

Chapter (Ch. 21) Evaluation of the Patient with Dizziness and Balance Disorders
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CHAPTER 21

Evaluation of the Patient with Dizziness and Balance Disorders

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INTRODUCTION

Balance disorders are common and can occur in patients of all ages, constituting a significant personal and public healthcare burden. It is often reported that dizziness is the third most common complaint among outpatient medical visits and the single most common complaint among elderly patients. Dizziness and balance disorders may result from abnormalities in a variety of organ systems including the vestibular system, central or peripheral nervous system, cardiovascular system, and cerebrovascular system. Additionally, medications taken by patients can contribute to symptoms of dizziness. When a patient presents to the balance clinic, the primary goal of the healthcare provider is to investigate the symptoms and conduct evaluations to narrow the differential diagnosis. Although most patients with dizziness have a benign condition, a small percentage may have a potentially life-threatening underlying cause involving the brain, heart, or the circulation of blood necessitating more immediate medical management. In many cases the patient with an acute balance disorder will recover spontaneously requiring only short-term treatment for the symptoms. However, patients demonstrating more chronic symptoms may require significant intervention from healthcare providers to evaluate and manage the dizziness.

More than 4 out of 10 Americans will experience an episode of dizziness sometime during their lives significant enough for them to seek medical care (NIH News in Health, 2012). Data suggest that one in five patients over 65 years of age experience problems with balance or dizziness annually. A review of data from the US Census Bureau's National Health Interview Survey, collected in 2008, provided alarming statistics on balance issues in the elderly population (Lin and Bhattacharyya, 2012). For patients 65 years of age and older, 20% or 7 million people in the United States reported experiencing dizziness or a balance problem in the previous 12 months. With respect to quality of life and functional impact, of those individuals who experienced dizziness or balance problems, 27% reported that the balance issues prevented them from participating in normal activities.

The restriction in activities included not engaging in exercise (61%), social events (46%), driving (47%), and participation in work/school (38%). Additionally, for 26% of those with balance issues, simple activities of daily living such as bathing, dressing, and eating were also reported as affected.

Epidemiologic studies relate balance disorders to the increased incidence of falls in the aging population. The Centers for Disease Control and Prevention in the United States report that roughly one-third of adults 65 years of age and older fall each year, resulting in injuries that limit activities and independent living. Of patients who fall, 20% require medical attention (Gillespie et al., 2013). In addition, falls among older adults, especially those resulting in fractures, are a leading cause of injury-related deaths. Patients suffering from dizziness or imbalance may report unsteadiness, light-headedness, vertigo, dysequilibrium, or a feeling of fainting/pre-syncope. Such conditions may ultimately lead to serious medical, physical, emotional, and social consequences such as loss of independence, isolation, and injuries from falls. Because of the impact of dizziness on the quality of life of patients and the increased risk of falls, a number of falls prevention programs have been investigated and found to provide effective methods for reducing falls (Gillespie et al., 2013).

Given the vast number of acronyms commonly used in relation to vestibular screening and diagnostic measures, Table 21.1 provides a list that will aid in recognizing many terms and their abbreviations used throughout this chapter.

CLINICAL PRESENTATION OF THE DIZZY PATIENT

Our innate ability to maintain balance and navigate safely through the environment depends on sensory information that is gathered from the visual, vestibular, and somatosensory (proprioceptive) receptors of the body. A properly functioning balance system allows us to maintain stable vision with movement, orient ourselves with respect to gravity, and make automatic postural adjustments for maintenance

TABLE 21.1

List of Screening and Diagnostic Vestibular Tests or Measures with Commonly Used Acronyms

Acronym	Test Name or Measurement
AHR	Active head rotation
BPPV	Benign paroxysmal positional vertigo
CDP	Computerized dynamic posturography
CTSIB	Clinical Test of Sensory Integration of Balance
DHI	Dizziness Handicap Inventory
DP	Directional preponderance
DVA	Dynamic visual acuity
ENG	Electronystagmography
HIT	Head impulse test
HSN	Headshake nystagmus
HVT	Hyperventilation test
OKN	Optokinetic nystagmus
SHA	Sinusoidal harmonic acceleration
SCV or SPV	Slow-phase component eye velocity/ slow-component eye velocity or slow-phase velocity
UW	Unilateral weakness [may also be referred to as reduced vestibular response [RVR]]
VFX	Visual fixation
VNG	Videonystagmography
VOR	Vestibulo-ocular reflex
VSS	Vertigo Symptom Scale
VVOR	Visually enhanced vestibulo-ocular reflex

of stability. When a person is complaining of imbalance or dysequilibrium, the first task of the audiologist is to have the patient describe the symptoms in detail. This information forms the basis for beginning to determine which sensory input system, or which combination, is contributing to the patient's complaints.

Signs and Symptoms

Many patients will report their presenting symptom as "being dizzy." The term "dizzy" is not particularly specific because it broadly refers to some perception of imbalance, disorientation in space, or false feelings of movement. Patients may describe symptoms with terms such as dizziness, dysequilibrium, spinning, swimming, light-headedness (pre-syncope), floating, turning, and perhaps even vertigo. Although the symptoms reported by patients can provide valuable information for formulating an assessment plan, caution must be taken because the terms used are subjective and can be misleading. The importance of gathering more detailed information to further charac-

terize the reported symptoms will be emphasized below under the topic of the neurotologic case history. Dizziness is often classified into distinct categories based on quality or character of presentation. Various authors have suggested from four to six general categories with the most common descriptors being vertigo, dysequilibrium, pre-syncope, light-headedness, and gait instability. Each of these is briefly described here.

Vertigo has been described as a hallucination or illusion of movement because of an imbalance in the central or peripheral vestibular system. The spinning or tilting illusion of movement can be of self, of surroundings, or a combination of both. Vertigo is often associated with nystagmus, oscillopsia (blurring or oscillation of the visual field), postural imbalance, and autonomic symptoms (e.g., sweating, pallor, nausea, and/or vomiting).

Dysequilibrium is a state of altered static (standing/sitting) or dynamic (ambulating) postural balance without vertigo. Patients presenting with dysequilibrium often complain of visual disturbance, unsteadiness, imbalance, and/or falls. Typically, this condition reflects a failure or mismatch of sensory integration among body systems (e.g., visual, vestibular, muscular, or neurologic) or a disturbance of motor control. Dysequilibrium may be further subdivided into psychologic and ocular subcategories with the former characterized by feelings of anxiety, fear, or confusion and the latter with visual integration deficits often leading to motion sickness.

Pre-syncope is a syndrome characterized by a sensation of impending loss of consciousness (as opposed to syncope, which is actual fainting) and may be associated with a cardiovascular abnormality, malaise, generalized weakness, diaphoresis, visual disturbances, nausea, facial pallor, and/or epigastric (abdominal) distress. Orthostatic hypotension is a common cause of pre-syncope, but arrhythmias, postural orthostatic tachycardia syndrome, hyperventilation, panic attacks, and other conditions can produce the sensation as well. Episodes of pre-syncope are generally relieved with lying down or reclining.

Light-headedness is another common descriptor and is generally meant to imply a head sensation that is not vertiginous or pre-syncopal and not related to ambulation. Light-headedness can be transient or persistent and is often associated with anxiety or hyperventilation syndrome. Patients who complain of this sensation often say that they feel like they are floating, they are giddy, or their head is somehow detached from their body. Because light-headedness is such a vague and variable term, it may actually reflect other types of dizziness that are not properly described.

Gait instability or ataxia is an unsteadiness or inability to perform coordinated muscle movements. Gait unsteadiness can arise when there is a deficit in the central nervous system or either the central or peripheral vestibular systems. Symptoms with this type of presentation are generally constant and sometimes progressive, with patients

reporting that they feel like they are intoxicated during ambulation.

The Neurotologic Case History

Most vestibular disorders cannot be distinguished from one another based solely on laboratory studies. Additionally, laboratory studies tell us little about a particular patient's functional disability as a result of his/her condition. As such, balance function tests are best interpreted in conjunction with an in-depth neurotologic case history. The neurotologic case history begins with the acquisition of a full depiction of the patient's self-described symptoms. Several aspects must be investigated including, but not necessarily limited to, the feeling created by the symptoms, any precipitating events, the onset (e.g., when did they begin), the frequency (e.g., how often they occur), and the duration (e.g., how long do they last).

The general health condition preceding the onset of symptoms should be determined (e.g., any minor or major health issues such as a cold, gastrointestinal or respiratory problems, or head trauma). It is equally important to gather a complete drug history, including information about any medical or nonmedical care the patient has sought for the dizziness. This should include questions about the use of recreational drugs; the use of prescription medications; and the use of homeopathic or naturopathic herbs, supplements, and vitamins.

To the extent possible it is also important to identify any associated symptoms, recognizing that some of these symptoms may occur with more than one type of dizziness. Headache, for example, can occur with vertigo (e.g., migraine, brainstem ischemia), motor dysequilibrium (e.g., cerebellar infarct or hemorrhage), pre-syncope, and psychosomatic dizziness (often associated with anxiety, sleep deprivation, and caffeine overuse/withdrawal) (Sowerby et al., 2010). A careful evaluation of the patient's complaints and the answers to several simple questions can lead the audiologist to suspect whether the patient is suffering from a peripheral vestibular disorder, a central disorder, or a multifactorial disorder, which may alter the order or types of tests with which an individual is evaluated. Table 21.2 provides a summary of key areas to address during the case history process.

Although obtaining the neurotologic case history can be time-consuming, the collective sum of the patient's responses is used to initially separate out suspected vestibular versus nonvestibular disorders. This may be indicated by the patient's descriptions of onset, duration, and provoking factors of the dizziness. If the patient complains of the sensation that the room is spinning for about 1 minute after rolling over in bed or looking up, the clinician should suspect that a peripheral disorder may exist, specifically benign paroxysmal positional vertigo (BPPV). If the vertigo is continuous without fluctuation for long periods of time, such as weeks or more, a central cause should be suspected.

TABLE 21.2

Key Points to Address in the Neurotologic Case History Related to Dizziness

Area of Questioning	Probes (Preferably Asking Open-Ended Questions)
Description of the feeling/experience	What does the sensation feel like? Why are you here?
Severity	Is it mild, moderate or severe?
Onset	It is new, ongoing or changing since onset?
Duration	Is it short [seconds to minutes], intermediate [minutes to hours], long [>24 hours]?
Frequency	How often? [i.e., single episode vs. multiple and daily vs. weekly vs. occasionally]
Provoking factors	When do the attacks occur? Does anything make the dizziness occur [i.e., change in head, neck or body position; loud noise, exertion, diet, visual stimuli]?
Associated symptoms	Do you also have hearing loss, tinnitus, aural fullness, pain, headache, visual disturbances, numbness, nausea, or vomiting?
Other medical history/general health	Did any illness or health changes occur near the onset?
Drug case history	Any new medications or changes in prescriptions?
Level of disability or impact on function	No restrictions to activities to completely unable to engage in routine activities

In other instances, the preceding factors play a key role in highlighting a suspected origin for the dizziness or imbalance. For instance, if the patient reports the possibility of a viral illness prior to the sudden onset of dizziness and changes in hearing, this may point towards a viral labyrinthitis. In such cases, a hearing evaluation should be administered along with balance function assessment. Trauma to the head and/or neck may indicate neurologic involvement or, once again, BPPV. Medications that were prescribed for existing medical conditions, or to ameliorate symptoms of dizziness, could result in side effects and/or vestibulotoxicity and impaired balance function. Table 21.3 provides an overview of how the qualitative details gathered from appropriate questions can contribute to differentiating between suspected vestibular and nonvestibular sites of origin.

TABLE 21.3

Differentiating Vestibular and Nonvestibular Dizziness on the Basis of Patient Complaints

Component	Vestibular	Nonvestibular
Common descriptive wording used by patients	Off-balance, spinning (usually the environment moves), tilting, feels like car sickness, too much to drink, unsteady	Light-headed, floating on a cloud or swimming sensation, out-of-body, self-spinning but world is steady
Time course	Distinct attacks (episodic)	All day long (constant)
Common antecedent or exacerbating factors	Change in body position or quick head movements up or down or side to side	Stressful situations, heavy mouth-breathing (hyperventilating), heart thumping
Common symptoms	Nausea, vomiting, unsteadiness, ringing in ear(s), decreased hearing, blurred vision or bouncing vision	Syncope, difficulty concentrating, numbness, tension in body with or without accompanying headache

Self-Assessment Inventories

To assess the functional limitations of an individual's balance problems many health professionals employ self-assessment inventories. These can help to ascertain the patient's functional state or, stated otherwise, how the physiological problems affect the patient's quality of life. Several such self-assessment scales are reported in the literature; two of the common ones are described below.

The Vertigo Symptom Scale (VSS) (Yardley et al., 1992) was developed to assess the symptoms and the relationship between vertigo, anxiety, and emotional disturbances in an effort to examine the relative influence of vertigo and anxiety on reported handicap and distress. The VSS consists of 36 items describing common symptoms often reported by or observed from patients with vertigo. With the VSS, the patient is asked to rate the frequency of his/her experience over the preceding 12 months, and the results are summed and analyzed by the examiner in relation to vertigo and anxiety/autonomic symptom subscales.

The Dizziness Handicap Inventory (DHI) (Jacobson and Newman, 1990) is a standardized measure of self-reported limitations of daily life imposed by the patient's symptoms. The DHI consists of 25 questions that pertain to dizziness or unsteadiness and are to be answered by the patient with "yes," "no," or "sometimes." There are three subscales which investigate functional, physical, and emotional impacts on disability. Scoring ranges from 0 to 100 with those scoring above 10 indicating at least a mild handicap.

"Bedside" Screening Procedures

Evaluating patients with dizziness and/or balance disorders takes time. Often, when a patient is referred for evaluation, it may not be feasible or appropriate to perform a full vestibular test battery. Fortunately, simple "bedside" screening tools are available and, in the vast majority of patients,

produce results that coincide with the more extensive laboratory studies. Appropriately applied bedside measures can assist the clinician in the identification of site of lesion and qualification of functional impairment and, in some cases, are a useful counseling tool for patients. Screening measures, however, have limited validity and reliability. It is important to remember that a negative result on a bedside screening does not necessarily mean that the patient does not have the disorder being assessed. Sensitivity and specificity of screening measures vary widely and some have not been thoroughly investigated. In almost all cases, bedside tests should be used to direct patient management and should be corroborated by more comprehensive evaluations.

Determining which bedside tests to employ for a particular patient can be challenging. A typical screening battery may be driven by patient symptoms or may be more general, consisting of multiple measures to evaluate central ocular-motor control, as well as vestibulo-ocular and vestibulospinal reflex function. Bedside tests need not be limited to the initial patient interview either. Some screening procedures such as the swivel chair study and the Clinical Test of Sensory Integration of Balance (CTSIB) can be combined with electronystagmography (ENG) or videonystagmography (VNG) to expand the laboratory investigation, particularly when equipment such as rotary chair and computerized posturography may not be readily available. Although a comprehensive list of bedside testing is beyond the scope of this chapter, some of the common tests are briefly described below.

OCULAR MOTILITY

The ocular-motor and vestibular systems share many close anatomic and physiological connections. For this reason, eye movement can provide considerable information to assist in a preliminary evaluation. Certain patterns of nystagmus can be associated with either central neurologic or peripheral labyrinthine disorders. Prior to any examination, a quick