

Advanced Concepts Assessing & Treating Vertiginous & Concussed Patients

LAB

Objectives

1. Practice bedside testing for acute onset of vertiginous symptoms to differentiate central vs peripheral origin.
2. Accurately perform VOMS testing.
3. Perform additional testing and treatment techniques to address more challenging or atypical forms of BPPV.

HINTS to INFARCT

Katah, J.C. et al (2009). Newman-Toker, DE (2013). Newman-Toker, DE (2015).

TESTS...

- **H** – Head
- **I** – Impulse
- **N** – Nystagmus
- **T** – Test of
- **S** – Skew

Results suggesting central...

- **I** – Impulse
- **N** – Normal
- **F** – Fast-phase
- **A** – Alternating (DC-GEN)
- **R** – Refixation on
- **C** – Cover
- **T** – Test

Head Impulse Testing

- **Lateral**
 - **Horizontal plane**
- RALP
 - Right anterior/Left posterior
 - Rotate head 45 degrees left
 - Vertical plane
- LARP
 - Left anterior/Right posterior
 - Rotate head 45 degrees right
 - Vertical plane

Head Impulse (HIT)/Head Thrust Test

- Advise patient what you will be doing before testing! Instruct to relax and to minimize blinking
- Grasp head firmly and maintain consistent pressure as to avoid providing cues to patient of impending direction
- Tip patient's head forward 20-30 degrees
- Instruct patient to look at your nose (may need distant target)
- Move patient's head slowly to ensure patient relaxed
- Quick thrust AND STOP
 - Direction of thrust is the side which you are testing
 - Make sure to pause after thrust to view eyes
 - Needs to be unpredictable

Gaze-Evoked Nystagmus (GEN)

- Up, down, left, right / cardinal planes
- Do not go to end gaze (physiologic nystagmus)
- Reminder that eye ROM reduces with age so may reach end-gaze earlier.
- Hold to observe for nystagmus
- Direction Changing (DC) – GEN → central sign
 - i.e. look left, beats left; look right, beats right

Cover – Uncover Test

- Assess for the presence of tropias
- Cover 1 eye with occluder 1-2 seconds, then remove; repeat several time
- Observe the uncovered eye for any shift in position



Tim Root, MD



Cross Cover Test

- Assess for the presence of phorias
- Breaks fusion
- Cover 1 eye, then cross over to cover opposite eye, going back and forth several times if needed (one eye should always be covered)
- Immediately look at the eye that has just been uncovered to assess for a shift
- Phorias are VERY common

Maddox Rod Testing

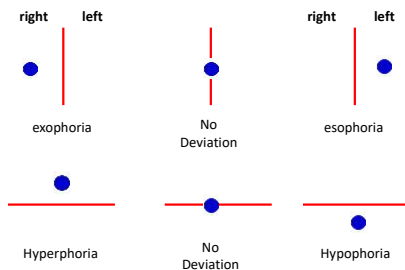
- Confirms and subjectively quantifies malalignment
- Advise patient that you will be holding the rod up to their eye while looking about arms length away at a pen light. Advise that they will see a vertical or horizontal line (depending on the direction of the ribbing). Ask patient to indicate whether light is touching or to the side of the line and if offset, by about how much.



Maddox Rod

- If Maddox Rod placed over the **right** eye &:
 - Light to the right of the vertical line = exophoria
 - Light to the left of the vertical line = esophoria
 - Light touching the vertical line = normal lateral alignment
 - Light above the horizontal line = hyperphoria
 - Light below the horizontal line = hypophoria
 - Light touching the horizontal line = normal vertical alignment

From patient's view..... results based on maddox rod over the RIGHT eye!



Practice

- HINTS → INFARCT
 - Head Impulse Test (horizontal)
 - Look for Gaze-Evoked Nystagmus (GEN)
 - Test of skew (vertical skew)
 - Cover-uncover
 - Cross-cover
 - Maddox rod – quantifies alignment

Ocular Alignment (continued)

- Comitant vs incomitant
 - Move the light up/down or left/right (depending on which plane you are testing)
 - If distance between line and light remain the same regardless of where eyes look = comitant
 - Usually seen in children
 - If distance between line and light changes depending on which direction eyes look = incomitant

Additional Resources

- Tim Root, MD – www.rootatlas.com
- <https://www.youtube.com/watch?v=dRYBOBSyzAU>
 - Ophthalmology Lecture – Tropias & Phorias (part 1 of 2)
- <https://www.youtube.com/watch?v=TxEQWtIXtrl>
 - Ophthalmology Lecture – Tropias & Phorias (part 2 of 2)

The Vestibular/Ocular Motor Screening (VOMS) – see supplemental handout

- Brief assessment of 5 domains:
 - Smooth Pursuit
 - Horizontal & Vertical Saccades
 - Near Point Convergence (NPC)
 - Horizontal & Vertical Vestibular Ocular Reflex (aVOR)
 - Visual Motion Sensitivity (VMS)
- Patient rates 0-10 changes in
 - Headache, dizziness, nausea and fogginess

Mucha, Collins, Elbin, Furman, Troutman-Enseki, DeWolf, Marchetti, Kontos. Am J Sport Med; 2014

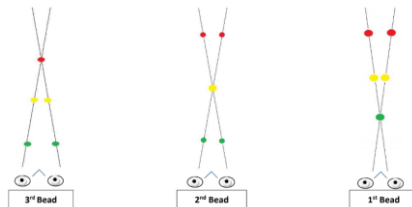
Oculomotor Training

- Rehab to include vision exercises/vision therapy to address specific deficiencies:
 - Visual Motion Sensitivity (VMS)*
 - Convergence Insufficiency
 - Gaze holding / Fixation Impairment
 - Pursuit: saccadic or symptomatic
 - Saccades: hypometric, slowed, symptomatic
- Hypermetric saccades ATYPICAL w/ concussion – Refer!
- Medication for convergence spasm
- Optometrist - Prism Lenses; additional vision therapy



Oculomotor Exercise Examples

- Brock String
- Pencil Pushups
- Lifesaver cards
- Barrel cards
- Pursuit
- Saccades



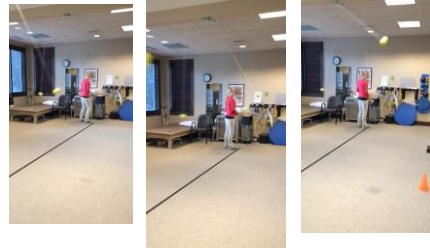
Visual Motion Sensitivity Training

- Use of fixation point initially
- Modify posture, surface & duration
- Do not over-stimulate
- Do not provoke migraine
- Gradual exposure to noxious stimuli
- Example: VORc (utilizing for visual motion sensitivity) first slow in sitting, progress to faster speed in standing with complex background

Visual Motion



Motion (self and environment) progressions

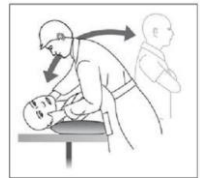


BPPV Positionals

- DH or Side lying Test (perform the side you DON'T believe to be the problem first!)
- Supine Neutral
- Roll (head vs body to screen cervical component)
- Other positional testing based on subjective & clinical findings
 - Straight Head Hanging Position
 - Null Point
 - Bow & Lean
 - Problematic position

Dix Hallpike - Right

- Patient sitting upright
- Turn head 45° to right
- Eyes remain open
- Assist patient into supine, head hanging position 20 degrees; maintain 45° head turn to right
- Patient focuses on target; observe eyes for nystagmus
- Maintain head hanging position for 30-40 seconds; if response occurs, wait for nystagmus to fatigue
- Patient returns to upright, seated position
- When seated, patient focuses on target; look for reversal of nystagmus
- Repeat with head hanging left



Side Lying Test



Courtesy of Lee and Kim 2010

Straight Head Hanging Position (SHHP)

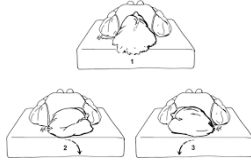
- Most sensitive for AC-BPPV
- Long sitting to supine (no cervical rotation)
- Head extended off end of table
- AC-BPPV produces a DBN
- May or may not see weak torsion for the AC
 - If torsion present, presumed to be towards the involved side
- May evoke a DBN if apogeotropic PC-BPPV
 - May see stronger torsional component
- Return to sit nystagmus
 - Anterior canal – may be absent
 - Posterior apogeo variant – may be absent; if present seldom reverses; if present, excitatory direction therefore intensity greater.

Roll Test – head vs body

- Supine neutral first w/ head in plane of horizontal canals, ~ 20-30°
- Note subjective symptoms & nystagmus (if present)
- Turn to one side comfortable range
- Wait for s/s to abate or reduce
- Return to midline, noting symptoms and nystagmus. Wait to abate or reduce.
- Turn to opposite side

Note:

- Subjective complaints
- Nystagmus
 - ❖ Onset
 - ❖ Direction
 - ❖ Duration
 - ❖ Intensity



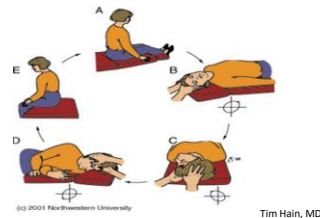
HC – Which side is involved?

- Null point – in cupulolithiasis, slowly rotate ~10-30 deg range. The nystagmus will stop when rotated towards the involved side (if able to achieve vertical alignment of the cupula, as to not be deflected).
- Bow & Lean
 - Much easier to perform and see nystagmus with IR video goggles
 - In sitting, bow forwards, wait to see nystagmus
 - Transition from the bow to a leaning position

BPPV Maneuvers (not inclusive)

- Posterior/Anterior
 - CRT (canalithiasis)
 - Semont/modified Semont (canalithiasis/cupulolithiasis)
 - Deep Head Hanging (aSCC canalithiasis)
 - Brandt-Daroff
- Lateral (Horizontal)
 - BBQ roll or Gufoni - head down (canalithiasis)
 - Gufoni – head up (cupulolithiasis)
 - Casani (cupulolithiasis)
 - Modified Brandt-Daroff
 - Forced Prolonged Positioning (FPP)

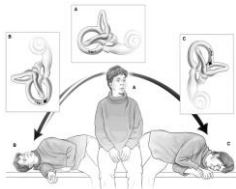
Canalith Repositioning Treatment (CRT)



Semont Maneuver for Right Posterior Canal BPPV

(Semont A. 1988)

- Originally developed for cupulolithiasis
- **Speed** from position #B to #C is critical (Faldon 2008); 1.5 seconds
- Nystagmus in position #C should be **consistent** with position #B (upbeating and right torsion in this example)



Deep Head Hanging Maneuver (Yacovino et al. 2009)

- Does not require acknowledgement of side involved
- Intervals 15-30 seconds beyond nystagmus (ensure nystagmus resolved)
- Must extend the head when in supine at least 30 deg below horizontal
- Head is brought up quickly when transitioning in supine from head extended to head flexed (chin to chest)

Deep Head Hanging

(Yacovino et al 2009)

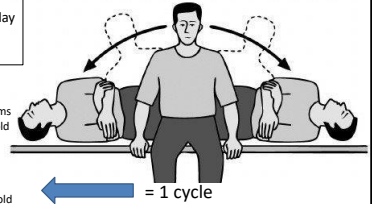
- A. Long Sitting head neutral
- B. Supine head extended
- C. Supine neck flexion
- D. Return to sit neck flexion
- E. Head Neutral



Brandt-Daroff (vertical canals canalithiasis)

shorten hold time to only a few seconds for cupulolithiasis

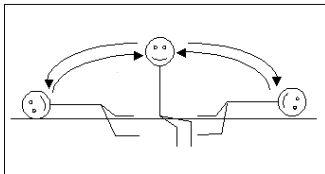
- Original calls for 10-20 cycles, 3x/day
- I typically find that 5 cycles, 2x/day is sufficient
- Some say perform to tolerance



STOP EXERCISE: 1) No symptoms 2) Change in type of symptoms 3) Symptoms increase

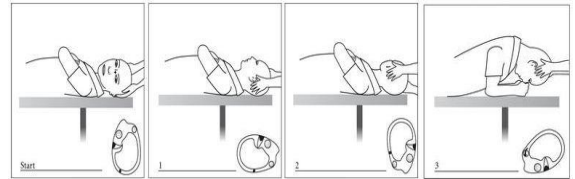
Modified Brandt-Daroff (horizontal canals)

- Head remains in a neutral alignment

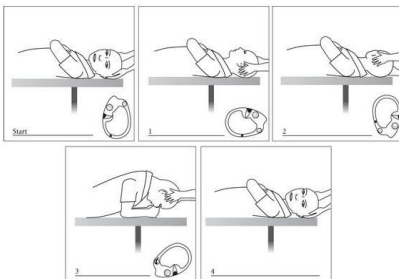


STOP EXERCISE: 1) No symptoms 2) Change in type of symptoms 3) Symptoms increase

Horizontal Canal Maneuver (BBQ 270 degrees)



BBQ 360 degrees



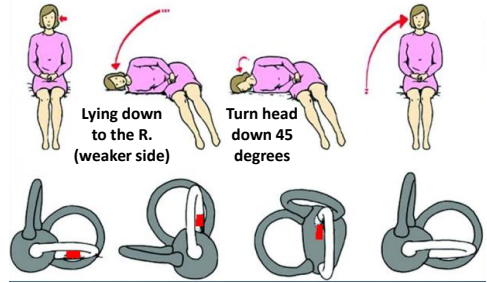
Gufoni Maneuver

- Easier to perform compared to BBQ roll
- Only need to identify side of weaker nystagmus regardless of whether nystagmus is geotropic or apogeotropic
 - Geotropic nystagmus: weaker side is the unaffected side
 - Apogeotropic nystagmus: weaker side is the affected side
- Need to modify maneuver depending on location of otoconia (in the ampullary segment whether otoconia are on the canal side or the utricle side of the ampulla)
- May need to perform a follow up maneuver of a different kind when treating cupulolithiasis (i.e. Appiani or BBQ roll)

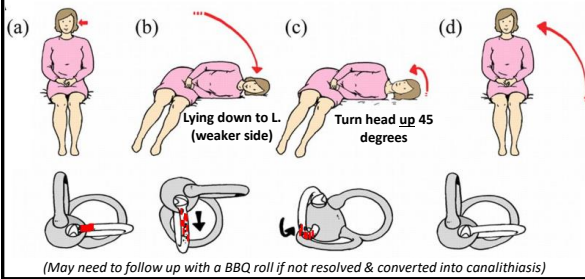
Gufoni Maneuver

1. Patient quickly transitions from sitting to side-lying to the weaker side and hold head in neutral x 2 minutes
 - a. Horizontal Canalolithiasis → Geotropic Nystagmus → unaffected side
 - b. Horizontal Cupulolithiasis → Apogeotropic Nystagmus → affected side
2. Rotate head 45 degrees....holding for another 2 minutes
 - a. ...Down for canalithiasis (geotropic nystagmus)
 - b. ...Up for cupulolithiasis (apogeotropic nystagmus) *NOTE: You may have to perform a BBQ roll after Gufoni head up if otoconia moved closer to the utricle but did not drop into the utricle (i.e. converted to canalithiasis)

Gufoni Maneuver (picture showing tx for L. hSCC BPPV canalithiasis)

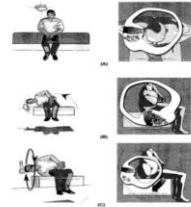


Gufoni Maneuver (picture showing L. hSCC BPPV cupulolithiasis)



Casani (cupulolithiasis) otoconia on utricular side

- a.k.a "Bump and dump"
1. Sitting on side of table, quickly lie down to involved side, head neutral
 2. Immediately rotate head down, hold 2-3 minutes



Forced Prolonged Positioning (FPP for canalithiasis)

- Get into bed lying on your affected side, hold 30-60 seconds
- Roll over onto your back and then to your unaffected side
- Remain there all night
- If you get up in the middle of the night or wake up in a different position, repeat the process



Forced Prolonged Positioning (FPP for cupulolithiasis) does not fix; may convert to canalithiasis variant

- Get into bed lying on your unaffected side
- Roll over onto your back, then to your affected side
- Remain there all night
- If you get up in the middle of the night or wake up in a different position, repeat the process.



BPPV Lab

- Testing
 - DH
 - SL
 - Roll (head roll; body roll)
 - Null point
 - Bow & Lean
- Maneuvers
 - CRT
 - Semont
 - Modified Semont – for anterior canal
 - Deep Head Hanging
 - BBQ roll
 - Gufoni
 - Casani
 - FPP