

# Dizziness and Vertigo

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## KEYWORDS

- Benign paroxysmal peripheral vertigo • Vestibular neuritis • Vestibular migraine
- Meniere's disease • Migrainous vertigo • Acute labyrinthitis

## KEY POINTS

- Benign paroxysmal peripheral vertigo (BPPV) is the most common cause of vertigo. It is diagnosed using the Dix-Hallpike maneuver and treated with the Epley maneuver.
- Vestibular neuritis is a single episode of acute, severe vertigo. The head thrust test and visual fixation can help differentiate it from acute stroke. The mainstay of treatment is vestibular rehabilitation.
- Vestibular migraine manifests as vertigo accompanied by classic migraine symptoms, and responds to migraine medications.
- Over eighty percent of patients with Meniere's disease can be successfully managed with lifestyle changes and diuretics.

## INTRODUCTION

Dizziness is a common and challenging condition seen in the primary care office. More than one-third of Americans see a health care provider for dizziness during their lifetime.<sup>1</sup> Although most dizziness is due to benign causes, life-threatening causes, such as a stroke or intracranial mass, also need to be excluded. Because “dizziness” is a vague term that can include a wide array of medical disorders, it is important to use a stepwise approach to differentiate between causes.

First, clinicians should distinguish between the four common types of dizziness: (1) presyncope, (2) disequilibrium, (3) psychogenic dizziness, and (4) vertigo. Patients should be asked to specifically describe their dizziness in their own words. Vertigo is a false sense of motion of either the environment or self. Often, patients describe a feeling of the room spinning or tilting. Benign paroxysmal peripheral vertigo (BPPV), vestibular neuritis, vestibular migraine, and Meniere's disease are the four most common causes of vertigo in ambulatory settings, and a thorough history and physical examination alone can lead to the diagnosis in most cases ([Table 1](#)).

## BENIGN PAROXYSMAL PERIPHERAL VERTIGO

BPPV is the most common cause of vertigo. Patients typically report brief episodes triggered by head movement. A positive Dix-Hallpike maneuver is diagnostic, and

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	<b>BPPV</b>	<b>Vestibular Neuritis</b>	<b>Vestibular Migraine</b>	<b>Meniere's Disease</b>
Time Course	Recurrent, lasting seconds	Single episode lasting days	Recurrent, lasting minutes to days	Recurrent, lasting hours
History	Brief, triggered by head movement	Subacute onset of severe, constant vertigo with significant nausea and vomiting	Previous history of migraine. Vertigo accompanied by migraine symptoms	Hearing loss, tinnitus and ear fullness
Nystagmus	Up beating torsional	Horizontal or horizontal torsional	Usually none	Horizontal or horizontal torsional
Gait	Normal	Veers toward affected side	Abnormal during vertigo attacks	May have impaired gait and imbalance
Auditory Symptoms	None	Hearing loss (acute labyrinthitis)	None	Present
Diagnostic Findings	Positive Dix Hallpike maneuver	Positive head thrust test, Nystagmus suppressed by visual fixation	Vertigo attacks resolve with acute migraine medications	Repeat audiometry shows fluctuating, low frequency hearing loss

canalith repositioning procedures (CRP), such as the Epley maneuver, are the mainstay of treatment.

### **Epidemiology**

BPPV accounts for more than 40% of vertigo diagnoses seen in primary care, and is the most common cause of vertigo across the lifespan.<sup>2</sup> Patients with BPPV most commonly present between the fifth and seventh decades of life, and it is seen more commonly in women.<sup>3</sup> By 80 years of age, nearly 10% of adults have been diagnosed with BPPV during their lifetime.<sup>4</sup>

### **Risk Factors**

A history of prior head trauma or prior vestibular disorders, such as vestibular neuritis, increases a patient's risk of BPPV. Osteoporosis and vitamin D deficiency have been associated with BPPV.<sup>5</sup> Recently, sleep position has also been correlated with BPPV, with patients who have BPPV being more likely to report lying on their sides with the affected ear down.<sup>6</sup>

### **Pathophysiology**

It is hypothesized that BPPV is caused by loose calcium carbonate debris (otoconia) in the semicircular canals of the inner ear. With head motion, otoconia begin to move freely in the canals. When head motion stops, otoconia continue to move, causing endolymph to move against the hair cells of the semicircular canal. This leads to a false sense of motion that lasts until the otoconia settle, usually only a few seconds. The posterior canal is involved in 85% of cases, followed by the horizontal canal in 10% of cases.<sup>7</sup> Rarely, BPPV can be bilateral.

### Clinical Presentation

In BPPV, patients complain of brief episodes of vertigo triggered by position changes. Episodes usually last only seconds, and are less than 1 minute in duration. Commonly, patients experience attacks when rolling over in bed, or tilting the head to look upward. Patients may report difficulty placing objects on high shelves, or bending forward to tie shoes. Nausea and vomiting may occur with episodes. Vertigo from most causes is exacerbated by certain movements. In BPPV, however, vertigo is actually *preceded* by position changes and patients are normal between attacks.

Physical examination should include a complete ear, nose, and throat, cardiovascular, and neurologic evaluation. This is to exclude other causes of vertigo (Table 2), because there are no specific physical examination findings in BPPV. However, the Dix-Hallpike and supine roll tests are two maneuvers that can confirm BPPV suspected by historical clues.

### Diagnosis

The diagnosis of BPPV is made clinically. It is confirmed most often with the Dix-Hallpike maneuver, and in some cases the supine roll test.

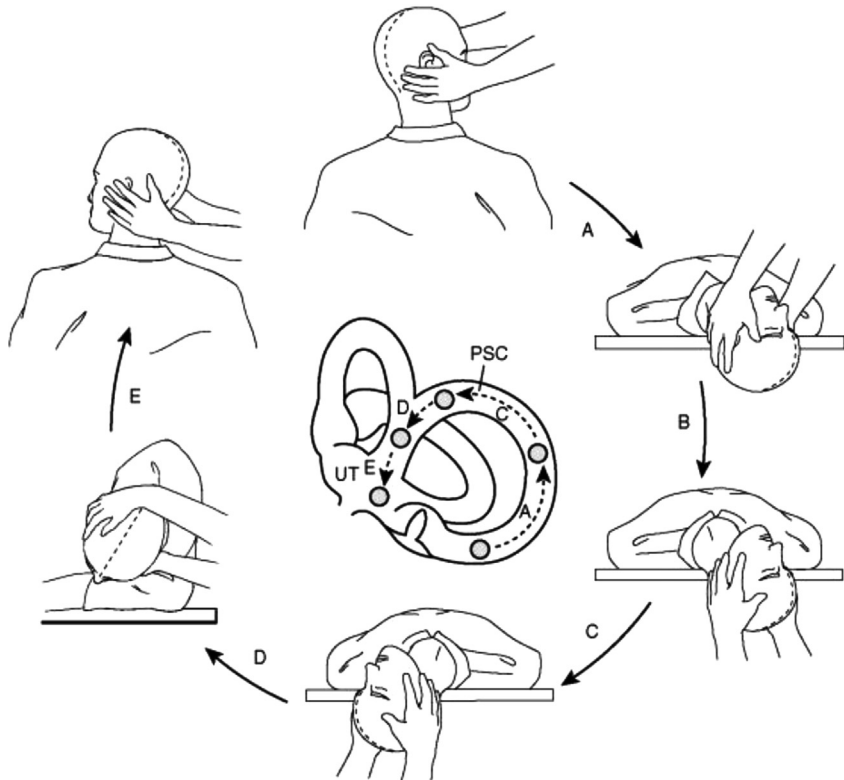
#### Diagnostic maneuvers

The Dix-Hallpike maneuver should be performed in any patient being evaluated for BPPV (Fig. 1). It is used to diagnose posterior canal BPPV. Before performing the Dix-Hallpike, clinicians should warn patients that severe vertigo, and possibly nausea, may occur. Patients sit upright on an examination table with the head rotated 45 degrees to the right. Maintaining this head position, the examiner quickly lays the patient back into the supine position, and extends the neck approximately 20 degrees so that the head “hangs” supported off the edge of the examination table. The examiner then observes the patient for vertigo and nystagmus. In posterior canal BPPV, nystagmus is up-beating and torsional. Characteristically, there is a latency period of 5 to 20 seconds after the position change to the onset of nystagmus and vertigo. The nystagmus and vertigo initially increase in intensity and then resolve within 60 seconds (“crescendo-decrescendo” nystagmus). The side that provokes symptoms indicates the involved ear. Even if positive, the Dix-Hallpike should be repeated on the opposite side to exclude bilateral BPPV. A positive Dix-Hallpike test requires observation of the characteristic nystagmus. If a persistent or down-beating nystagmus is elicited, a central cause should be suspected.

If the Dix-Hallpike maneuver is negative, a supine roll test should be performed to diagnose lateral canal BPPV (Fig. 2). For the supine roll test, the patient begins in the

**Table 2**  
Differential diagnosis of vertigo

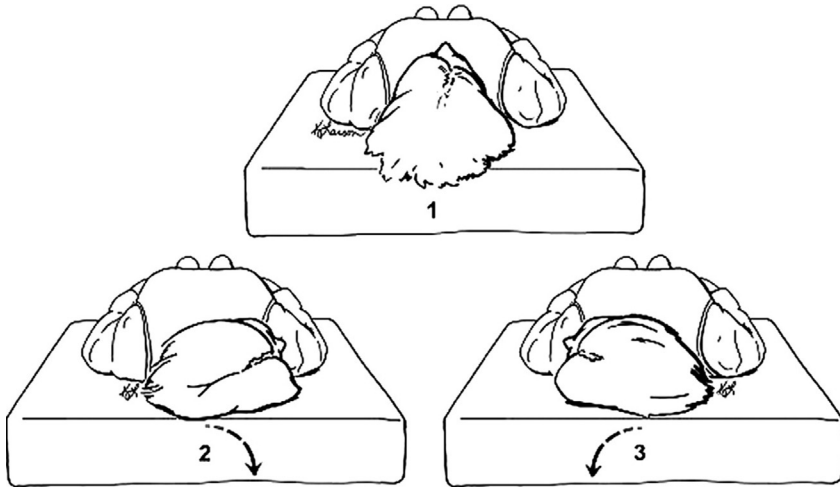
Peripheral Causes	Central Causes
BPPV	Migrainous vertigo
Vestibular neuritis	Intracranial mass
Meniere's disease	Cerebrovascular attack
Perilymphatic fistula	Vertebrobasilar insufficiency
Herpes zoster oticus	Chiari malformation
Acoustic neuroma	Multiple sclerosis
Ototoxicity	Episodic ataxia type 2
Otitis media	
Semicircular canal dehiscence syndrome	
Posttraumatic vertigo (labyrinth concussion)	



**Fig. 1.** Treatment maneuver for benign paroxysmal positional vertigo affecting the right ear. To treat the left ear, the procedure is reversed. The drawing of the labyrinth in the center shows the position of the particle as it moves around the posterior semicircular canal (PSC) and into the utricle (UT). The patient is seated upright, with head facing the examiner, who is standing on the right. (A) The patient is rapidly moved to head hanging right position (Dix Hallpike test). This position is maintained until the nystagmus ceases. (B) The examiner moves to the head of the table, repositioning hands as shown. (C) The head is rotated quickly to the left with right ear upward. This position is maintained for 30 seconds. (D) The patient rolls onto the left side while the examiner rapidly rotates the head leftward until the nose is directed toward the floor. This position is then held for 30 seconds. (E) The patient is rapidly lifted into the sitting position, now facing left. The entire sequence should be repeated until no nystagmus can be elicited. After the maneuver, the patient is instructed to avoid head hanging positions to prevent the particles from reentering the posterior canal. (From Rakel RE. *Conn's current therapy* 1995. Philadelphia: WB Saunders; 1995. p. 839; with permission.)

supine position with their head facing upward. The examiner quickly moves the patient's head 90 degrees to one side, and examines for nystagmus and vertigo. The supine roll test should be repeated to the opposite side. In lateral canal BPPV, nystagmus is most often a geotropic type: horizontal and beating toward the lower (affected) ear during the supine roll test. When rolled to the opposite side, the nystagmus recurs and beats toward the lower (unaffected) ear but is less intense. Less often, nystagmus may be of apogeotropic type: horizontal and beating toward the upper ear.

If the Dix-Hallpike and supine roll tests are negative, another diagnosis should be suspected. However, if the clinical history is strongly indicative of BPPV, then the



**Fig. 2.** Supine roll test. (1) Start supine with head in neutral position. (2) Turn the patient's head quickly 90 degrees to the right and observe for nystagmus. Return the head to neutral position (1). (3) After any residual nystagmus or symptoms resolve, turn the patient's head quickly 90 degrees to the left and observe for nystagmus. (From 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;70:2067-74; with permission.)

patient should return in 1 week to repeat the maneuvers. Although the positive predictive value of the Dix-Hallpike maneuver is 83%, its negative predictive value is 52%.<sup>2</sup> Therefore, it is worth repeating to avoid a false-negative result.

### **Radiographic imaging**

Patients with BPPV do not require neuroimaging unless the diagnosis is uncertain and a central cause is suspected (Table 3). Magnetic resonance imaging (MRI) is the best imaging test in most cases because it includes the posterior fossa, and is useful for evaluating central causes, such as a cerebrovascular lesion, intracranial mass, or demyelinating disease.

<b>Table 3</b>	
<b>Red flags for a central cause</b>	
<b>History</b>	
Sudden onset	
New, severe headache	
Cardiovascular risk factors	
<b>Nystagmus</b>	
Direction changing	
Purely vertical or torsional	
Unsuppressed by visual fixation	
<b>Inability to walk</b>	
<b>Negative head thrust test</b>	
Additional neurologic signs (e.g. aphasia, dysarthria, weakness, sensory loss)	

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