Dizziness

Ronald J. Tusa, MD, PhD

DEFINITION, EPIDEMIOLOGY

What is the Definition of Dizziness?

Dizziness is an imprecise term used to describe various symptoms, each of which has a different pathophysiologic mechanism and significance (Table 1). If the patient cannot describe the symptoms, ask the patient if the problem primarily causes problems in the head or problems with balance. If the patient has spells, have the patient describe in detail the initial spell and the last severe spell.

How Common is Dizziness in the United States?

Dizziness is the third most common complaint among outpatients. Only chest pain and fatigue are more common. In 80% of these cases, the dizziness is severe enough to require medical intervention. Dizziness affects more than 50% of the elderly population and is the most common reason for visiting a physician after the age of 75 years.

CAUSE

What are the Causes of Dizziness?

The causes of dizziness in patients seen at our Dizziness and Balance Center since 2000 are shown in Fig. 1.

BEDSIDE ASSESSMENT

What are the Key Elements of the History?

The tempo, symptoms, and circumstances of the complaint are three key items in the history (Table 2).

Tempo

Determine if the patient has an acute attack of dizziness (3 days or fewer), chronic dizziness (more than 3 days), or spells of dizziness. Most disorders of acute dizziness lead to chronic dizziness. If the patient suffers from spells, try to determine the average duration of the spells in seconds, minutes, or hours.
Symptoms
What is meant by “dizziness” should be determined. If the patient cannot describe the symptoms then ask the patient if the problem primarily causes problems in the head or problems with balance. If the patient has spells, have them describe in detail the initial spell and the last severe spell.

Circumstance
Determine the circumstances in which dizziness occurs. Dizziness may be provoked by only certain movements, such as standing up after lying down for at least 10 minutes in

Table 1
Symptoms of Dizziness

| Symptoms                        | Mechanism                                                                                       |
|---------------------------------|-------------------------------------------------------------------------------------------------|
| Dysequilibrium: imbalance or unsteadiness while standing or walking | Loss of vestibulospinal, proprioceptive, visual, or motor function; joint pain or instability; psychologic factors |
| Lightheadedness or presyncope   | Decreased blood flow to the brain                                                                |
| Sense of rocking or swaying as if on a ship (mal de debarquement) | Vestibular system adapts to continuous, passive motion and must readapt once environment is stable. Anxiety. |
| Motion sickness                 | Visual-vestibular mismatch                                                                       |
| Nausea and vomiting             | Stimulation of medulla                                                                            |
| Oscillopsia: illusion of visual motion | Spontaneous: acquired nystagmus. Head-induced: severe, bilateral loss of the vestibulo-ocular reflex |
| Floating, swimming, rocking, and spinning inside of head (psychologically induced) | Anxiety, depression, and somatoform disorders                                                    |
| Vertical diplopia               | Skew eye deviation                                                                               |
| Vertigo: rotation, linear movement, or tilt | Imbalance of tonic neural activity to vestibular cerebral cortex                                  |

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Fig. 1. Causes of dizziness.
orthostatic hypotension, or may occur after vertical or oblique head movements, such as lying down, turning over in bed, or sitting up in benign paroxysmal positional vertigo (BPPV). If the individual tells you that simply moving the eyes with the head stationary causes dizziness and there is no eye movement disorder (eg, ocular misalignment or

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| Disorder               | Tempo         | Symptoms                                      | Circumstances                                                                 |
|------------------------|---------------|-----------------------------------------------|------------------------------------------------------------------------------|
| Vestibular neuritis    | Acute dizziness| Vertigo, dysequilibrium, nausea/vomiting, oscillopsia | Spontaneous, exacerbated by head movements                                   |
| Labyrinthitis          | Acute dizziness| Vertigo, dysequilibrium, nausea/vomiting, oscillopsia, hearing loss and tinnitus | Spontaneous, exacerbated by head movements                                   |
| Wallenberg infarct     | Acute dizziness| Vertigo, dysequilibrium, nausea/vomiting, tilt, lateropulsion, ataxia, crossed sensory loss, oscillopsia | Spontaneous, exacerbated by head movements                                   |
| Bilateral vestibular deficit or >3 d from a unilateral vestibular defect | Chronic dizziness | Dizzy, dysequilibrium, occasionally oscillopsia. | Induced by head movements, walking. Exacerbated when walking in the dark or on uneven surfaces. |
| Mal de debarquement    | Chronic dizziness | Rocking or swaying as if on a boat | Spontaneous while lying or sitting. Rarely occurs while in motion |
| Oscillopsia            | Chronic dizziness | Subjective illusion of visual motion | Spontaneous with eyes open |
| Anxiety/depression     | Chronic dizziness | Lightheaded, floating or rocking | Induced by eye movements with head still |
| Benign paroxysmal positional vertigo | Spells: seconds | Vertigo, lightheaded, nausea | Positional: lying down, sitting up or turning over in bed, bending forward |
| Orthostatic hypotension | Spells: seconds | Lightheaded | Positional: standing up |
| Transient ischemic attacks | Spells: minutes | Vertigo, lightheaded, dysequilibrium | Spontaneous |
| Migraine               | Spells: minutes | Vertigo, dizziness, motion sickness | Usually movement-induced |
| Panic attack           | Spells: minutes | Dizzy, nausea, diaphoresis, fear, palpitations, paresthesias | Spontaneous or situational |
| Motion sickness        | Spells: hours  | Nausea, diaphoresis, dizzy, | Movement-induced, usually visual-vestibular mismatch |
| Ménière disease        | Spells: hours  | Vertigo, dysequilibrium, ear fullness from hearing loss and tinnitus | Spontaneous, exacerbated by head movements |
an internuclear ophthalmoparesis), then dizziness is likely to be the result of anxiety. When dizziness occurs without provocation (spontaneous) and is vestibular in origin, it frequently is exacerbated by head movements.

**How Does the History Help Determine Management?**

One of the most useful questions to ask to determine appropriate management is “How does dizziness affect your life?” A peripheral vestibular loss from vestibular neuritis on one side may yield different responses in different individuals. Patients may state that they are not affected at all by the dizziness, but they want to be reassured that nothing is seriously wrong. These patients may not require extensive evaluations and management. Other patients may state they have no unsteadiness while walking, but they can no longer play golf or tennis because of their imbalance. These patients may require limited balance rehabilitation. Other patients state they are completely devastated by their dizziness and they do not leave the house, drive, or participate in any social activities. These patients require extensive counseling and physical therapy, and may require medication.

**What Portion of the Bedside Examination Should be Done in Every Dizzy Patient?**

**Box 1** lists the portions of the examination that should be performed on all patients who have dizziness to facilitate diagnosis. Visual fixation reduces or suppresses horizontal and vertical nystagmus generated by peripheral vestibular defects. The head thrust test is shown in Fig. 2. Fig. 3 shows the Hallpike-Dix test.

**What are the Characteristics of Nystagmus in Individuals Who Have Acute, Unilateral Peripheral Vestibular Loss?**

The characteristics of nystagmus in individuals who have acute unilateral peripheral vestibular loss (eg, vestibular neuritis) are shown in Fig. 4.

**MANAGEMENT**

**What are Vestibular Suppressant Medications and When Should They be Used?**

Various vestibular suppressant medications can be used for symptomatic treatment of acute vertigo and nausea (Table 3). These should be used for 1 week or less, when the symptoms of spontaneous vertigo and nausea are most intense. I give promethazine (25–50 mg intramuscularly [IM]) in the office at the onset of severe vertigo, and then send the patient home for 3 days of bed rest with promethazine suppositories to be taken as needed. This medication causes sedation and reduces nausea. Ondansetron may also be appropriate for patients who have severe vertigo and nausea, but currently this is only approved for chemotherapy-induced nausea.³

| Box 1 Routine physical examination |
|-----------------------------------|
| Check for spontaneous nystagmus in the light when the patient is fixating a target and also with fixation blocked. |
| Check the vestibulo-ocular reflex by doing a head thrust test. |
| Do the Hallpike-Dix test to check for benign paroxysmal positional vertigo and central positional vertigo. |
| Check smooth pursuit and saccadic eye movements. |
| Check standing balance (Romberg and sharpened Romberg); check gait. |
Fig. 2. Vestibulo-ocular reflex (VOR) during head thrust test. In this test, the examiner holds the head firmly between the hands. Tell the patient to fixate your nose. Then quickly thrust the head 10° to 20° to either side and determine if the patient is still fixating on your nose immediately after the head thrust. If the patient has to make a corrective saccade to refixate your nose after the head thrust, the VOR is impaired (Adapted from Leigh RJ, Zee DS. The neurology of eye movements. New York: Oxford University Press; 1999. p. 646; with permission.)

Fig. 3. Hallpike-Dix test for BPPV. (A) In this test, the patient sits on the examination table and the head is turned 45° horizontally. (B) The head and trunk are quickly brought straight back en bloc so that the head is hanging over the edge of the examination table by 20°. Nystagmus is looked for and the patient is asked if they have vertigo. Although not shown in the figure, the patient is then brought up slowly to a sitting position with the head still turned 45° and nystagmus is looked for again. This test is repeated with the head turned 45° in the other direction. This figure also shows movement of debris in the right posterior semicircular canal (black arrows) during the test. In this example, the patient would have nystagmus and vertigo when the test is performed on the right side, but not when the test is performed on the left side. (From Tusa RJ. Vertigo. Neurol Clin 2001;19:39; with permission.)
Fig. 4. Peripheral vestibular nystagmus. This figure depicts disruption of the left superior division of the 8th nerve from vestibular neuritis. Top figures show vigorous right beating and right torsional nystagmus when subject views straight ahead through Frenzel glasses, and mild nystagmus when patient does not have the glasses on. Arrows indicate the direction of the quick phases of nystagmus. Frenzel glasses block the patient’s ability to visually fixate. Nystagmus is labeled according to the direction of the quick phases. Eye movement trace is shown below the face. Bottom figures illustrate the effect of horizontal eye position on nystagmus. The intensity of nystagmus increases when the patient looks in the direction of the quick phases (Adapted from Brandt T. Vertigo: its multisensory syndrome. London: Springer-Verlag; 1991. p. 329; with permission.)

| Drug          | Major Action          | Indication                  | Dosage                  |
|---------------|-----------------------|-----------------------------|-------------------------|
| Alprazolam    | GABA agonists         | Acute UVL                   | 0.25 mg prn             |
| Meclizine     | Antihistamine,        | Acute UVL                   | 25–50 mg q6h × 3 d max  |
|               | anticholinergic       |                             |                         |
| Ondansetron   | Serotonin agonist     | Severe nausea from central  | 4 mg q8h for 3 d        |
|               |                       | vertigo                     |                         |
| Scopolamine   | Anticholinergic       | Motion sickness             | 1 patch for 3 d         |
| Promethazine  | Phenothiazine (antidopa) | Acute UVL               | 25 mg po, IM, supp q6h |
| Prochlorperazine | Phenothiazine (antidopa) | Acute UVL               | 25 mg po, IM, or supp q12h |

Abbreviations: supp, suppository; UVL, unilateral vestibular loss.
**What Therapeutic Medications are Available and When Should They be Used?**

There are various medications that may be therapeutic for different causes of dizziness (Table 4). For example, prednisone and acyclovir during the first 10 days of the attack may shorten the course of the illness in patients who have Ramsay Hunt syndrome. Prednisone alone may be useful in patients who have vestibular neuritis. Midodrine and fludrocortisone are useful in treating orthostatic hypotension.

**What Medications can Cause Dizziness or be Harmful to the Dizzy Patient?**

Several medications may cause subjective symptoms of dizziness, especially in those patients older than 65 years of age. Table 5 lists the more common medications along with their primary effects. Certain drugs cause dysequilibrium and lightheadedness. These include anticonvulsants, antidepressants, antihypertensives, anti-inflammatory agents, hypnotics, muscle relaxants, tranquilizers, and chronic use of vestibular suppressants. Sensitization may occur to meclizine and scopolamine after a few days of continuous use, and withdrawal symptoms will occur when the medication is discontinued. This may be misinterpreted as recurrence of the disorder itself, so that physicians should be cautious about restarting these medications.

Certain drugs may cause vestibular ototoxicity and spare hearing, yet lead to dysequilibrium. These include certain aminoglycosides (streptomycin, gentamicin, tobramycin), furosemide and ethacrynic acid. The other aminoglycosides affect hearing primarily. Treatment of bilateral vestibular defects should include avoidance of all ototoxins that may cause further permanent peripheral vestibular damage (gentamicin, streptomycin, tobramycin, ethacrynic acid, furosemide, quinine, cisplatinum) and avoidance of drugs that may transiently impair balance (sedative, antianxiety, antiepileptics, and antidepressants). Vestibular rehabilitation may be helpful for these patients.

**Table 4**

| Drug          | Major Action      | Indications                        | Dosage                  |
|---------------|------------------|-----------------------------------|-------------------------|
| Acetazolamide | Diuretic         | Ménière disease                   | 250 mg bid to tid       |
| Acyclovir     | Antiviral        | Ramsay Hunt syndrome              | 400 mg 5×/d × 10 d      |
| Fludrocortisone | Mineral corticoid | Orthostatic hypotension          | 0.1–0.6 mg/d            |
| Midodrine     | Alpha1 adrenergic stimulant | Orthostatic hypotension | 10 mg tid              |
| Paroxetine    | Selective serotonin reuptake inhibitor (antidepressant) | Anxiety                  | 10–20 mg q AM           |
| Prednisone    | Anti-inflammation | Acute vestibular neuritis and Ramsay Hunt syndrome | 60 mg qd, then taper over 10 d |
| Propranolol   | Beta-blocker     | Migraine                          | At least 80 mg qd split up in several doses |
| Valproic Acid | GABA agonist     | Migraine                          | 250–500 mg po bid       |
| Drug                        | Drugs that can Cause Dizziness | Drugs that Interfere with Vestibular Compensation | Ototoxic (Vestibular) Drugs |
|-----------------------------|--------------------------------|---------------------------------------------------|-----------------------------|
| Antiarrhythmics             |                                |                                                   |                             |
| Amiodarone, quinine         |                                | X (synergistic)                                   |                             |
| Anticonvulsants             |                                |                                                   |                             |
| Barbiturates                |                                 | X                                                 |                             |
| Carbamazepine, phenytoin, ethosuximide |                  | X                                                 |                             |
| Antidepressants             |                                |                                                   |                             |
| Amitriptyline, imipramine  |                                 | X                                                 |                             |
| Antihypertensives           |                                |                                                   |                             |
| Diuretics                   |                                |                                                   |                             |
| Hydrochlorothiazide         |                                 | X                                                 |                             |
| Furosemide, ethacrynic acid |                                |                                                   | X (synergistic)             |
| Alpha1-blockers             |                                |                                                   |                             |
| Prazosin, Terazosin         |                                 | X                                                 |                             |
| Beta-blockers               |                                |                                                   |                             |
| Atenolol, propranolol       |                                 | X                                                 |                             |
| Calcium antagonists         |                                |                                                   |                             |
| Nifedipine, verapamil       |                                 | X                                                 |                             |
| Anti-inflammatory drugs     |                                |                                                   |                             |
| Ibuprofen, indomethacin    |                                 | X                                                 |                             |
| Acetylsalicylic acid        |                                |                                                   | X (reversible)             |
| Antibiotics                 |                                |                                                   |                             |
| Streptomycin, gentamicin    |                                 | X                                                 |                             |
| Tobramycin                  |                                 | X                                                 |                             |
| Chemotherapeutics           |                                |                                                   |                             |
| Cisplatinum                 |                                 |                                                   | X                           |
| Hypnotics                   |                                |                                                   |                             |
| Flurazepam, triazolam       |                                 | X                                                 |                             |
| Muscle relaxants            |                                |                                                   |                             |
| Cyclobenzaprine             |                                 | X                                                 |                             |
| Orphenadrine                |                                 | X                                                 |                             |
| Methocarbamol               |                                 |                                                   |                             |
| Tranquilizers               |                                |                                                   |                             |
| Chlordiazepoxide            |                                 | X                                                 |                             |
| Meprobamate                 |                                 |                                                   |                             |
| Vestibular suppressants     |                                |                                                   |                             |
| Chlordiazepoxide, diazepam |                                 | X                                                 | X                           |
| Meclizine, scopolamine      |                                 | X                                                 | X                           |
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