



Vestibular Disorders: An Overview

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The vestibular system includes the parts of the inner ear and brain that process the sensory information involved with controlling balance and eye movements. If disease or injury damages these processing areas, vestibular disorders can result. Vestibular disorders can also result from or be worsened by genetic or environmental conditions, or occur for unknown reasons.

The most commonly diagnosed vestibular disorders include benign paroxysmal positional vertigo (BPPV), labyrinthitis or vestibular neuritis, Ménière's disease, secondary endolymphatic hydrops, and perilymph fistula. Vestibular disorders also include superior canal dehiscence, acoustic neuroma, ototoxicity, enlarged vestibular aqueduct, and mal de débarquement. Other problems related to vestibular dysfunction include migraine associated vertigo and complications from autoimmune disorders and allergies.

Prevalence and Incidence

Because of difficulties posed by accurately diagnosing and reporting vestibular disorders, statistics estimating how common they are, how often they occur, and what social impacts they have range widely. Yet even the lowest estimates reflect the fact that vestibular disorders occur frequently and can affect people of any age.

One recent large epidemiological study estimates that as many as 35% adults aged 40 years or older in the United States—approximately 69 million Americans—have experienced some form of vestibular dysfunction.¹ According to the National Institute on Deafness and Other Communication Disorders (NIDCD), a further 4% (8 million) of American adults report a chronic problem with balance, while an additional 1.1% (2.4 million) report a chronic problem with dizziness alone.² Eighty percent of people aged 65 years and older have experienced

dizziness,³ and BPPV, the most common vestibular disorder, is the cause of approximately 50% of dizziness in older people.⁴ Overall, vertigo from a vestibular problem accounts for a third of all dizziness and vertigo symptoms reported to health care professionals.⁵

Symptoms of chronic dizziness or imbalance can have a significant impact on the ability of a disabled person to perform one or more activities of daily living such as bathing, dressing, or simply getting around inside the home, affecting 11.5% of adults with chronic dizziness and 33.4% of adults with chronic imbalance.⁶ The painful economic and social impacts of dizziness are significantly underestimated.⁵

Vestibular disorders not only profoundly affect adults, but also children. Once thought to be exceptionally rare, pediatric vestibular disorders are receiving increasing attention from clinicians as an overlooked problem.⁷ In addition to impairments of motor development and balance, vestibular deficits may cause poor gaze stability that inhibits children from learning to read. Despite new awareness of pediatric vestibular disorders, children are currently not typically screened for them, and as a result frequently fail to receive medical treatment for their symptoms.

Symptoms

Symptoms of vestibular dysfunction may be mild, lasting perhaps only seconds or minutes, or they may be severe, resulting in total disability. Not all symptoms will be experienced by every person, and other symptoms are possible. Common symptoms of vestibular disorders are listed below.

- Imbalance or unsteadiness
- Vertigo, (a spinning or whirling sensation; an illusion of the self or world moving)
- Dizziness (a lightheaded, floating, or rocking sensation)
- Blurred or bouncing vision
- Nausea
- Hearing changes
- Problems with coordination, thinking, and memory

In addition, people with vestibular disorders may experience headaches and muscular aches in the neck and back, an increased tendency to suffer from motion sickness, and elevated sensitivity to noise and bright lights. People with vestibular disorders often report fatigue that can be so severe that it interferes with their reading and speech ability. If symptoms persist, a person may experience increased irritability, loss of self-esteem, and depression.

Causes

Whiplash and blows to the head are common causes of vestibular disorders

in people under 50 years of age. Exposure to sudden or significant pressure changes, as occur during scuba diving or rapid descent or ascent in an aircraft, can injure the ear. Advancing age can also change the vestibular system and result in balance disturbances.

Ear infections may also cause damage to the vestibular and hearing structures of the inner ear, including the nerves that transmit signals from the ear to the brain.

High doses or long-term use of certain antibiotics can be *ototoxic*, meaning that they cause permanent damage to the inner ear. Other drugs, such as aspirin, caffeine, alcohol, nicotine, sedatives, and tranquilizers, can cause temporary dizziness but typically do not result in permanent damage to the vestibular system.

Migraine or stroke can affect the vestibular system by reducing or blocking the flow of blood to the inner ear or brain.

In many cases, the underlying cause of a vestibular disorder cannot be determined. For example, the definition of Ménière's disease is "the idiopathic syndrome of endolymphatic hydrops." *Idiopathic* means "of unknown cause." Likewise, although head injury and advancing age are common causes of BPPV, about half of all cases of BPPV have no identifiable underlying cause.

Diagnosis

The diagnosis of a vestibular disorder relies on a combination of tests and careful inspection of the history of the problem. A complete physical examination is essential to rule out other causes of dizziness, such as cardiovascular or central nervous system disorders. If a person is then referred to a specialist (otolaryngologist/ENT, otologist, or neurotologist), tests may be performed to measure hearing, eye movement, and balance.

Hearing: Because the vestibular system is closely connected to the hearing apparatus, identifying a change in hearing can give clues about how the vestibular system is functioning. Auditory testing may include audiometry tests to measure a person's ability to hear sounds and recognize words at various frequencies and volumes, tympanometry to measure eardrum function, and an acoustic-reflex test to measure muscle reflexes in the ear with loud sounds. An otoacoustic emissions (OAE) test measures the responsiveness of hair cells in the cochlea, electrocochleography (ECoG) measures how sound signals move from the ear along the beginning of the hearing nerve, and an auditory brainstem response test (ABR; also known as BER, BSER, or BAER) measures how hearing nerve signals travel from the ear to the brain and then within parts of the brain.

Eye movements: The ability of the eyes to keep objects in focus during head movement depends upon information from the vestibular system. Eye movements occurring with various positional changes can be recorded during electro-nystagmography (ENG) or videonystagmography (VNG) and rotary-chair testing. Sometimes a caloric test, involving flushing the ear canal with warm and then cool water, is also used to compare the functioning of each inner ear.

Balance: The vestibular organs provide sensory information about equilibrium, movement, and acceleration. Disorders of these organs negatively affect balance, posture, and movement. These negative affects can be measured and recorded with computerized dynamic posturography (CDP), which uses a special moving platform. Vestibular evoked myogenic potential (VEMP) testing is used to evaluate whether the saccule and the inferior vestibular nerve are intact and functioning normally.

Treatment

In some cases, the symptoms may diminish or disappear without treatment as the vestibular system heals or the nervous system learns to compensate for the disorder. When symptoms persist, treatment can provide a complete cure for some. In other persistent cases, the symptoms can only be controlled, not eliminated entirely. Treatment for vestibular disorders varies according to the diagnosis, and may consist of head

maneuvers, diet changes, a special form of physical therapy called vestibular rehabilitation therapy, prescribed drugs or equipment, or in some cases surgery.

Resources

Vestibular disorders are sometimes difficult to diagnose, and the related symptoms and problems are frequently misunderstood or unrecognized by others. The more informed people with vestibular disorders are, the better that they manage their symptoms and communicate about their needs with family, friends, and health professionals. The Vestibular Disorders Association (VEDA) can help by providing information on specific disorders and on issues related to diagnosis, testing, treatments, and coping; contact information for vestibular disorder specialists; advocacy; help finding a support network; and other resources.

In addition to resources available for purchase, VEDA offers free content and short publications online through the generous support of VEDA members. To learn more about VEDA resources and membership, visit www.vestibular.org.

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