

Diagnosing and Treating Dizziness

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KEYWORDS

• Dizziness • Vertigo • Epley • Primary care

KEY POINTS

- Dizziness is a common presenting concern in primary care practice.
- History and physical examination usually suffice in making the diagnosis, without need for formal studies.
- Effective treatment can often be offered in the clinic, without need for medications.

INTRODUCTION

Dizziness that is severe enough to bring an individual into the clinic is remarkably common, affecting approximately 30%¹ of individuals aged 18 to 79 years during their lifetime. Prevalence of dizziness in the elderly and very elderly is even greater.²

Many primary care physicians find the care of the dizzy patient challenging, because of the vagueness and ambiguity of the patient's specific symptoms and the wide variety of possible diagnoses, ranging from benign to serious.³ Even so, studies of many patients presenting with dizziness (**Table 1**)^{4–6} have helped clarify the cause of dizziness. Whether the clinician works in the emergency department, the primary care clinic, or a specialized clinic for dizziness, the most common final diagnosis in dizzy patients is peripheral vestibular disease, usually benign paroxysmal positional vertigo (BPPV), less commonly Ménière disease or vestibular neuronitis.^{5,7} The second most common diagnostic group in patients presenting acutely with dizziness to a primary care clinic or emergency room is orthostatic hypotension.

Many dizziness experts consider a condition called multiple sensory deficits to be particularly common in elderly patients. This disorder describes the accumulation of multiple sensory insults (such as decreased vision, vestibular disease, peripheral

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| Cause | Emergency Room (n = 907 ^b) (%) | Primary Care, Elderly (n = 1708 ^b) (%) ^a | Specialized Dizziness Clinic (n = 125 ^b) (%) |
|---|--|---|--|
| Peripheral vestibular disease (benign positional vertigo, vestibular neuronitis, Ménière disease) | 32 | 40 | 38 |
| Orthostasis/syncope | 15 | 10 | – |
| Multiple sensory deficits | – | 8 | 13 |
| Psychiatric | 2 | 6 | 9 |
| Infection | 4 | 4 | – |
| Central neurologic (serious) | 5 | 4 | 5 |
| Drug-related | 5 | 3 | – |
| Cardiac (serious) | 4 | 2 | 4 |
| Unknown | 22 | 16 | 9 |

^a Percentages rounded to the nearest integer.

neuropathy, poor perfusion of the brain, and orthopedic disorders), which, although by themselves are insufficient to be symptomatic, in combination deprive patients of enough sensory information about the environment to cause the presenting concern of dizziness.⁸

Serious cardiac or neurologic disorders (eg, arrhythmias, stroke) are uncommon causes of dizziness, affecting fewer than 1 in 10 patients. A diagnosis may be made in dizzy patients more than 80% of the time.

PATHOPHYSIOLOGY OF VESTIBULAR DISEASE

A basic understanding of the principal causes of peripheral vestibular disease helps clinicians recognize these disorders during their history and physical examination. For all of the causes discussed in this article, it can be helpful to recall that vertigo requires an imbalance between the 2 sides.

BPPV stems from detached otoliths that settle in the most dependent portion of the inner ear, most commonly the posterior semicircular canal⁹ (otoliths are the tiny rocks that normally reside in the saccule and utricle and provide the body with information about our position in the gravitational field, ie, whether the body is upside down, upright, or tilting). Movements of the head in the plane of the affected posterior semicircular canal result in exaggerated movements of endolymph and cause vertigo.

The cause and pathophysiology of Ménière disease is poorly understood, thus, the alternative term of idiopathic endolymphatic hydrops.¹⁰ The common histologic finding is dilated endolymph channels, although this abnormality has also been found in asymptomatic patients.¹¹ One theory is that obstruction causes increased endolymph pressure, leading to breaks in the intralabyrinthine membranes, and subsequent vertigo. The increased pressure also results in the tinnitus, aural fullness, and hearing loss,¹² which initially fluctuates but can progress to severe hearing loss in the affected ear.⁹ Another theory redefines the problem as a dysfunction in 1 or more homeostatic systems that regulate the ionic composition of the endolymph. According to this theory, changes in endolymph composition result in dizziness and hearing fluctuation.^{13,14}

Vestibular neuronitis is also called viral neuronitis, acute vestibulopathy, epidemic vertigo, and acute labyrinthitis. It stems from spontaneous mononeuropathy of the

vestibular division of the eighth cranial nerve on 1 side. The mononeuropathy is usually believed to be virally mediated, in part because many patients report a viral prodrome and the illness may occur in epidemics. There is increasing evidence from animal studies and autopsy studies that many cases of vestibular neuronitis are caused by reactivation of latent herpes simplex virus type 1 infection.¹⁵

Central Vestibular Disease

Rarely, stroke may mimic vestibular neuronitis if it affects vestibular nuclei, as in cerebellar stroke and, less likely, lateral medullary stroke.

SYMPTOMS

Clinicians should attempt to categorize the patient's dizziness into 1 of 3 types: vertigo, light-headedness, or disequilibrium, an approach based on early investigations of chronic dizziness.⁶ Vertigo is a sensation of movement (eg, twirling, tilting), perceived in the head, a symptom implying either peripheral or central vestibular disease. All vertigo is abrupt in onset, episodic, and aggravated by head movements; the various types are distinguished by duration, setting, and associated symptoms. Light-headedness is a feeling of faintness or graying of vision, implying hypotension and poor perfusion of the brain. Disequilibrium is a sensation of unsteadiness not in the head, implying proprioceptive or cerebellar disease. Nonetheless, this classification of dizziness fails in at least 10% of patients, despite the clinician's best efforts, because the patient's symptoms are too vague or ambiguous.^{3,6}

Additional helpful questions to ask patients during the interview are given in **Table 2.**¹⁶⁻²⁰ A careful history may help to clarify nonspecific dizziness that does not easily fall into any 1 category. Some small percentage may be attributable to panic disorder or more rare causes, such as toxic exposure or infection (see **Tables 1** and **2**). Usually, a fairly certain diagnosis can be made by history alone, although physical examination helps confirm the diagnosis.²¹

PHYSICAL EXAMINATION

After the history, the most important step in evaluating dizziness is an attentive physical examination. Key components of examination are vital signs, gait, and special provocative tests. In patients with positional vertigo, the special provocative tests include the Dix-Hallpike test^{22,23} (for posterior canal BPPV) and supine roll test (for lateral canal BPPV). In patients with acute, sustained vertigo (a symptom prompting consideration of vestibular neuronitis [common, benign] and posterior fossa stroke [uncommon but severe]), important additional tests are the head impulse test and a thorough neurologic examination.

If the physician is aware in advance that the patient's concern is dizziness, it is helpful to ask the nurse or medical assistant to perform orthostatic vital signs on the patient before the visit. Orthostatic hypotension, especially if it reproduces the patient's symptom of dizziness, helps confirm the diagnosis of presyncope. Nonetheless, presyncope or light-headedness itself is not a final diagnosis but merits further investigation, including careful review of recent medication changes and queries about fevers, bleeding, alteration in dietary habits, cardiac symptoms, and neurologic changes.

Observation of gait helps detect disequilibrium and other neurologic disorders, especially multiple sensory deficits among elderly patients who typically feel fine when resting but become conspicuously unsteady when walking. A useful diagnostic test in the office is to have the patient make several right-angle turns while walking

| Table 2 Helpful questions to elicit the diagnosis of dizziness | | |
|---|---|--|
| Questions | Purpose | Answers: Suggested Diagnosis |
| What do you mean by "dizzy?" | Further elicit historical points without prejudicing a particular diagnosis | Vertigo, light-headedness, disequilibrium (see text) |
| What brings on the dizziness? | Ascertain the type | Turning my head: vertigo ¹⁶ Rolling over in bed: vertigo ¹⁶ Standing up: presyncope Stress: psychiatric Walking: disequilibrium or multiple sensory deficit ¹⁷ Darkness or uneven ground: disequilibrium or multiple sensory deficit ¹⁷ |
| How long does the dizziness last? | Helpful in subtyping vertigo | Less than 1 min: BPPV ¹⁶ Hours: Ménière ¹⁸ Days: vestibular neuronitis |
| What other symptoms have you had? | Helpful in evaluating for serious causes and subtyping vertigo | Other neurologic ^a : central vestibular disease ¹⁸ Hearing loss/tinnitus: Ménière, syphilis Palpitations: cardiac arrhythmia Fever: infection Viral prodrome: vestibular neuronitis |
| Any recent toxic exposures ¹⁷ or medication changes? ¹⁹ | Helpful in evaluating for precipitating causes | Gas heat in cold winter months: carbon monoxide poisoning ²⁰ Recent medication change: untoward effect of medication |

^a Dysarthria, paresis, truncal instability, lethargy, ataxia, focal neurologic abnormality, imbalance, previous stroke.^{5,8,26}

without assistance; if dizziness appears during this maneuver, the patient with multiple sensory deficit experiences immediate relief by touching the clinician's hand or the wall (a maneuver providing initial sensory information and thus relieving the unsteadiness).¹⁷ Further support for the diagnosis of multiple sensory deficit includes documentation of a positive Romberg test (a test of proprioceptive loss), sensory loss in the legs (peripheral neuropathy), diminished visual acuity (eg, cataracts), or other abnormalities during musculoskeletal examination of the legs (eg, genu valgum). In all patients with dizziness, but especially those with disequilibrium, it is crucial to assess the patient's risk for fall-related or driving-related injury, issues that must be addressed in the treatment plan.²⁴

SPECIAL PHYSICAL EXAMINATION MANEUVERS

Positional Vertigo

In patients with vertiginous symptoms related to change in position, the clinician should attempt to reproduce the symptom in the office using the Dix-Hallpike or supine roll maneuvers. The purpose of these maneuvers is not only to confirm the diagnosis but also to direct future therapy. Because most patients with positional vertigo have otoliths abnormally located in the posterior semicircular canal (reproduced by Dix-Hallpike maneuver) and only 10% to 15% have otoliths in the lateral semicircular canal (reproduced by the supine roll maneuver), the clinician usually

begins testing with the Dix-Hallpike maneuver (**Fig. 1**).²² During these tests, the clinician tests 1 ear at a time, beginning with the ear suspected to be abnormal, as suggested by the patient interview (eg, if the patient reports vertigo when rolling to the right, the clinician should suspect that the right ear is abnormal and begin testing with that ear).

A positive Dix-Hallpike maneuver has 3 key features: (1) it reproduces the patient's vertigo and nystagmus, (2) there is a latency period of several seconds to a minute before the vertigo and nystagmus are provoked, and (3) the vertigo and nystagmus resolve in less than 1 minute.¹⁶

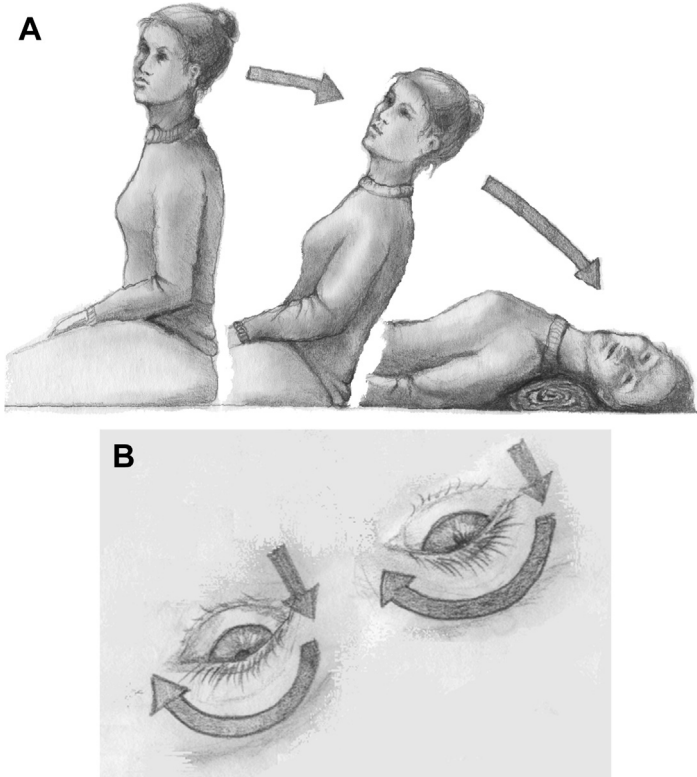


Fig. 1. (A, B) Dix-Hallpike maneuver²² to diagnose posterior canal BPPV (85%–90% of cases of BPPV). Remember to test both sides. The undermost ear is the one being tested. To maximize the sensitivity of the test, the movement from upright to supine should take 1 to 2 seconds. It is important to warn the patient that this maneuver reproduces the vertigo and possibly even nausea, but the symptoms should resolve rapidly. Despite these symptoms, counsel the patient to keep their eyes wide open and focused on the examiner, so that the examiner may watch for nystagmus. The direction of the nystagmus (quick component) is upward and torsional, with the superior pole of the eyes rotating down toward the undermost ear. One often has to remind the patient throughout the maneuver about the importance of keeping the eyes open, because it is a natural reaction to close the eyes in response to the vertiginous symptoms. Usually, the examiner does not have the patient's head dangling off the end of the table as initially described,²³ because of the layout of many examination rooms and concerns about patient safety. Instead, the patient lies back with head fully supported by the table but the shoulders elevated on several rolled towels or a pillow, as shown in (A). (Courtesy of Jessica Stanton, MD.)

Some providers, when a history is strongly pointing toward BPPV but the Dix-Hallpike is negative bilaterally, go on to perform the supine roll maneuver (**Fig. 2**).²⁵

Sustained Vertigo

Most patients with sustained vertigo suffer from vestibular neuronitis, although a few patients (especially elderly patients with cardiovascular risk factors) are having a stroke or other serious disease in the cerebellum or brainstem. One helpful bedside maneuver to help distinguish central and peripheral causes is the head impulse test (**Fig. 3**).^{26–28}

Sustained vertigo implies an imbalance between the right and left vestibular systems, either peripheral or central. The head impulse test investigates the integrity of the peripheral vestibular system. Therefore, if the test is abnormal in patients with sustained vertigo, peripheral disease is suspected (ie, vestibular neuronitis); if the head impulse test is normal in patients with sustained vertigo, the peripheral system is normal and therefore central disease is suspected (ie, posterior fossa stroke). It is important to only do this test in someone with prolonged vertigo; if the vertiginous episodes are brief, then BPPV is the more likely diagnosis, and the Dix-Hallpike maneuver is more useful.

In addition to the finding of a normal head impulse test in patients with sustained vertigo, several other neurologic findings are compelling arguments that the patient is suffering from a posterior fossa stroke: truncal ataxia, skew deviation (**Fig. 4**),²⁶ saccadic pursuit, and direction-changing nystagmus (**Table 3**).^{26,29} In clinical studies, these findings are sometimes more accurate than the initial diffusion-weighted magnetic resonance imaging (MRI) scans.^{29,30}

Most patients with dizziness do not require additional laboratory testing. Important exceptions are patients with orthostatic hypotension (blood tests for anemia, electrolyte abnormalities, or renal insufficiency), suspected Ménière disease (audiometry, syphilis testing), or suspected posterior fossa disease (MRI). Vestibular testing is rarely indicated.¹⁶

TREATMENT

In patients with positional vertigo and a positive Dix-Hallpike test (posterior canalithiasis), the Epley maneuver (**Fig. 5**)³¹ is indicated; if the supine roll test is positive (lateral or horizontal canalithiasis), no maneuver is indicated. The Epley maneuver addresses the anatomy of the canal affected and is specifically designed to move the patient through sequential positions to rid the affected canal of the abnormal otoliths, moving them back into the saccule. Canalith repositioning maneuvers may be performed immediately after the positive diagnostic maneuver and are easily and quickly achieved during the clinic visit. Other canalith repositioning maneuvers are available, but these other maneuvers have less robust data to support their successful application in the patient with vertigo.¹⁶

If a Dix-Hallpike is positive, the patient can maintain the position with the head down and be moved directly through the Epley maneuver (see **Fig. 5**). Even if the resolution does not occur in the clinic, 74% of patients report total resolution of symptoms within 1 week of undergoing an Epley maneuver,¹⁶ although these data come from subspecialty clinics and the success rate for inexperienced practitioners may be less. The number of Epley attempts necessary to achieve success is unclear. Many experienced practitioners attempt the Epley more than once during a single clinic visit to maximize the chances of success, assuming the patient is willing and able.

For patients in whom the Dix-Hallpike is negative, but the supine roll is positive (ie, suspected horizontal canal BPPV), there is insufficient evidence to recommend

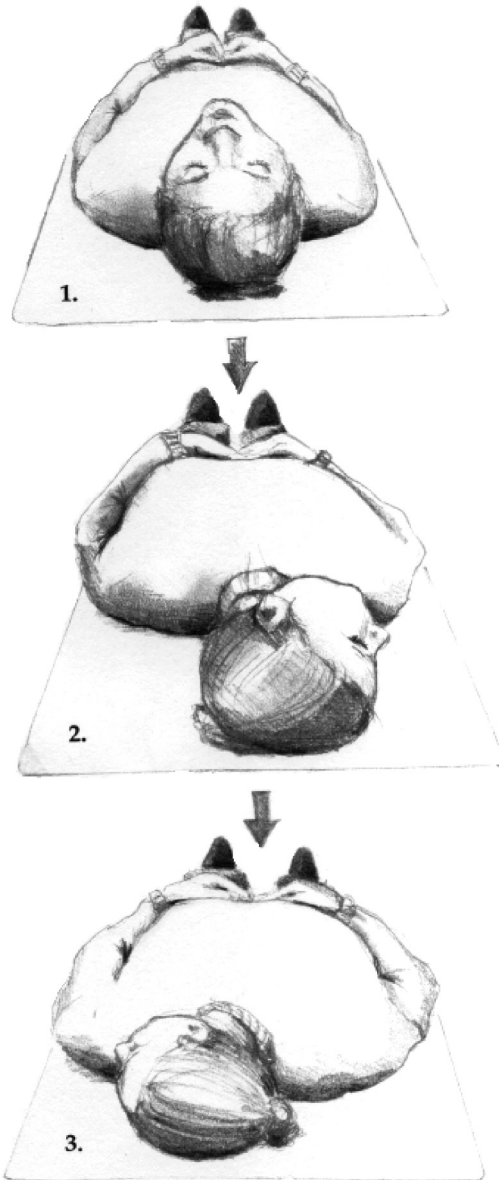


Fig. 2. The supine roll maneuver for diagnosis of lateral canal BPPV (10%–15% of cases of BPPV).²⁵ Remember to test both sides. The downward ear is the one being tested. (1) Lie supine facing the ceiling. (2) Quickly turn head to face right. If this provokes symptoms, the affected ear is the right ear. Return to facing the ceiling. (3) Quickly turn head to face left. If this provokes symptoms, the affected ear is the left ear. (Courtesy of Jessica Stanton, MD.)

PERIPHERAL VESTIBULAR DISEASE



CENTRAL VESTIBULAR DISEASE



Fig. 3. The head impulse test²⁶ may be used to distinguish between a peripheral vestibular disease (such as vestibular neuronitis or Ménière disease²⁷) and a central lesion (such as stroke or mass). The examiner sits in front of the patient and places a hand on each side of the patient's head. The patient is instructed to focus on the examiner's nose and the examiner focuses on the patient's eyes. The patient should keep their eyes open even if vertiginous symptoms worsen. An abnormal vestibulo-ocular reflex (peripheral disease) causes the eyes to move away with the head movement toward the abnormal side. At the end of rotation, the patient's eyes move quickly back to return the gaze to the clinician's nose. This is the corrective saccade. A normal vestibulo-ocular reflex (central disease) allows the patient to maintain gaze on the clinician's nose during rapid head movements to both sides without corrective saccades. There is improved sensitivity if the test is performed rapidly to aid in detection. The examiner should repeat the examination if initially normal or negative to make sure that saccades are not missed.²⁸ (From McGee SR. Evidence-based physical diagnosis. 3rd edition. Philadelphia: Elsevier/Saunders; 2012. p. 663; with permission.)



Fig. 4. Skew deviation.²⁶ One eye is aligned higher than the other, a sign of cerebellar or brainstem disease. (Courtesy of Jessica Stanton, MD.)

Table 3
Acute sustained vertigo and imbalance, detecting stroke: diagnostic accuracy of physical examination

| Finding | Likelihood Ratio if Finding: | |
|------------------------------|------------------------------|--------|
| | Present | Absent |
| Severe truncal ataxia | 17.9 | 0.7 |
| Skew deviation present | 5.3 | 0.7 |
| Saccadic pursuit | 4.6 | 0.2 |
| Direction-changing nystagmus | 3.5 | 0.7 |
| Normal head impulse test | 9.6 | 0.2 |

Definition of findings: truncal ataxia: patient cannot sit unassisted; skew deviation: see Fig. 4; saccadic pursuit: when following the examiner's moving finger, the movements are not smooth but instead jerky or saccadic; direction-changing nystagmus: when patients with nystagmus look in the direction opposite the quick component of the initial nystagmus, the direction of the nystagmus changes.²⁹

Data from McGee SR. Evidence-based physical diagnosis. 3rd edition. Philadelphia: Elsevier/Saunders; 2012.

1 particular canalith repositioning maneuver.¹⁶ Although the Lempert maneuver is 1 proposed remedy for this disorder, 1 study³² found little advantage to this maneuver over watchful waiting; this same study found that horizontal canal BPPV tends to self-resolve more rapidly than posterior canal BPPV.

For individuals suffering from BPPV for whom the in-office canalith repositioning maneuvers are unsuccessful, home treatment can offer relief. Self-administered canalith repositioning procedures (CRPs), reviewed in the patient education handout in the supplementary appendix, are often effective for motivated patients with frequent attacks.³¹ The self-administered Epley CRP is successful at least 64%¹⁶ of the time. For patients who find this maneuver too complex to perform at home, the simpler Brandt-Daroff maneuver is recommended, although this maneuver completely relieves symptoms in only 23%³¹ of patients. Like the Epley maneuver, the Brandt-Daroff maneuver reduces (fatigues) symptoms even if it does not bring about total resolution of symptoms.

For BPPV, there is a strong recommendation against medical treatments such as antihistamines and benzodiazepines. These treatments can increase risk of falls and urinary retention in older adults, and multiple studies have reported that they retard resolution of symptoms.¹⁶ One study comparing CRP with medication showed CRP to be more successful at 2-week follow-up, with CRP giving 74% of individuals total relief and medication giving only 30% of individuals relief. Rarely, antiemetics are indicated for severe nausea or as prophylaxis for a planned maneuver that has provoked severe nausea during previous attempts.¹⁶

Treatment of Ménière disease is more challenging and usually requires further evaluation by audiologists or otolaryngologists. Traditional treatments include vestibular rehabilitation, sodium restriction, and thiazides.^{14,33} In most patients, the episodes of vertigo become less common over time, although the patient's hearing loss progresses.

Vestibular neuronitis is also difficult to treat. Supportive care is important, and patients should be reassured that most cases resolve with time. Despite hopeful studies about the success of early steroid therapy,³⁴ further meta-analysis has found little difference between placebo and steroids³⁵ in patient symptoms and speed of recovery.

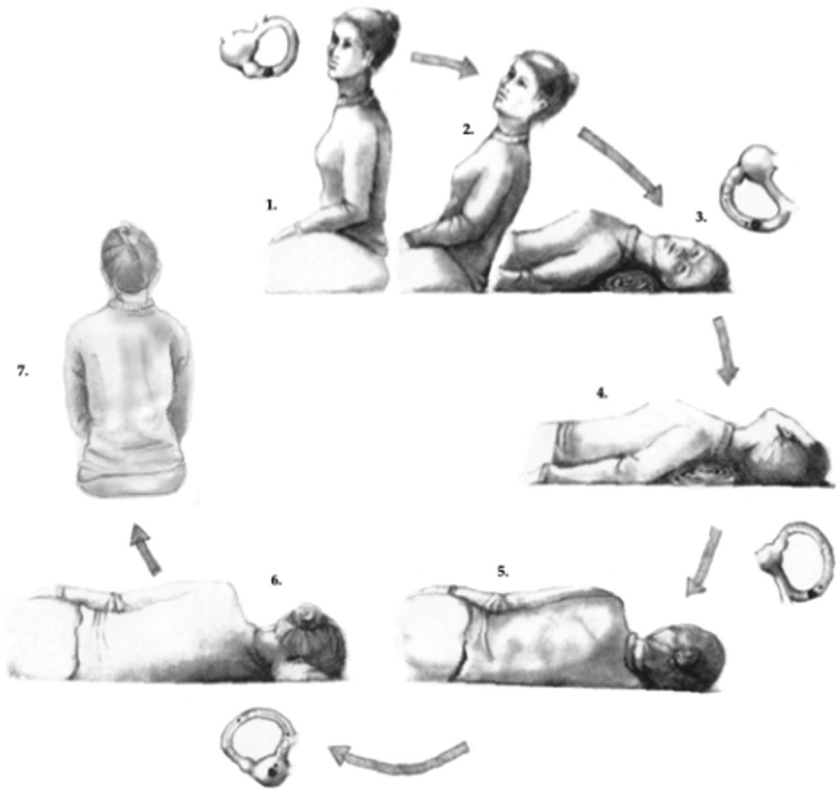


Fig. 5. Epley maneuver³¹ shown for left ear (left ear downward initially). (1) Start by seating the patient on the table with the head turned 45° to the left. Place a pillow or rolled towel on the table so that on lying back it is under the shoulders. (2, 3) Lay the patient back quickly with shoulders on the pillow, neck extended, and head resting on the bed. In this position, the affected (left) ear is underneath. Wait for 30 seconds. (4) Turn the head 90° to the right (without raising it), and wait again for 30 seconds. (5, 6) Turn the body and head another 90° to the right, turning the head so that it is facing the ground, and wait for another 30 seconds. (7) Sit the patient up on the right side. Next to the patient positions are illustrations of the displaced otoliths moving through the semicircular canal with each position. Repeat maneuvers may be helpful. (Courtesy of Jessica Stanton, MD.)

Treatment of light-headedness depends on its cause, varying between simple counseling (arise slowly from a supine or seated position) and medication adjustments to specific treatments of serious underlying problems (eg, antiarrhythmic medications, pacemakers, mineralocorticoid medications).

Multiple sensory deficit can rarely be completely cured, but multidisciplinary efforts can improve functional status tremendously.²⁴ Interventions focus on providing the patient with more information about their environment through fall prevention efforts with a physical therapist, assistive devices, and home evaluation. Consideration of nightlights to improve nighttime sensory input and, for those with reduced visual acuity, updated spectacles prescription or cataract extraction might be necessary.

Psychiatric causes of dizziness can be challenging to treat.⁶ Working closely with the patient and consideration of biofeedback, counseling, or medication may improve symptoms.

Serious conditions such as cerebellar stroke and unstable arrhythmia require emergent treatment, likely in an inpatient setting.

ADDITIONAL CONSIDERATIONS

Safety is a crucial consideration in managing patients with dizziness. Evaluating and mitigating fall risk with patients and their families reduces risk to the patient. Fall risk may be reduced with the assistance of physical therapists, home safety evaluations, and medication review. In addition, a careful discussion of risks related to driving or operating machinery reduces injury to the patient and the community. This discussion can be challenging for a variety of reasons, especially if loss of driving privileges isolates an elderly person. Enlisting the help of family or other social supports can reduce this isolation.

Recurrence is common, especially with BPPV. Counseling the patient that there may be recurrence but it is usually self-limited may help the patient be prepared if it does recur.

Follow-up is recommended at approximately 1 month for cases of BPPV. For most patients, symptoms of BPPV have resolved by this time. If it persists at 1 month, another Epley maneuver is indicated, with up to 98% success rates reported at follow-up attempts.¹⁶

SUMMARY

Dizziness is a common presenting concern in primary care practice. The history and physical examination distinguish almost all the different types of dizziness, and formal studies are rarely necessary. In most cases, effective treatments are available to administer in the clinic or at home, without need for medication.

Although providers may be tempted to order laboratory tests and prescribe medications for their patients with dizziness, a growing body of evidence indicates that the hands-on physical examination and therapeutic maneuvers are all that is necessary to care for patients with dizziness.⁷ More than perhaps any other diagnosis, the presenting concern of dizziness allows providers to return to the healing touch that is the core of the doctor-patient relationship.

PATIENT EDUCATION MATERIAL

Your provider believes that your dizziness comes from a type of vertigo called benign paroxysmal positional vertigo (BPPV). This problem usually resolves without treatment within weeks. Some people with this type of dizziness experience more rapid relief by trying one of the maneuvers depicted below.

Epley maneuver³¹: start by determining which side is affected by turning your head to the left and right. The direction that gives you the most symptoms is the affected side. The maneuver will be most helpful if you practice it starting with the affected ear downward as you lean back. This maneuver will temporarily worsen symptoms, but can also help to make your vertigo go away entirely. The image below shows how to do the Epley maneuver with the left ear (affected ear) down (see [Fig. 5](#)).

The Epley maneuver has shown the most success when practiced at home, but can be complex. Some people find the Brandt-Daroff easier to do on their own at home. It also does not require that you know which ear is most affected ([Fig. 6](#)).

Keeping moving and active despite the dizziness does help to resolve symptoms more quickly, even though it may feel difficult. Please take extra caution while you are dizzy to avoid falls. Ask a friend or relative for help and sit down when possible.

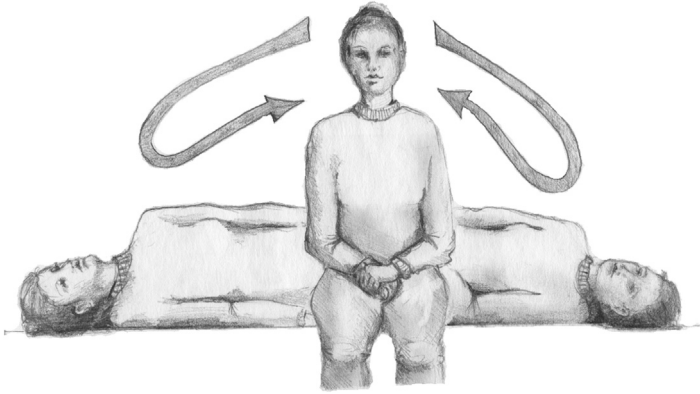


Fig. 6. The Brandt-Daroff maneuver: sitting upright on the side of a bed or couch, lie quickly down on 1 side, wait 30 seconds for dizziness to improve, and then sit up quickly. Repeat this maneuver on the other side. (Courtesy of Jessica Stanton, MD.)

If you are experiencing dizziness when you turn your head, *please do not drive a car* for your own safety and the safety of those around you.

If your symptoms get worse or new symptoms arise, contact your doctor immediately. If your symptoms do not improve after 2–3 weeks, please also contact your doctor's office.

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