK PATIENTS

Patricia Gaffney, AuD
Associate Professor
Nova Southeastern University

NSU Interprofessional Fall Prevention Clinic
- Started in 2004 as a grant
  - Eventually grant money ran out, but everyone felt it was a good service so it continued.
- Free clinic to anyone with history of fall or fear of falling
- Patient population: primarily older adult
- 2 patients every other Thursday afternoon for ~2-3 hrs
- Bedside evaluations
- All providers and students watch the patient evaluation
NSU Interprofessional Fall Prevention Clinic

- Report is written while patient is there and given 2 copies prior to their departure
- Have evaluated 170+ patients
- No lead provider- work as a team to complete patient evaluation
- Psychology students do a pre-phone interview to determine if the patient is a candidate and then to schedule
- Pharmacy calls prior to appointment to get entire list of medications.

Fall Prevention Clinic Team

- Audiology: Patricia Gaffney, AuD
- Geriatric Medicine: Hady Masri, DO and Kenya Rivas, MD
- Occupational Therapy: Allison Herman, MPH, OTR/L
- Optometry: Nicole Patterson, OD
- Pharmacy: Joshua Caballero, PharmD and Andrea Fass, PharmD
- Physical Therapy: Dabra Stern, PhD, Jennifer Canbek, PhD, and Kim Smith, PT
- Psychology: Michelle Gagnon Blodgett, PsyD
- Spiritual: Edye Grossclose, PhD

Audiology Bedside Screening

- Otoscopy
- Vertebrobasilar screening
- Hjaltile
- Otoliths
- Hicchokes
- Head thrust
- Sensory organization testing
- Dynamic Visual Acuity
PATIENT TT
Patient’s Goal/Priority: To improve balance and reduce risk for falls.

History
- Reported concern—stating “I’d like to know what’s causing the feeling like I’m going to fall. No one has been able to tell me why. I’m worried for my safety, especially outside.”
- She reported that her stability on her feet is a 4-5 on a scale of 1 – 10. (1 = not at all stable & 10 = maximum stability)
- Balance difficulties began about 4 years ago.

History of Falls
She reported a fall when getting out of bed in January 2011, when she “tripped over bed sheet”.
- She noted a lot of bruising and felt sore for one week following, finally going to the doctor.
- X-ray revealed no broken bones, but did find bone loss.
A second fall occurred in January 2012, again when she got out of bed.
- This time, she walked to her closet, reached up to get something, felt the room “spin”, “lost control of [her] body” and fell.
- She got back into bed, got up a while later, felt a spinning sensation, and fell again.
- She did not seek immediate medical attention and denied any injuries.
### History Continued

- She went for and ENT evaluations a while later; wax was removed from her right ear, which she noted helped.
- One of her physicians also gave her Brandt-Daroff exercises to treat benign paroxysmal positional vertigo (BPPV).

### History Continued

- Episodic dizziness
  - reports that room with “spin” and that she must lie down 20 – 30 minutes to allow sensation to stop
- lightheaded since 2007
- weakness in legs and whole body when dizzy, fatigue, occasional headaches
- occasional numbness in hands and feet
- s/p bilateral cataract surgery in 2005
- dry eye
- hearing loss in right ear

### History Continued

- COPD (2009)
- HTN (2005)
- high cholesterol
- GERD
- Osteopenia (2009)
- Bunions
  - Sleep difficulties (takes alprazolam @ night)
  - Decreased appetite and weight loss past 6 – 12 months
  - Sadness secondary to health concerns / symptoms that also impede quality of life / lifestyle.
History- Denied

- Hx of neurological condition
- cardiac problems
- Surgery in past 5 yrs
- Hx stroke or blood clot
- joint problems
- Diabetes
- Thyroid disorder
- Cancer
- Memory loss
- Hx or current anxiety
- Hx or current substance abuse/misuse.

Environment

- Client lives alone in an apartment in senior retirement community.
- She reports good support from female friends and her oldest daughter, who lives out of state.
Audiology Findings

- Otoscopy is within normal limits bilaterally.
- Optokinetics are present.
- Headthrust was negative.
- Vertebral artery screening is negative bilaterally.
- Hallpike to the right was negative.
- Hallpike to the left revealed an upward torsional nystagmus with report of vertigo.
- (Sensory organization testing not completed b/c after Hallpike she was nauseated and PT had already done the Berg Balance Scale)

Patricia Gaffney, AuD

Medical Findings

- VS: lying: 136/80 HR 72, standing 134/74 HR 80 No orthostasis
- Gen: NAD, AAx3
- HEENT: NC/AT B/L cataract surgery noted. EOMI, NO JVD, radiating heart sound to the right
- Heart: S1/s2 RRR +crescendo-descendo murmur which I heard in the 2nd ICS
- Lungs: CTA b/L
- MS: kyphotic, diffuse sarcopenia, temporal wasting, some squaring of the shoulders

Hady Masri, DO

Optometry Findings

- Visual acuity: Distance uncorrected 20/70 OD, 20/25 OS.
- Near acuity unaided approximately 20/20 OU.
- Confrontation visual fields: full to finger count.
- Pupils: equal round, reactive to light.
- Extra ocular motilities: full range of motion OU.
- Amsler: no defects
- Patient reports dry eyes

Nicole Patterson, O.D.
Pharmacy Findings

<table>
<thead>
<tr>
<th>Name of the Medication</th>
<th>Condition for which the medicine was prescribed</th>
<th>Direction from the Doctor</th>
<th>Strength of the Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lipitor</td>
<td>Statin for high cholesterol</td>
<td>At night</td>
<td>40 mg</td>
</tr>
<tr>
<td>Diovan</td>
<td>High blood pressure</td>
<td>In the morning, an hour after eating</td>
<td>160 mg</td>
</tr>
<tr>
<td>Omeprazole</td>
<td>Digestive</td>
<td>In the morning, before blood pressure pill</td>
<td>20 mg</td>
</tr>
<tr>
<td>Actonel</td>
<td>Osteopenia</td>
<td>Once a week</td>
<td>35 mg</td>
</tr>
<tr>
<td>Alprazolam</td>
<td>For sleep difficulties</td>
<td>At night, prescribed (0.25 taken)</td>
<td></td>
</tr>
<tr>
<td>Spiriva</td>
<td>COPD</td>
<td>Daily, takes 3 times a week, dosage unknown</td>
<td></td>
</tr>
</tbody>
</table>

Joshua Caballero, PharmD

Pharmacy Findings

- Oscal
- Vitamin C
- Centrum All Purpose
- Magnesium
- Multi B Vitamin

Joshua Caballero, PharmD

Physical Therapy Findings

- **Gait:**
  - Frail and apprehensive appearance during gait – client reported feeling insecure and feels as if people watch her walk, reports fatigue easily.
  - Client is able to ambulate independently though presents with narrow base of support, slight path deviation to left, tendency to cross left leg to midline during swing phase, minimal arm swing, short step length bilaterally.
  - Backward walking asymmetrical step and noted instability.
  - Sidestepping right/left improved stability noted.

Kim Smith, PT, MSPT
Physical Therapy Findings

- **Balance:**
  - Berg Balance Test 39/66 indicated medium risk for falls
  - difficulty noted with standing with feet together (Romberg), alternate stool tap in standing, tandem standing, standing looking over shoulder decreased rotation to right
  - Functional Mobility: TUG score 16.8 secs indicating independent in most activities.

- **Strength:**

---

Psychology Findings

- The Geriatric Depression Scale score of 2/15 indicated a non significant number of depressive symptoms, suggesting the client does not have a clinical depression.
- The Geriatric Anxiety Scale score of 6/20 indicated a non significant number of anxiety symptoms, suggesting the client does not have a clinical anxiety disorder.
- The client voiced some worry regarding her withdrawal of pleasurable activities due to health concerns and a fear of falling.

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Occupational Therapy

- Unfortunately the OT could not attend the clinic this particular day.
TT

- I did another Hallpike on her to show the physician after all of the assessments were completed.
- This made her very dizzy and nauseated
- Typically treatment is not done at this evaluation; however, I offered to treat her and she declined because she felt so dizzy.

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**RECOMMENDATIONS**

**Significant Findings and Recommendations**

<table>
<thead>
<tr>
<th>Findings</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insomnia</td>
<td>consider changing xanax to nonbenzodiazepine such as ambien, encourage good sleep hygiene.</td>
</tr>
<tr>
<td>Neuropathy</td>
<td>B12 level. RF for b12 deficiency is PPI use. No diabetes.</td>
</tr>
<tr>
<td>Diffuse sarcopenia/Weight loss/ Frailty:</td>
<td>Would benefit for some strengthening with physical therapy. Check Thyroid function. May benefit from some supplementation between meals such as Ensure Glucerna. Monitor weights every month. If fails, appetite stimulants may be a consideration such as mirtazapine at low dose or megace, etc. Wasting may be due to COPD.</td>
</tr>
</tbody>
</table>
Vestibular Grand Rounds 2013
Recorded November 7, 2013

### Significant Findings and Recommendations

<table>
<thead>
<tr>
<th>Findings</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention</td>
<td>-DEXA was already ordered. -Check Vitamin D level if not done so, continue Oscal with Vitamin D as well as weekly actonel.</td>
</tr>
<tr>
<td>Impaired Balance (Berg Balance Scale 38/56 = Medium risk for falls) and Gait Instability</td>
<td>Physical therapy to address balance and gait abnormalities, to decrease fall risk, improve ability to shift weight and change directions, increase stability during gait. -Possible recommendation for use of straight cane during gait. -Education on fall risk</td>
</tr>
<tr>
<td>Weakness in legs and generalized deconditioning</td>
<td>Physical therapy for strengthening of legs and generalized conditioning program to improved endurance/overall activity tolerance and functional mobility for change of positions.</td>
</tr>
</tbody>
</table>

### Significant Findings and Recommendations

<table>
<thead>
<tr>
<th>Findings</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Posterior Canal BPPV</td>
<td>Treatment of left posterior canal BPPV by an audiologist, physical therapist, or physician (not home exercises)</td>
</tr>
<tr>
<td>Hearing loss</td>
<td>Audiologic evaluation</td>
</tr>
<tr>
<td>Fall and GI concerns interfering with pleasurable activities</td>
<td>Consider a brief term/course of psychotherapy to address how to minimize health concerns and resume pleasurable activities</td>
</tr>
<tr>
<td>Patient reports dry eye</td>
<td>-Continue yearly dilated eye examinations -Suggest amber or brown sunglasses instead of gray.</td>
</tr>
</tbody>
</table>

### Significant Findings and Recommendations

<table>
<thead>
<tr>
<th>Findings</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medications all appear to be appropriate. Pt states compliance with meds including how to take, and how to separate (especially with Actonel).</td>
<td>-The only medication that may be of concern may be alprazolam if hepatic complications present. -Recommend liver enzyme test to see hepatic function. -Alternative may be lorazepam 0.25-0.5 mg at bedtime or temazepam 7.5 mg to replace alprazolam if hepatic complications exist. Of note, temazepam carries a lower half life, therefore, pt may feel less sedated when she wakes up. -Finally, may recommend blood test for anemia or B12 deficiency if not done lately.</td>
</tr>
</tbody>
</table>
NSU Interprofessional Fall Prevention Clinic
- The patient is given 2 copies of their report to take with them at the end of the appointment
- Typically around 5-7 pages long.

Importance of Interprofessional Teaching/Learning

Importance of Interprofessional Teaching/Learning

- WHO report on Interprofessional Education
- Audiologists receive little interprofessional education in comparison to other healthcare fields.

Q&A

To ask a question, please type your question into the chat box in the lower left corner of the screen and click on the “Send” button located right below the box.
References


THANK YOU
Patricia Gaffney, AuD
Associate Professor
Nova Southeastern University
pgaffney@nova.edu

Lost and Found: The Importance of cVEMP in Vestibular Assessment

Richard A. Roberts, PhD, FAAA
Alabama Hearing & Balance Associates
Cervical Vestibular Evoked Myogenic Potential (cVEMP)

The cVEMP is an inhibitory myogenic response resulting from high intensity acoustic stimulation. Commonly measured from ipsilateral sternocleidomastoid neck muscle. It occurs through the vestibulocollic reflex (VCR), specifically originating from the saccule.

<table>
<thead>
<tr>
<th>Pathology</th>
<th>Absent</th>
<th>Reduced</th>
<th>Enhanced</th>
<th>Delayed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meniere’s Disease</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>Superior Canal Dehiscence</td>
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<td>Neurolabyrinthitis</td>
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<tr>
<td>Vestibular Neuritis</td>
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<td>Neurologic Migraine</td>
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<td>Spinocerebellar Degeneration</td>
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<td>Multiple Sclerosis</td>
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<tr>
<td>Brainstem Stroke</td>
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(Gans & Roberts, 2005)

(Murofushi et al., 2001; Welgampola & Colebatch, 2005)

Snowbird season in Alabama: Jan-March
Case 1

Hx:
• 70 y.o. Female
• Acute onset dizziness, nausea & imbalance 3 weeks ago
• No Auditory changes
• Congenital SNHL AS
• Gentamicin for bladder infection
• Recurrent Shingles
• Cervical Spine

Sx:
• Some Improvement
• Walker to Quad cane
• Exacerbation with head movement, better with supine
• Profound SNHL AS Mod 6-8 AD
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**Sx:**
- Some Improvement Walker to Quad cane
- Exacerbation with head movement, better with supine
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**Dx:**
- Vestibulo-toxicity BVD
- Right superior branch Vestibular Neuritis & no function on Left from long ago

**Vestibular Neuritis**
Viral inflammation of vestibular portion CN VIII

**Key Considerations**
- Vestibular symptoms only
- Vertigo
- Duration is hours to days
- Peripheral nystagmus

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Viral inflammation of vestibular portion CN VIII

**Key Considerations**
- Herpes virus (cold sores, shingles, genital herpes, allergy)
- Vestibular symptoms only
- Vertigo
- Duration is hours to days
- Peripheral nystagmus
Two-week Follow-up

- Had not started with PT
- VRT with head movement hurts neck so stopped it
- Relying less on Quad cane
- Guarding Head Movement less

Two-weeks Post-VRT

Two-week Follow-up Recommendations:

- SOP confirms NOT BVD
- Start with PT
- Modify VRT with swivel chair so no neck torsion
Vestibular Grand Rounds 2013
Recorded November 7, 2013

4 weeks Post-VRT

Four-week Follow-up
- Big improvement SOP
- Big Improvement DVA
- VRT is working!
- Not Gent, Vestibular Neuritis on AD
- Presence of cVEMP steered management to VRT
- Modified VRT because of neck problems
Case 2

Hx:
- 38 y.o. Male
- Active duty Pilot
- 2 Attacks
- Both after eating
- MRI/MRA clear
- EKG/Tilt Table WNL
- DHI = 22 (Mild)
- Acyclovir

Sx:
- Constant sensation similar to alcohol “buzz”
- Frequent after-sensation to normal head/body movements
- Better in a.m./ worse p.m.
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Case 2 Calorics

Case 2 cVEMP's
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Dx:
- Sway on foam EC
- Left Inferior Branch Neuritis
- Uncompensated

3 weeks Post-VRT
- DHI = 0
- No further symptoms at all!
- cVEMP Absence led to VRT program

Summary
- cVEMP finding (presence/absence) helped diagnose vestibular neuritis
- Accurate diagnosis led to appropriate management
- VRT works excellent with uncompensated vestibulopathy
To ask a question, please type your question into the chat box in the lower left corner of the screen and click on the “Send” button located right below the box.