Differential diagnosis of dizziness

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Purpose of review

Dizziness is one of the most common complaints among patients presenting to primary care physicians, neurologists, and otolaryngologists. This symptom is nonspecific and includes a broad differential diagnosis. The current review aims to present a general overview of the approach to dizziness as well as to discuss the more common causes in detail.

Recent findings

The term dizziness encompasses a large spectrum of symptomatology. Understanding how to differentiate between vestibular disorders and other types of dizziness is the key to the evaluation and management of dizzy patients. The distinction between central and peripheral vertigo will be emphasized and the various causes of each type of vertigo will be presented.

Summary

Dizziness is a common medical condition that impacts significantly on patients' activities of daily living. This review outlines the clinical approach to dizziness to facilitate timely diagnosis and management of this complex symptom.

Keywords

benign paroxysmal positional vertigo, dizziness, Ménière's disease, vertigo, vestibular neuronitis

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Introduction

'Dizziness' is a nonspecific term often used by patients to describe their symptoms, but it encompasses a number of different pathophysiologic processes. Dizziness is among the most common complaints leading to a visit to a physician for all age groups. The incidence of dizziness in the general population ranges from 20 to 30% [1••] and it has been demonstrated that with every 5 years of age increase, there is a 10% increase in the probability of suffering from dizziness [2]. A population-based study estimated that 7.5 million patients with dizziness are examined in the ambulatory care setting in the United States each year [3]. The three most common settings to which dizzy patients present are the primary care office, the emergency department, and the specialized dizzy clinics. The first challenge is to establish the presence or absence of vestibular disease, as it comprises approximately 50% of the presenting complaint [4]. Once vestibular disease is confirmed, emphasis is on differentiating peripheral from central causes of vertigo. Most causes of dizziness are benign; however, a small percentage may represent a serious underlying disorder such as cerebrovascular disease or posterior fossa tumor. Accurate and timely diagnosis and management is essential in the life-threatening cases, whereas it can significantly improve quality of life for the debilitating aspect of dizziness in those with benign disorders.

Approach to the patient with dizziness

Given the varying underlying disease processes that may cause dizziness, the patients' description of their symptoms has been found to be the most critical in the establishment of the cause of dizziness [1••,5]. It is crucial to ask the patients to describe their symptoms by using words other than 'dizzy', as it may carry different meanings for different patients. Most commonly, the word is used to describe a variety of subjective symptoms, including vertigo, unsteadiness, light-headedness, generalized weakness, presyncope, syncope, or falling. As practitioners, the distinction between vertigo and nonvertigo is critical in the history, as true vertigo is most likely due to vestibular organ dysfunction, whereas nonvertigo symptoms may be due to a variety of central nervous system, cardiovascular, or systemic diseases. Vertigo is the illusion of true rotational movement of self or surroundings. Nonvertigo symptoms include light-headedness, generalized weakness, imbalance, tilting sensation, or unsteadiness.

Once the symptom of vertigo is established, the time course is the next distinguishing feature. Vertigo lasting

seconds and associated with positional changes is probably due to benign paroxysmal positional vertigo (BPPV). Episodic vertigo that lasts for minutes to hours to days is likely to be caused by Ménière's disease or vestibular neuronitis. Inner ear diseases are often accompanied by other associated symptoms such as hearing loss, aural pressure, or tinnitus. In contrast, central vertigo secondary to central nervous system ischemia is often associated with neurologic characteristics including diplopia, dysarthria, dysphagia, or focal motor/sensory weakness. Ataxic gait and dysdiadochokinesis during vertiginous episodes most likely signifies cerebellar disease. A history of headache may be associated with migraine-related dizziness.

To complete the history, a review of systems including any history of trauma, ear disease/surgery, as well as a psychiatric screen is helpful in establishing the diagnosis. Information on prescription, over-the-counter, and herbal medications may facilitate the identification of any pharmacological causes.

According to the study by Kroenke *et al*. [4], the physical examination did not make the diagnosis but helped confirm it. Positional changes, orthostatic blood pressure and pulse changes, gait evaluation, and the findings of nystagmus were found to be most helpful on physical examination. General examination should begin with vital signs with emphasis on orthostatic changes. The cardiovascular and neurologic systems should also be evaluated. A complete head and neck examination including detail assessment of the external and middle ear to rule out any infectious or inflammatory processes is critical. Cranial nerve examination should be included. Furthermore, a specific assessment of the vestibular system should include eye movement examination, positioning tests, as well as vestibulospinal reflex testing.

After careful history taking and complete physical examination including a vestibular examination, additional tests may be performed to confirm the diagnosis. Precise understanding of the symptoms helps determine the workup. The battery of tests includes audiometry, vestibular tests, hematology, as well as imaging. Due to the scope of this review, vestibular workup will not be discussed.

Differential diagnosis of dizziness

The various causes of dizziness are similar in different settings including the primary care setting, the emergency department, and the specialized dizzy clinic [1••]. Reported proportions are as follows: 40% peripheral vestibular dysfunction, 10% central nervous system lesion, 15% psychiatric disorder, 25% presyncope/dysequilibrium, and 10% nonspecific dizziness [1••]. Each of these disease entities will be discussed in further details in the following sections.

Presyncope

Syncope describes the loss of consciousness as a result of temporary disruption to cerebral oxygenation due to interruption of blood flow to the brain [6]. Presyncope, a more common occurrence, is the prodromal symptom of fainting or a near fainting. Other descriptions patients may report include light-headedness, visual blurring, diaphoresis, or a feeling of warmth. Common causes of presyncope consist of orthostatic hypotension, cardiac arrhythmias, psychogenic disorders, and vasovagal syncope.

Dysequilibrium

Dysequilibrium is a sense of unsteadiness and loss of balance involving the legs or trunk [6]. A number of different underlying disorders may result in dysequilibrium. These include peripheral neuropathy, vestibular disorder, musculoskeletal disorder, gait disorder, and Parkinson's disease.

Nonspecific dizziness

Patients with nonspecific dizziness often have difficulty articulating the exact presenting symptom and seem to have no definite illness. Staab and Ruckenstein [7] proposed the term 'chronic subjective dizziness' to designate patients with nonvertiginous dizziness, subjective imbalance, and hypersensitivity to motion cues in the absence of active vestibular deficits. Psychiatric disorders represent the primary cause of nonspecific dizziness and these include depression, generalized anxiety disorder, panic or phobic disorder, and conversion disorder [8]. This disease entity is also commonly related to hyperventilation, so purposeful hyperventilation is one means to confirm this diagnosis. Other causes of nonspecific dizziness are head trauma [9] and hypoglycemia [10].

Causes of vertigo

The vestibular system consists of a central and a vestibular component. The semicircular canals, the utricle, the saccule, and the vestibular nerve constitute the peripheral parts of the vestibular system. The vestibular nuclear complex, vestibule cerebellum, brainstem, spinal cord, and vestibular cortex represent the central parts of the vestibular system. Once vertigo has been distinguished from other forms of dizziness, the physician must then determine whether the vertigo is of a peripheral or central origin.

Peripheral causes of vertigo

The peripheral causes of vertigo generally comprise most of the cases. The most common causes of peripheral vertigo include BPPV, vestibular neuronitis, and Ménière's disease [11]. Other diagnoses of peripheral vertigo are herpes zoster oticus, labyrinthine concussion, perilymphatic fistula, semicircular canal dehiscence syndrome, and recurrent vestibulopathy. Various causes may be differentiated by their temporal pattern and presence or absence of otological symptoms of hearing loss, tinnitus, or aural fullness.

Benign paroxysmal positional vertigo

BPPV is the most commonly recognized cause of vertigo [12] and is usually encountered as one of two variants: BPPV of the posterior semicircular canal or BPPV of the lateral semicircular canal [13••]. The posterior canal BPPV is by far the more common variant constituting 85–95% of BPPV. The underlying pathophysiology of posterior canal BPPV is thought to be due to debris trapped in the posterior semicircular canal known as canalithiasis, resulting in vertigo with head motion. BPPV affects mostly female patients in the fifth decade. Classically, the history of BPPV consists of brief vertiginous episodes lasting seconds with head movement. The Dix–Hallpike maneuver is the test of choice to confirm the diagnosis of posterior canal BPPV.

Ménière's disease

Ménière's disease is a peripheral vestibular disorder characterized by discrete episodic vertigo lasting minutes to hours, fluctuating low-frequency sensorineural hearing loss, tinnitus, and aural fullness [14]. The vertigo associated with Ménière's disease is often severe and associated with nausea, vomiting, and loss of balance. The underlying pathogenesis is believed to be related to excess endolymphatic fluid pressure leading to inner ear dysfunction; however, the exact causes of hydrops are unknown [15]. Typically, patients present with symptoms between ages of 20 and 40. The reported disease incidence ranges from 10 to 150 per 100 000 persons [16].

Vestibular neuronitis

Vestibular neuronitis, also known as labyrinthitis, is an acute peripheral vestibular dysfunction syndrome characterized by a rapid onset of severe vertigo, nausea, vomiting, and gait instability [17]. The vertigo usually lasts for days to weeks, which helps distinguish vestibular neuronitis from other forms of peripheral vertigo. The vertigo is present at rest and may be exacerbated by position change. A viral prodrome is usually present, as vestibular neuronitis is believed to be a viral or inflammatory disorder affecting the vestibular portion of the cranial nerve eight. Symptoms of hearing loss may be present if the cochlear portion of CN VIII is involved in addition to the vestibular portion and this is termed labyrinthitis. The natural history of this entity usually starts with severe vestibular symptoms followed by gradual return to equilibrium.

Central causes of vertigo

Central vertigo is generally associated with severe vertigo with neurologic signs and less prominent movement illusion. The presence of pure vertical and multidirectional nystagmus with no optical fixation suppression is usually indicative of a central cause of vertigo [1••]. Epidemiologic studies demonstrated that central causes comprise approximately 25% of vertigo experienced in patients [18]. A number of central vertigo disorders may require emergency intervention and they are cerebellar infarction or hemorrhage, basilar artery occlusion, vertebral artery dissection, and a tumor of the posterior cranial fossa. Other central causes of vertigo include migrainous vertigo, multiple sclerosis, and hereditary ataxia. Several selected common central causes of vertigo will be discussed.

Migrainous vertigo

There is increasing recognition that migraine headache is a cause of recurrent vertigo; however, the underlying mechanism is not well understood [19]. Three subtypes of clinical vestibular syndromes related to migraine are basilar-type migraine, benign paroxysmal vertigo of childhood, and vestibular migraine [1••]. Basilar-type migraine is characterized by recurrent headaches associated with visual aura, usually followed by vertigo, tinnitus, decreased hearing, diplopia, ataxis, dysarthria, bilateral paresthesia, and impaired cognition. Benign recurrent vertigo of childhood is considered a childhood manifestation of migraine-related vertigo. This condition is characterized by attacks of vertigo with nausea and vomiting lasting 30 s to 20 min and usually subsides by adolescence or evolves into migraine headaches. Migrainous vertigo is a vestibular disorder that presents with vertigo lasting seconds to days and is associated with migraine symptoms such as headache, visual aura, photophobia, or phonophobia, during the episode. Similar to migraine headache, this type of vertigo can be triggered by foods, sensory stimuli, or situations.

Cerebrovascular disorders

The vertebrobasilar arterial system provides blood supply to the inner ear, brainstem, and cerebellum. The vascular syndromes related to vertigo are as follows.

Brainstem ischemia

Vertebrobasilar transient ischemic attacks of the brainstem is characterized by episodic vertigo lasting minutes

to hours with concurrent neurological symptoms such as diplopia, dysarthria, and ataxia.

Wallenberg's syndrome

Wallenberg's syndrome, also known as lateral medullary infarction, is usually caused by an occlusion of the ipsilateral vertebral artery that supplies the posterior inferior cerebellar artery, leading to acute onset of vertigo. Other neurologic deficits include abnormal eye movements, ipsilateral Horner's syndrome, ipsilateral limb ataxia, and loss of pain/temperature sensation on ipsilateral face and contralateral trunk.

Cerebellar infarction and hemorrhage

Cerebellar infarction and hemorrhage affect mainly older patients and usually produce sudden vertigo associated with nausea and vomiting. Limb ataxia and impaired gait are suggestive of cerebellar lesion.

Multiple sclerosis

It has been reported that vertigo occurs in 20–50% of multiple sclerosis patients [1••,20]. Vertigo usually lasts days to weeks and symptoms may resemble vestibular neuronitis. Depending on the location of the demyelinating plaques, the associated findings may vary. Dysfunction of adjacent cranial nerves (facial numbness, diplopia) or cerebellar signs (severe ataxia) may be present.

Conclusion

Dizzy patients present a complex yet frustrating diagnostic challenge, given the numerous possible underlying medical conditions. Dizziness can be a manifestation of disorder of the neurologic, cardiovascular, psychiatric, or vestibular systems. Eliciting a precise description of the dizziness is the most crucial factor in identifying the specific diagnosis. Once a history of vertigo is ascertained, a physician needs to differentiate between a central and a peripheral cause, as the disturbance in vestibular function can exist anywhere in the vestibular system. The precise understanding of the symptomatology determines the work-up of dizziness. Although most causes of vertigo are benign, rare cases of central vertigo can be life-threatening and require immediate medical attention. A systematic approach to dizziness as presented is essential in the timely diagnosis and management.

References and recommended reading

Papers of particular interest, published within the annual period of review, have been highlighted as:

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Additional references related to this topic can also be found in the Current World Literature section in this issue (pp. 244–245).

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