Horizontal Canal BPPV

Case report by Kenzie Owens

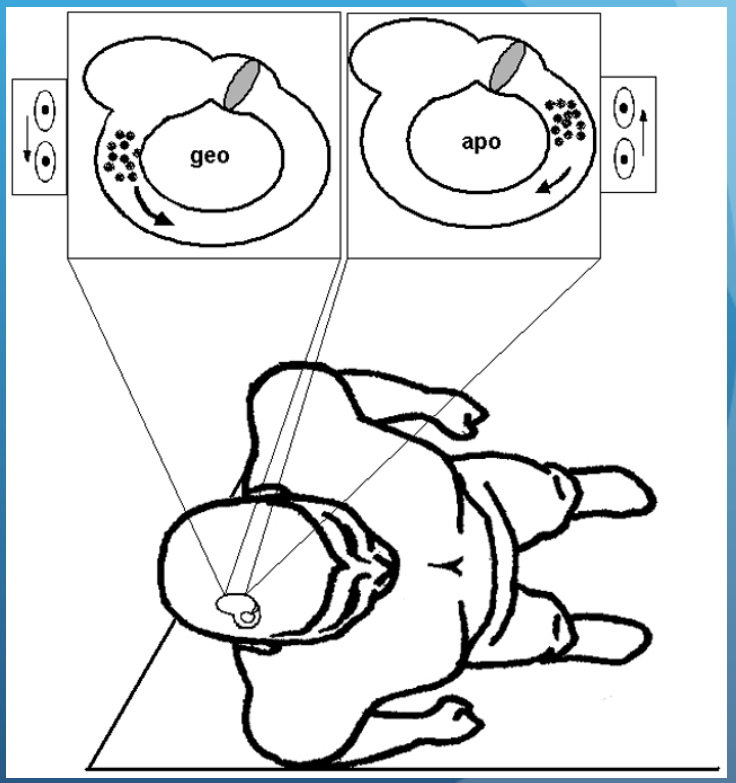
What is it?[1]

- Benign Paroxysmal Positional Vertigo
  - "Brief recurrent episodes of vertigo triggered by changes in head position with respect to gravity"
  - Due to abnormal stimulation of the cupula within the semicircular canals
    - Movement of otolith crystals create current of endolymph
    - Once otoliths fall from macula of utricle into lumen of semicircular canal they are referred to as canaliths
    - When head position is changed with respect to gravity these canaliths move into the semicircular canal
    - This deflects the cupula → vertigo and nystagmus

Horizontal Canal BPPV[1,2]

- 10-17% of BPPV
- Horizontal nystagmus that changes direction when head is turned right or left in supine
  - Geotropic- toward the ground
    - Ex. Right beating nystagmus when laying on right side
    - Due to free-moving otoconial debris in long arm of semicircular duct
    - More responsive to treatment

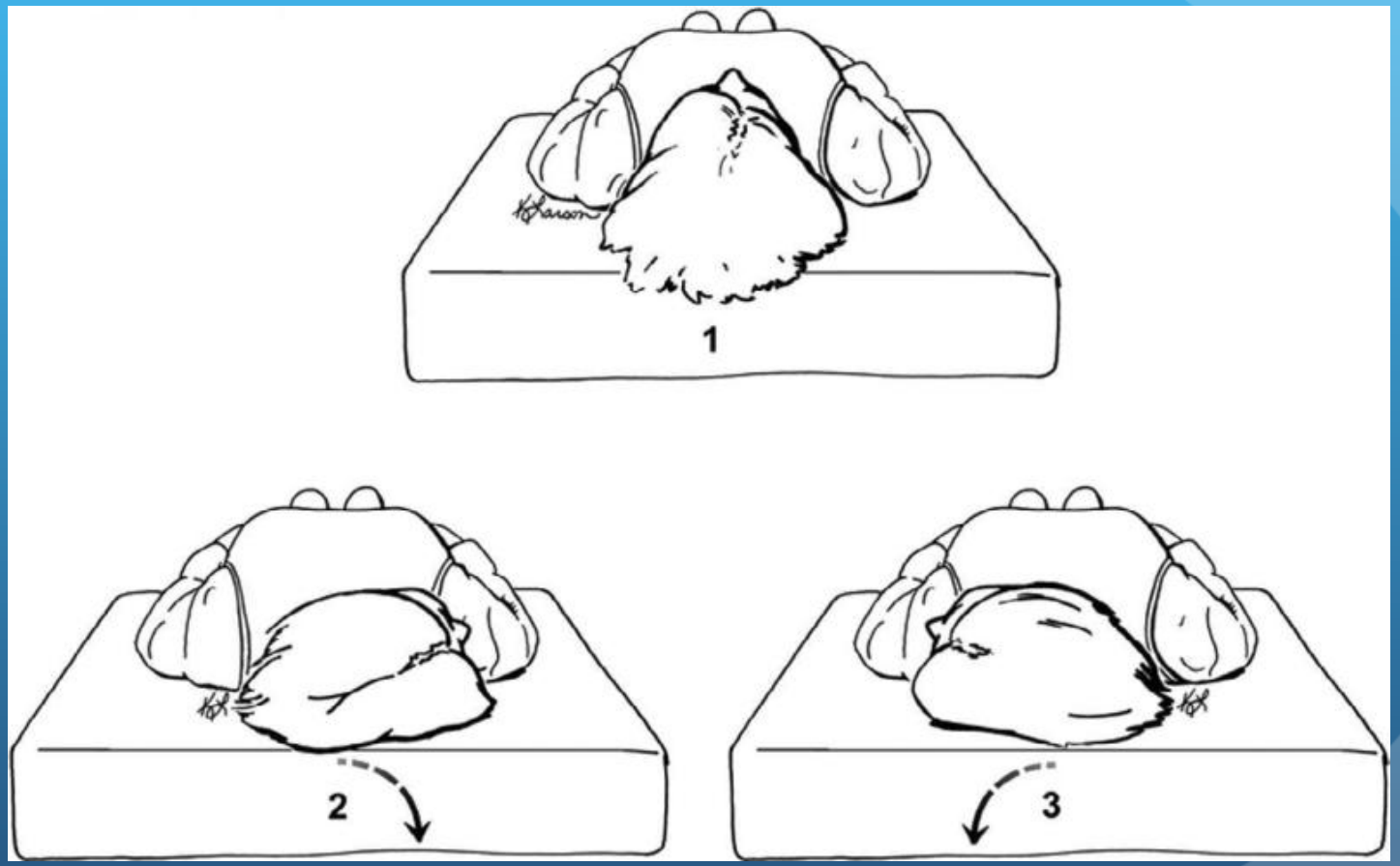
  OR
  - Ageotropic- away from the ground
    - Ex. Left beating nystagmus when laying on right side
    - Due to otoconial material in short arm of canal or attached to cupula = cupulolithiasis
    - More treatment resistant
    - Want to convert to geotropic



Recognize and Test[3]

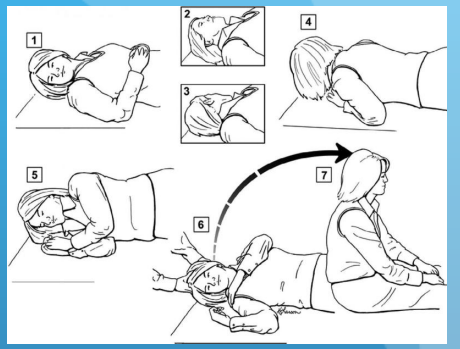
- Common complaints
  - “Dizziness” or “woozy”
    - During bed mobility
      - Rolling to affected side
    - Lying on affected side
- Horizontal Roll Test
  - Supine
    - Head inclined to ~30 degrees (into plane of horizontal canal)
    - Rotate head ~60 degrees to each side and observe for nystagmus

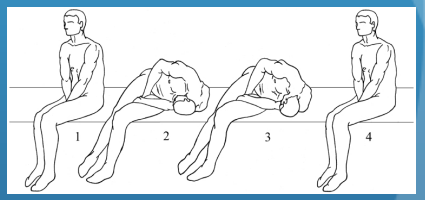
Horizontal Roll Test[4]



Clinical Management[1,4]

- Roll Maneuvers
  - Most widely published treatments
  - Success based on Class IV studies
    - <75% but ranges from ~50-100%
    - HOWEVER used different/unclear endpoints and many lacked control groups → natural resolution?
  - Include
    - Lempert or *Barbecue roll maneuver*





- Gufoni maneuver
  - Several Class IV studies reported successful

- Forced prolonged positioning
  - Lay on affected side with head turned 45 degrees toward ground for 12 hours
  - One Class IV study reported remission 75-90%

- Evidenced-based consensus- more controlled studies needed to show efficacy of treating horizontal canal BPPV as it has a quick natural resolution

Barbecue Roll Maneuver

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

Examination: Chart Review

- HPI: Mrs. R is a 86 y.o. F admitted 7/28/15 after Mvc with XR/CT showing "mildly displaced sternal fracture and small adjacent hematoma," "R 3rd rib fracture," "left knee pain/effusion," and R shoulder pain. PMHx of osteoporosis.
- Reports nausea and ***dizziness while being transported to CT***. Gets nauseated with morphine and vomited with PA in room.

	7/28	7/29	Norms
HGB	12.2	9.5*	12-16
HCT	37.3	28.7*	37-47
PLT	156	133*	150-400

Examination

- Background:
  - One level home with spouse
    - 2 stairs in front and 6 in back
      - Uses right rail (can't reach both, R hand dominant)
    - Shower seat in a walk in shower
  - Independent prior to accident
  - Family to help at d/c

Examination

- Systems Review
  - Pain assessment: ***9/10 acute rib cage***
  - Lower extremity assessment: Generalized weakness
    - ***Bruising and edema L knee, able to move vs gravity***
  - Communication: No difficulties
  - Cognition
    - Arousal/Alertness: Awake/alert
    - Behavior During Therapy: WFL for tasks assessed/performed
    - Overall Cognitive Status: Within Functional Limits for tasks assessed

Examination

- Tests
  - ***Gaze stability***
    - ***Smooth pursuits loss of target focus peripherally to the right and made pt symptomatic (dizziness and nausea)***
  - Roll test left
    - No rotational nystagmus
    - Asymptomatic
  - ***Roll test right***
    - ***Upwardly rotating nystagmus***
    - ***Symptoms of nausea, vomiting, pt subjectively reported room spinning***
- Bed mobility
  - Mod assist to roll both R and L for vestibular testing and *to change bed sheets*

Tip for the Future:

Check the bag!

Evaluation

- Suspect based on limited eval ***R posterior canal BPPV*** but ***cannot definitely rule out horizontal canal due to pt symptoms*** during session.
- In next session plan to perform ***Dix Halpike to the right due to circular nystagmus when rolling to the right side***. Did not perform this session as pt symptomatic with nausea and vomiting.
- Plan to ***test*** pt ***mobility*** during next session ***before*** testing R posterior canal as pt becomes very symptomatic (nausea, vomiting).

Evaluation

- Pt needs continued PT services
- PT Problems List
  - Decreased strength
  - Decreased ROM
  - Decreased activity tolerance
  - Decreased balance
  - Decreased mobility
  - Decreased coordination
  - Decreased knowledge of use of DME
  - Decreased knowledge of precautions
  - Pain

Diagnosis

- Difficulty walking
- Generalized weakness
- Acute pain (Acute nausea)

Goals

- Pt will roll supine to right side with supervision
- Pt will go supine/side to sit with supervision
- Pt will go sit to supine/side with supervision
- Patient will transfer sit to/from stand with supervision
- Pt will ambulate > 125 feet, with supervision, with least restrictive assistive device
- Pt will go up / down stairs with supervision, with least restrictive assistive device, 6-9 stairs
- Pt will verbalize and adhere to sternal precautions while performing mobility
- Pt/caregiver will perform home exercise program independently, for improved balance

Prognosis

- Fair-Good
  - Older
  - Other injuries from Mvc

  HOWEVER
  - Pt has supervision of spouse and daughters upon d/c
  - Active before incident
  - Symptoms last for < 1 minute and only began after the accident

Intervention- *PT/Vestibular Eval*

- DME instruction
- Gait training
- Stair training
- Functional mobility training
- Therapeutic activities
- Therapeutic exercise
- Balance training
- Modalities

Chart Review Before Tx Session 2

- CSW
  - “patient states that if she could get the nausea under control she will be more mobile”
- PA
  - Anemia
    - “suspect oozing from sternal fx with platelets being down as well”
    - Check tomorrow
  - Left knee giving her the most trouble → ortho eval
- Ortho
  - L knee can be ranged to full extension to 120 degrees of flexion w/o significant pain
  - Symptomatic treatment
    - WBAT, ROM as tolerated
    - Ice and elevate

Intervention- *Tx Session 2*

- Pain
  - No pain at rest
  - Some sternal pain with mobility
    - Hurts to cough → taught to hug pillow
- Bed Mobility
  - Rolling: Min assist- *without support of arms*, needed cues to push with her legs while rolling

Taking into account this pt's injuries, why would we have the pt roll without the support of her arms?

Sternal Precautions

- For pt's comfort
  - No pushing or pulling
  - No lifting anything >5 pounds
  - No lifting one arm overhead
  - No reaching behind the back

Intervention- *Tx Session 2*

- Transfers
  - Sit to stand- 1 person hand held assist, min guard to steady pt for balance during transitions
- Ambulation/Gait
  - 90’ min guard with 1 person hand held assist- for safety to ensure balance
  - Gait pattern/deviations- step-through pattern; staggering left; staggering right
  - Gait velocity: Decreased, Below normal for age/gender
  - General Gait Details: Pt with mildly staggering gait pattern, min guard assist for safety to ensure she keeps her balance. Pt moving slowly and cautiously down the hallway.

Intervention- *Tx Session 2*

- Bilateral Dix Hallpike (-)
- L and R horizontal canals
  - Geotropic nystagmus and nausea/vomiting to the R
  - Less severe symptoms (no vomiting) and ageotropic nystagmus to the L
- Indicates R horizontal canal BPPV
  - Treated with Barbecue roll
  - Re-tested R ear- after maneuver pt did not have nystagmus or nausea rolling to the R
  - Plan to re-test next session to ensure pt has cleared

Chart Review Before Tx Session 3

- PA
  - Pt very tired after morning routine this am
  - Anemia- continued decline

	7/30	7/31	Norms
HGB	8.7*	7.7*	12-16
HCT	26.3*	23.1*	37-47
PLT	97*	96*	150-400

  - MD
    - Transfusion → Continue PT

Intervention- *Tx Session 3*

- No pain!
- Bed Mobility
  - Supine to sit- min guard for pt safety, pt with strong abdominal muscles able to go from supine to sit and scoot EOB without assistance

Intervention- *Tx Session 3*

- Transfers
  - Sit to stand- supervision for pt safety. Pt cued to push from EOB and able to stand without rollator however used rollator with amb.
- Ambulation/Gait
  - 140’ min guard/supervision using rollator- one break as lightheaded and SpO2 89 with amb after resting 97 on room air
  - Gait pattern/deviations: Step-through pattern
  - Gait velocity- Decreased, Below normal speed for age/gender
  - General gait details: Supervision min guard for pt safety. Pt moving slowly but with decreased staggering today and able to continue amb while turning head without loss of balance.

Intervention- *Tx Session 3*

- Horizontal roll test
  - Left (-)
  - Right (-)

- LE Exercises
  - Ankle Circles/Pumps: AROM; Both; 20 reps; Seated
  - Quad Sets: AROM; Strengthening; Right 10 reps; Seated
  - Long Arc Quad: AROM; Strengthening; Both 10 reps; Seated
  - Hip Abduction/Adduction: AROM; Strengthening; 10 reps; Seated

Would you still recommend OP PT for vestibular rehab?

PT no longer recommending OP PT for vestibular rehab

- (-) for both right and left horizontal roll test
- Pt has supervision of spouse and daughters upon d/c
- PT continue to follow acutely

Chart Review Before Tx Session 4

- Anemia now stable with HCT 28.6
- Home today

	7/31	8/1	Norms
HGB	9.8*	9.7*	12-16
HCT	28.9*	28.6*	37-47
PLT	112*	102*	150-400

Intervention- *Tx Session 4*

- Pain
  - Sore
- Bed Mobility
  - Supine to sit: Modified independent (device/increased time)- head of bed elevated, good technique

Intervention- *Tx Session 4*

- Transfers
  - Sit to stand- supervision, pt locked rollator, v/c's to push up from bed
- Ambulation/Gait
  - 160' min guard with supervision- for safety to ensure balance
  - Gait pattern/deviations- step-through pattern
  - Gait velocity: Decreased
  - General Gait Details: pt report mild SOB, no episodes of LOB

What else would you like to see this patient do before d/c?

Intervention- *Tx Session 4*

- Stairs
  - 2 stairs with min assist
  - One rail right; step to pattern (with PT on L to mimic bilateral handrails)
  - Educated on “up with the good, down with the bad”

Outcome

- Follow up Recommendations
  - No PT follow up; Supervision- Intermittent
    - Pt functioning at supervision level with exception of stairs
    - Good management of rollator
    - Denies dizziness
    - Progressing towards goals

Functional Outcome Assessments

- Could have used
  - RPE
  - 10 Meter Walk Test
  - DGI

References

1. Fife TD, Iverson DJ, Lempert T, et al. Practice parameter: therapies for benign paroxysmal positional vertigo (an evidence-based review): report of the Quality Standards Subcommittee of the American Academy of Neurology. Neurology. 2008;70:2067–2074.

2. Asprella Libonati G. Diagnostic and treatment strategy of Lateral Semicircular Canal Canalolithiasis. *Acta Otorhinolaryngologica Italica*. 2005;25(5):277-283.

3. Walker Jeff. Lecture presented: Vestibular Rehabilitation Therapy: Evaluation and Treatment of Dizziness and Balance at Lexington Medical Center; Columbia, SC.

4. Nguyen-Huynh AT. Evidence-Based Practice: Management of Vertigo. *Otolaryngologic clinics of North America*. 2012;45(5): 925-940. doi:10.1016/j.otc.2012.06.001.

Questions/Comments