Session 10: Practical Approaches to the "Dizzy" Patient

Learning Objectives

1. Consider the potential etiologies for symptoms of lightheadedness or vertigo.
2. Appropriately determine next steps, such as testing, referral or treatment based on clinical assessment.
Session 10: Practical Approaches to the "Dizzy" Patient

Faculty

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SESSION 10
12:30–1:30pm

Practical Approaches to the
"Dizzy" Patient

SPEAKER
Marcello Cherchi, MD, PhD

Presenter Disclosure Information
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• I have nothing to disclose.
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Objectives
• Appreciate the breadth of the symptoms and
etiologies of dizziness, and understand where
benign paroxysmal positional vertigo (BPPV)
fits into this landscape.
• Understand the incidence, prevalence and
demographics of BPPV.
• Learn to recognize BPPV.
• Learn to treat the most common variant of
BPPV.

What is dizziness?
• Much ink has been spilled in distinguishing terms
such as “dizziness,” “vertigo,” “lightheadedness,”
“disequilibrium” and others. We will not
recapitulate those debates here.
• From the medical perspective, the most relevant
point is that when patients use these terms, they
are symptoms, not diagnoses.
• To understand this better, let’s take a detour into
the term, “vertigo.”
What is vertigo?

• Medical dictionaries will typically define vertigo as an “illusion of movement,” meaning that a person has a misperception of motion or position (e.g., perceives motion even when remaining still, or experiences motion as different than the actual movement that is occurring, or perceives tilt when not actually tilted).
• That definition is helpful in its use of the term “misperception,” because it alludes to the biological basis for this symptom.

What is vertigo? A concrete example

When you are sitting in a stationary train, looking out the window at an adjacent stationary train, and the other train begins to move, for a moment you are uncertain which train is moving. Why?

What is vertigo?

• Despite everything just said, other sensations are often conflated (at least terminologically) with vertigo — both by patients and by medical professionals. Some common examples of this include:
  – Lightheadedness or a pre-syncopal sensation (as in orthostatic hypotension).
  – Unsteadiness due to mechanical problems (as in orthopedic disease).
• These are not misperceptions of motion or position, but are nevertheless often “lumped in” with vertigo, thereby bringing us back to the more vague term, “dizziness.”

What is vertigo? A concrete example

• In this circumstance, your vision is telling you that motion is occurring.
• In contrast, your inner ear (the vestibular system) has not recognized any motion. Moreover, your somatic sensation (here, the sensation of your back and bottom against the train seat) has not recognized any motion.
• This discrepancy between the three sensory modalities is disconcerting, and constitutes vertigo.

What is dizziness?

Given what we have just outlined, it is easy to see how the symptom of dizziness can encompass a very broad range of descriptors, such as spinning, wobbling, tilting, falling, floating, unsteadiness, lightheadedness, near loss of consciousness, and many others.
**What can cause dizziness?**

“Dizziness is one of the most challenging symptoms in medicine. It is difficult to define, impossible to measure, a challenge to diagnose, and troublesome to treat.” Why is this?


**What can cause dizziness?**

“Dizziness is the quintessential symptom presentation in all of clinical medicine. It can stem from a disturbance in nearly any system of the body. Patient descriptions of the symptom are often vague and inconsistent.”


**Approach to dizziness**

- Practically, no.
- As with any other symptom, you will formulate a differential diagnosis through a history and physical examination.
- Countless articles have been written with titles such as, “Approach to the dizzy patient.”
- As a neurologist I tend to approach this from a physiologically-based “circuit board” perspective.

**“Circuitry” of balance**

Reflexes (vestibulo-ocular, vestibulo-colic, vestibulo-spinal, postural, etc.) can be affected by medications.
What can cause vertigo?

- It is also helpful to bear in mind some statistics.

Epidemiology of dizziness

- How big of a problem is dizziness? It’s enormous!
- Some studies estimate that 2.5% of patients presenting to an emergency room have a complaint of isolated acute/subacute “vertigo,” “dizziness,” or “unsteadiness,” sometimes with nausea and vomiting. This amounts to over 4 million ER visits per year for this symptom.


Epidemiology of dizziness

- The epidemiologic studies of diagnoses (or diagnostic categories) provide widely divergent statistics. For example, one meta-analysis concluded that 41% of all dizziness is “peripheral” (meaning ear-related), but the range in the individual studies was 18% - 93%.
- Part of this range is due to the fact that epidemiology varies significantly between different practice settings (ER, general medicine clinic, otolaryngology clinic, neurology clinic).


Epidemiology of dizziness

- Even when one limits analysis to a particular practice setting, the statistics still encompass a broad range.
- Nevertheless, some generalizations are possible. The most relevant to our topic is that a substantial proportion of patients complaining of “dizziness” are ultimately diagnosed with benign paroxysmal positional vertigo (BPPV).


Why focus on BPPV?

- A typical statistic for a general medicine clinic is that 42% of patients have BPPV.
- Because of this, we will focus the remainder of this talk on the diagnosis and treatment of the most common form of BPPV.


Dizziness and BPPV

- BPPV accounts for 17 – 42% of dizziness overall.
- BPPV has an overall prevalence of 10.7 – 64 per 100,000, and a lifetime prevalence of 2.4% (3.2% in females, 1.4% in males).
- The mean age of onset is 49.4 ± 13.8 years, although overall BPPV is the most common vestibular disorder across the lifespan.
- The annual incidence of a first episode of BPPV is 0.6%.
- The incidence of BPPV increases with age.

More demographics of BPPV

- BPPV is more common in women, with an age-adjusted odds ratio of 2.4 (95% CI 1.3 – 4.5).
- BPPV is independently associated with comorbidities of migraine, low bone density, and vascular disease (hypertension, dyslipidemia, stroke).
- BPPV can occur secondary to head trauma, unilateral vestibular loss (such as vestibular neuritis, labyrinthitis) or intubation.

Pathophysiology of BPPV

- Normally, otoconia (crystals of calcium carbonate embedded in a protein matrix) reside in parts of the labyrinth called the utricle and the saccule.
- If these otoconia, or fragments of the otoconia, break loose, they can enter the semicircular canals and stimulate the crista ampullaris of the semicircular canals, thereby triggering erroneous vestibular signals and causing symptoms of dizziness.

Pathophysiology of BPPV

Although this mechanism was suspected for some time, eventually the calcium carbonate crystals were actually observed intraoperatively in patients with a history of BPPV.

Typical clinical history of posterior canal BPPV

- Symptoms may begin in the middle of the night (when the patient rolls over in bed) or first thing in the morning (when trying to get out of bed).
- Other common scenarios include having been in a reclining chair for dental work, or having had the neck extended backwards over the edge of a wash basin at the hair dresser’s.
- Usually triggered when the head assumes a position tilted backwards and to one side.

Typical clinical history of posterior canal BPPV

- Dizziness is usually described as a spinning sensation.
- From the time of the change of position, there is usually a latency of several seconds before the symptoms appear.
- The severe symptoms typically last 10 – 30 seconds.
- Milder residual symptoms can persist for several minutes.
- Nausea is common, emesis is unusual.
- The patient can be susceptible to this recurring over days to months.
Physical examination for posterior canal BPPV

- General physical and neurological examinations are normal.
- The Dix-Hallpike maneuver should be “positive” (more on this later). Be sure to check each side.
- Although vomiting is unusual, have a wastebasket nearby!

Nystagmus during Dix-Hallpike

- If a patient has posterior canal BPPV on a given side, then when they lie backwards with that side down, the nystagmus should be:
  - Upbeating (the fast phase of the vertical component of nystagmus is directed towards the top of the patient’s head)
  - Ipsiversive (the fast phase of the horizontal component of the nystagmus is directed towards the undermost ear)
  - Ipsitorsional (the top pole of the eye beats towards the undermost ear)
- We’ll be discussing eye movements in some detail, so a few words on the oculomotor examination are in order.

Oculomotor examination

- Eye movements are controlled by the brain (directly) and by the inner ear (indirectly).
- For this reason, observation of eye movements plays a very important role in distinguishing between central (neurologic) and peripheral (otologic) etiologies of vertigo, and is crucial in securing a diagnosis of BPPV.

Caveat on the oculomotor exam

- When a person has the ability to fixate (focus her vision on a specific target), she is often able to suppress a variety of eye movement abnormalities (particularly horizontal and vertical ones).
- This fixation suppression poses a problem for the clinician because when you are examining patients in an illuminated environment, they will instinctively fixate, and this will obfuscate their examination.

Useful tools to overcome fixation suppression

In our clinic we use video Frenzel goggles that employ infrared illumination to permit observation of eye movements while the patient is “in the dark,” thereby avoiding fixation suppression completely.

At the hospital bedside we sometimes use optical Fresnel lenses. These blur the patient’s vision sufficiently that they cannot fixate well.

Nystagmus in posterior canal BPPV, right side, then left side

Notice how the nystagmus “unwinds” (reverses direction) when the patient resumes a sitting position.

Courtesy of Dr. Lorne Parnes, MD
**Treatment for posterior canal BPPV**

If the Dix-Hallpike maneuver is positive, then you can “convert” it into the Epley maneuver in order to treat it.


**Epley maneuver, efficacy**

- By doing the Epley maneuver 1-3 times per night, studies report resolution of symptoms in 41-95% of patients at 1 week, 50-61% at 2 weeks, and 64-95% at 4 weeks
- If BPPV is secondary to some other disease, such as head trauma or labyrinthitis, it tends to be more resistant to treatment.
- For the first several nights, the patient may require a vestibular suppressant (meclizine or a low-dose benzodiazepine) at 30 minutes prior to the exercise.
- Do not prescribe vestibular suppressants for chronic use in this case. It is unnecessary, and obfuscates response to treatment.


**Treatment complications**

- Occasionally (<5%) a patient will undergo “canal conversion,” in which the otocnia (ear crystals) exit one canal (the posterior canal) and enter another canal (usually the lateral canal).
- This is diagnosed by observing a change in the pattern of nystagmus, and is treated by a different maneuver.

**BPPV, recurrence**

- Sometimes a patient will feel better, yet the dizziness will return the next day. Why?
- Dr. Epley himself called his maneuver the “canalith repositioning maneuver,” because its end result is that the otocnia have indeed been repositioned, but are still loose!
- Over time the otocnia will get resorbed by so-called “dark cells” in the saccule and utricle.

**BPPV, recurrence**

- After a first attack
  - 23% of patients have a recurrence within 1 year
  - 50% of patients have a recurrence long term (usually defined as within 5 years)
- When it recurs, it usually recurs on the same side and in the same canal, so the patient can simply try the same maneuver at home next time!


**Types of BPPV**

BPPV can affect any canal:

- Posterior (inferior) canal: 81-89%
- Lateral (horizontal) canal: 8-17%
- Anterior (superior) canal: 1-3%
Lateral canal BPPV

- The symptomatology will be very similar to posterior canal BPPV, although the symptoms and nystagmus may be more prolonged (up to several minutes).
- Note that when supine, this patient has almost pure horizontal nystagmus that beats towards the undermost ear, whichever way the head is turned (called “geotropic”).
- Lateral canal BPPV is treated with its own set of maneuvers (log roll maneuver, Gufoni maneuver) that we will not cover here.

Types of BPPV

BPPV can affect any canal:
- Posterior (inferior) canal: 81-89%
- Lateral (horizontal) canal: 8-17%
- Anterior (superior) canal: 1-3%

Anterior canal BPPV

- The symptomatology will be very similar to posterior canal BPPV.
- The nystagmus is ipsiversive and ipsitorsional (like posterior canal BPPV) but is downbeating (rather than upbeating).
- Anterior canal BPPV is treated with its own set of maneuvers (Kim maneuver, Yacovino maneuver) that we will not cover here.

“Positive Dix-Hallpike”

- Notice that for all three variants of BPPV that we have discussed, the nystagmus is elicited by the Dix-Hallpike maneuver.
- Although it is the “same maneuver,” it elicits different responses depending on the canal that is affected by loose otoconia.
- Therefore, when someone documents that a Dix-Hallpike maneuver was “positive,” the logical question to ask is, “POSITIVE FOR WHAT?”

Remember it’s paroxysmal

- Bear in mind that BPPV has the word “paroxysmal” in its title for a reason! Its symptoms are episodic.
- Even when the problem is active (i.e., even when otoconia are loose), the symptoms may not be triggered every time you do the Dix-Hallpike maneuver.
- Therefore, if your clinical suspicion for this diagnosis is high but you do not see the expected nystagmus on your initial examination, be sure to re-examine the patient the next hour or the next day.

You can do this!

General medicine practices can successfully diagnose and treat posterior canal BPPV, which is likely to be one of the most common causes of dizziness in your patients.


Summary: BPPV

- Positionally-triggered, (typically) spinning dizziness in episodes that are brief (seconds to a few minutes).
- No aural symptoms.
- Physical examination reveals a “positive” Dix-Hallpike maneuver (on the involved side), though you may need to examine the patient more than once to “catch” it. Remainder of the neurological exam should be normal.
- Recovery is accelerated by the Epley maneuver (on the affected side).
- Recurrences usually respond to the same maneuver (i.e., on the same side).
- Limited symptomatic management with low doses of meclizine or a benzodiazepine is reasonable.

Case studies

Case #1

- A 76-year-old man with no significant past medical history has experienced slowly progressive “dizziness” over the past year, with no other symptoms. He was referred to a physical therapist who diagnosed him with BPPV.
- Over numerous treatment sessions the physical therapist documented a “positive Dix-Hallpike maneuver” and attempted treatment with the Epley.
- After failure to improve, he was started on meclizine and was eventually referred.
- On examination, his eye movements were subtle and inconsistent (remember, he is on meclizine), but not particularly suggestive of BPPV.
- He was imaged.

Case #2

- 53-year-old man was working at his desk last week when he abruptly felt nauseated. Within a few minutes he had severe spinning, nausea and vomiting that improved somewhat after he was given lorazepam and ondansetron in the ED several hours later. His dizziness has been constant since then, though steadily improving. He has been able to resume walking with caution. He has never had any ear symptoms.

Case #1

- He had a 4th ventricular ependymoma.

- Lessons:
  - Prior examinations documented a “positive Dix-Hallpike,” without ever describing the actual pattern of nystagmus it provoked (remember, positive for what?).
  - Patient failed to respond to (putatively) appropriate treatment.
  - He was on meclizine while examined.
**Case #2**

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**Case #2**

- On tandem Romberg stance he tends to fall towards the right when he closes his eyes.
- On exam he has spontaneous left-beating nystagmus on primary position of gaze.
- The remainder of his examination is normal.
- The diagnosis is *vestibular neuritis* on the right.

**Case #3**

- 58-year-old lady developed right ear fullness yesterday.
- An hour ago she noticed right sided tinnitus and diminished hearing, followed a few minutes later by severe spinning dizziness, nausea and vomiting.
- When she is examined in the upright position, you see...

**Case #3**

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- When she is examined in the upright position, you see...

**Case #4**

- There are unilateral ear symptoms (aural fullness, tinnitus, hearing loss).
- Exam shows spontaneous right beating nystagmus.
- Diagnosis is *right sided Meniere's disease*.

**Case #4**

- 36-year-old graduate student developed fatigue, fever, headache and migratory paresthesias during the summer, and additionally described vague cognitive symptoms (“I couldn’t concentrate”) for several weeks. She had difficulty reading because words would “jump around on the page.”