

# **A practical approach to addressing more complex positional vertigo in the outpatient population**

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Dizziness is one of the most common complaints in people seeking medical care<sup>1</sup>. Studies have shown that 20-30% of the population may have experienced vertigo or dizziness at some point in their lifetime<sup>2</sup>. There are many causes of dizziness such as disturbances of the ear, nose and throat (ENT); central nervous system (CNS); cardiovascular system (orthostatic hypotension); and musculoskeletal system (cervicogenic). Dizziness complaints can be classified into four basic categories: Vertigo, disequilibrium, presyncope, and nonspecific lightheadedness. Vertigo is the feeling of spinning or the sensation of movement even when one is sitting still. The main cause of vertigo is benign paroxysmal positional vertigo (BPPV)<sup>1</sup>. Other causes of vertigo include central nervous system lesion, Meniere disease, vestibular neuritis, and labyrinthitis<sup>3</sup>.

BPPV occurs when otoconia escape from the utricle and begin floating around in the semicircular canals, causing the illusion of movement<sup>4</sup>. Canalithiasis is a term used to describe free floating otoconia in the semicircular canal, and symptoms are usually of immediate onset and short duration. Cupulolithiasis, which is not as common, is a term used to describe otoconia that have become adhered to the wall of the cupula, and symptoms are usually of delayed onset and longer duration<sup>5</sup>. For both types of BPPV, canalith repositioning maneuvers have been deemed safe and effective<sup>6-8</sup>. The Epley maneuver has been proven to be 85-95% effective in treating patients with BPPV<sup>4</sup>.

The following is a practical guide to handling a dizzy patient.

In the outpatient setting, the initial step is a triage to determine if the patient complaint requires emergency care, referral to the doctor for follow up, or can be treated safely in the outpatient physical therapy clinic.

When to refer to emergency medicine - dysphagia, dysarthria, diplopia, skew deviation, ataxia, muscle weakness, and paresthesias - any of these symptoms alone or in combination may indicate an acute central nervous system injury such as a stroke in progress<sup>9</sup>.

When to refer to a doctor for follow up - Unilateral hearing loss or episodes of vertigo lasting 20 minutes to 24 hours, which may be a sign of infection or inflammation of the inner ear<sup>9</sup>.

Based on subjective history as well as simply laying eyes on the patient, it can be determined fairly quickly if emergency medicine is needed. If there are any red flags of stroke (listed above), or visible signs of a critical medical event such as pallor, sweating, shortness of breath, nausea, or presyncope (patient stating they feel like they could pass out or collapse), have the patient lie down, take their vital signs, offer water, snack (symptoms could be caused by low blood sugar or dehydration which is very common - especially in older adults), cold cloth, and call emergency medical services.

However, If the patient says something like, “When I rolled over and got out of bed this morning I got the sensation of the room spinning. I haven’t been feeling right since.” Do a quick screen and then initiate treatment.

Typical presentation of BPPV:

Age: 50 or older

Onset: Woke up with dizziness

Associated symptoms: Possible nausea, vomiting

Description: Spinning

Duration: Seconds, episodic

Triggers: Positional head changes, head movement

Balance: Improving as the patient learns to compensate.

Refer to **Appendix A** for a suggested framework to use as a screen to determine if the cause of vertigo is central or peripheral and if canalith repositioning is indicated<sup>10</sup>.

BPPV Testing: Hold test positions for 30 seconds. Observe for nystagmus and/or dizziness symptoms. Patients with chronic vertigo often do not present with nystagmus, and diagnosis must be based on symptoms alone. Treat the affected side with a canalith repositioning technique (CRT) holding each position until symptoms resolve plus an additional 1 minute. The following treatment maneuvers all begin with the affected ear toward the floor.

- Dix-Hallpike Test (posterior/anterior canals) - Most common is posterior canal - 90% of cases<sup>2,11</sup>, with a sensitivity of 82% and a specificity of 71%<sup>12</sup>. Patient starts from long sitting and lies on their back quickly with head rotated 45 degrees and in 30 degrees of extension.
  - Treat symptomatic side with Epley maneuver.
- Roll Test (horizontal / lateral canals) - 8% of cases<sup>2</sup>. Patient starts in supine with head in 30 degrees flexion. Head is rotated 90 degrees to one side.
  - Treat symptomatic side with BBQ Roll

So, what to do when your patient with BPPV does not respond to the Epley maneuver or BBQ roll, or if the patient has mobility issues that restrict their ability to lie supine, roll over, or lie prone?

This is where it can get confusing. There are several techniques with similar sounding names (Libertory, Gufoni, Appiani, Casani) that describe maneuvers with only slight variants in position. To confuse matters further, the names of the techniques have been used interchangeably and also described in different ways. There is the Gufoni technique with head turned down for geotropic canalithiasis which is also referred to as Libertory by some and Appiani by others<sup>8,13-18</sup>. There is the Gufoni technique with head turned up for ageotropic cupulolithiasis which is a modification described by Apiani<sup>19-23</sup>. Furthermore, the Gufoni maneuver has been used to treat both posterior and horizontal canal BPPV<sup>8,16,17,24,25</sup>. And there is now a newer technique described by Zuma Mae which incorporates variants of similar head positions<sup>26</sup>.

When the research is reporting conflicting or confusing evidence, how do we make the right clinical decisions? This is where clinical experience comes into play.

The following is a basic framework to follow when treating more complex cases of BPPV. The techniques are described by current experts in the field who teach certification courses and who are treating BPPV on a regular basis<sup>24,25</sup>. The following list of techniques is intentionally short and simplified, and designed to successfully treat the majority of BPPV cases :

1. Treat posterior canals first.
  - Start with **Epley**.
  - If not effective or if patient cannot lie supine, move to **Libertory/Semont** maneuver. For anterior/ posterior cupulolithiasis, or for stubborn cases of canalithiasis. Found to be as effective as the Epley maneuver<sup>13</sup>.
2. Then treat horizontal canals if you suspect involvement (positive/symptomatic roll test, horizontal nystagmus).
  - Start with **Appiani**. May be more effective than BBQ roll<sup>18</sup>. May be more effective than Gufoni based on recent RCT by Lee et al, 2021<sup>16</sup>.
  - If not effective, try **Casani/Gufoni**. For stubborn cases or possible cupulolithiasis.

\*See **Appendix B** for step by step instructions for performing each maneuver listed above.

\*There is no specific recommendation for the speed of each movement transition or for exactly how long to hold each position. The general thinking is that for more severe or persistent cases of BPPV, there may be otoconia stuck to the wall of the canal (cupulolithiasis). For this reason the maneuvers should be performed with high speed in an attempt to knock otoconia free from the canal wall, and each position should be held for as long as it takes for symptoms to resolve + 1 extra minute - up to 3 minutes total.

\*It may take several treatments to be fully successful if the problem is chronic<sup>27</sup>. Treat to tolerance - don't induce excessive nausea by performing multiple CRTs in one session.

\*Take care not to accidentally induce BPPV into a horizontal canal by performing the Epley incorrectly - 30 degrees of cervical extension must be maintained throughout the head turn in order to avoid dumping otoconia into the horizontal canal<sup>14</sup>.

Recommended Home exercises for BPPV:

BPPV has a 50% recurrence rate<sup>28</sup>, so teaching a self treatment strategy is of value.

- Home Epley for posterior canalithiasis - found to be more effective than Brandt-Daroff or home Liberatory/Semont maneuvers<sup>29</sup>. Found to be 37% effective in trial by Foster et al, 2012<sup>30</sup>.
- Brandt-Daroff - Found to be as effective as Epley in long term outcome<sup>31</sup>.
- Half Somersault - found to be preferred by patients over Epley and 27% effective in trial by Foster et al, 2012<sup>30</sup>. Not as effective as the Home Epley<sup>32</sup>.
- Forced prolonged positioning- Sleeping entire night on uninvolved ear for lateral canal treatment was found to be as effective as Gufoni maneuver<sup>15</sup>.

Treating vertigo as you see it will be more effective since acute vertigo is much easier to treat than chronic vertigo, which can take several treatments. Vertigo can feel debilitating, treatment can be simple and life changing<sup>33</sup>, so don't hesitate. Literature shows that 90% or more of patients with BPPV have complete resolution of symptoms in one or two treatments. In short, the treatment is fairly easy and can really help the person. You will not make them worse if your treatment does not work. Don't be afraid to try, however, still always be vigilant for more nefarious causes of vertigo and call EMS if needed.

## APPENDIX A - Screening for central causes of vertigo<sup>10,34</sup>

### Oculomotor Screen<sup>34</sup>:

- Observe for spontaneous nystagmus at rest (eyes beating at rest).
  - If positive, this is an indication of either neuritis (horizontal beats/ requires medical treatment with steroids), or central dysfunction (vertical beats).
- Assess Smooth Pursuits - head is stationary. Ask patient to follow your finger with eyes moving no more than 30 degrees laterally. Finger is 12-18 inches from eyes. Observe ability to smoothly track without saccadic movement (any hitching during tracking). Positive indicates central nervous system involvement.
- Assess Saccades - head is stationary, hold your fingers 6 inches lateral to your nose, 12-18 inches away from the patient. Ask patient to quickly shift focus from one finger to the other. Observe for under or over shooting of the target (one failed movement is normal to determine parameters).
  - Positive indicates central nervous system involvement.
- Clear Cervical Spine - assess for pain and ROM restrictions to determine if patient would tolerate the 45 degrees of neck extension required for canalith repositioning techniques or might require alternative techniques to accommodate for motion loss in the neck.
- Assess Vertebral Artery - patient is seated or supine. Patient actively or passively rotates the head fully to one side, then extends the neck. Hold for 30 seconds. Do the same on the other side. (This study has an extremely low sensitivity of 0-57%, which is no better than chance, but is still widely recommended among educators<sup>35</sup>).
  - Positive indicates vertebral artery involvement.

### Neurological Screen<sup>34</sup>:

- Assess sensation
- Assess static balance with Rhomberg
- Assess dynamic balance and observe for ataxic movement with functional mobility
- Assess cerebellar function and observe for coordination with the following activities: Finger to nose, alternating supination/pronation, heel to shin, seated alternating toe taps.

## **APPENDIX B - Instructions for canalith repositioning techniques**

- Epley -
  - Have patient long sit on treatment table.
  - Turn the patient's head 45 degrees towards the side you wish to treat (affected side).
  - Lower the patient back into supine with head off the table into 30 degrees of extension.
  - Hold until symptoms resolve + 1 extra minute.
  - Rotate the patient's head to the opposite side keeping the patient's head in extension.
  - Hold until symptoms resolve + 1 extra minute.
  - Have the patient roll onto their side while rotating the head 90 degrees toward the floor, tucking the chin into the shoulder.
  - Hold until symptoms resolve + 1 extra minute.
  - Have the patient sit up on the side of the table while keeping the chin tucked into the shoulder.
  - Hold until symptoms resolve + 1 extra minute.
  - Return the patient's head to midline and look straight forward.
- Liberatory / Semont -
  - Patient seated.
  - Rotate the patient's head 45 degrees toward the unaffected ear.
  - Quickly lay the patient onto their affected side for 1-2 minutes.
  - Quickly return the patient to sitting and continue over onto the unaffected side for 1-2 minutes.
  - Return to starting position.
  - Ensure the head remains rotated 45 degrees toward the unaffected ear through entire sequence.
- Appiani -
  - Patient seated.
  - Move into sidelying on the unaffected side with head in neutral using pillow.
  - Hold 2 minutes.
  - Quickly rotate head 45 degrees down toward the floor.
  - Hold 2 minutes.
  - Patient returns to sitting while maintaining cervical rotation, then head is then returned to midline.

- Casani / Gufoni -
  - Patient seated
  - Move into side-lying with the asymptomatic/ affected ear down\* and rapidly rotate the head 45 degrees toward the floor.
  - Hold for 2-3 minutes.
  - Return to starting position.

\*In cases of horizontal cupulolithiasis, which are very rare, a horizontal nystagmus with a fast beat toward the ceiling (ageotropic) will be observed. The asymptomatic side is actually the involved side in this instance. Therefore, the Casani maneuver begins with the asymptomatic side down, which is the involved ear.

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