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Geriatric vestibulopathy assessment and management

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Abstract

Purpose of review—This review discusses the demographics of dizziness in the older person, the evaluation of the older dizzy patient and how the treatment of dizziness in older patients differs from that in younger individuals.

Recent findings—Seven percent of all visits to primary care physicians for patients older than 65 years of age are for dizziness, and dizziness is the most common complaint for patients older than 75 years. In a German study, the 12-month prevalence of vertigo in the general population was 5% with an incidence of 1.4% in adults overall. For individuals aged 60–69 the 12-month prevalence was found to be 7.2% and in individuals 70 years of age or older 8.9%. Data from the United States National Health and Nutrition Examination Surveys indicated that the prevalence of vestibular dysfunction for individuals in the seventh decade of life, eighth decade of life, and older was 49.4, 68.7, and 84.8 percent, respectively. Only subtle age effects are seen on caloric and rotational testing whereas vestibular evoked myogenic potentials (VEMPs) change somewhat with age. Particle repositioning for benign paroxysmal positional vertigo combined with vestibular rehabilitation is more effective than only performing the repositioning maneuver. Tai Chi appears to be an effective intervention for older adults at risk for falling.

Summary—When caring for an older dizzy patient always assess medication use, perform a Dix–Hallpike maneuver, obtain orthostatic vital signs, discuss fall risk precautions, and consider referral for vestibular rehabilitation.

Keywords

aging; benign paroxysmal positional vertigo; vestibular rehabilitation

Introduction

The older dizzy patient presents particular challenges to clinicians. There is good reason to focus on the older dizzy patient because dizziness is quite common in the older age group and this complaint may be particularly troubling to an older individual [1]. Based on a large

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United States study (n¼5086), it is estimated that 35% of people over the age of 40 have had vestibular dysfunction with active dizziness increasing the odds of falling by 12 [1]. Symptoms of dizziness may limit mobility and activities, especially in older persons. Moreover, older individuals are especially prone to falls [2] and a complaint of dizziness may indicate an increased fall risk [1]. Clinicians may wonder whether there are special considerations regarding dizziness in the older patient. In particular, a valid question is whether or not the assessment and treatment of the older patient with dizziness differs from that of younger individuals. This brief review will outline key aspects of the care of the older dizzy patient and review recent literature on this topic. In a recent review, Gopinath et al. [3] reported that dizziness in older persons is a frequent complaint that significantly reduces quality of life scores. Moreover, those patients with vestibular vertigo rather than nonvestibular vertigo appear to have a higher handicap as measured by the Dizziness Handicap Inventory. The purpose of this review is to discuss the demographics of dizziness in the older person, understand how the evaluation of the older patient with dizziness differs from that of younger individuals, and gain an appreciation for how the treatment of dizziness in older patients differs from that of younger individuals.

Demographics of dizziness in the older patient

Dizziness is a very common complaint in the older patient. In individuals older than 60 years of age, the 1-year prevalence of community-dwelling adults having significant dizziness that prompts a medical evaluation, treatment with a medication, or that interferes with activities in the past year is 20%[4]. In individuals greater than 70 years old, 36% of women and 29% of men have balance difficulties [5]. In the 80–90 year old age group, 51% of women and 45% of men suffer from imbalance [5]. There is a higher risk of falls and fractures in individuals over the age of 65. Seven percent of all visits to primary care physicians for patients older than 65 years of age are for dizziness, and dizziness is the most common complaint for patients older than 75 years [6,7].

Gopinath et al. [3] reported that dizziness and vertigo, vestibular vertigo, and nonvestibular vertigo had a prevalence of 36.2%, 10%, and 14.2%, respectively, in the older population. In a family practice setting, Maarsingh et al. [8] reported that the 1-year prevalence of dizziness for patients aged 65 or older is 8.3% with a higher prevalence in women. The incidence of dizziness was 47.1 per 1000 person years. Neuhauser and Lempert [9] reported that the 12-month prevalence of vertigo in the general population is 5%, with an incidence of 1.4% in adults overall. For individuals aged 60–69 the 12-month prevalence was found to be 7.2%, and in individuals 70 years of age or older 8.9%. Agrawal et al. [1] reported data from the United States National Health and Nutrition Examination Surveys using a simple pass/fail measure of upright balance while participants stood on a compliant foam pad with eyes closed, thus requiring individuals to use vestibular sensation primarily. The prevalence of vestibular dysfunction by this measure for individuals in the seventh decade of life, eighth decade of life, and older was 49.4, 68.7, and 84.8% respectively. These data highlight how common vestibular dysfunction becomes in older individuals. Illing et al. [10] recorded postural stability and found that older individuals were less stable when standing on either a firm or a foam surface.

Influence of aging on the anatomy and physiology of the vestibular system

An important question regarding the influence of aging on the balance system is whether or not balance dysfunction in a particular individual is related to a normal aging process or represents pathophysiology. Aging adversely affects sensory function, sensory-motor processing, and musculoskeletal abilities. For the vestibular system in particular, aging is associated with degeneration of otoconia, degeneration of hair cells, loss of vestibular afferents, and a reduction in the number of cells in the vestibular nuclei. A common misconception regarding the management of older dizzy patients is that dizziness is a part of normal aging and is, therefore, not treatable. This is certainly untrue. As a result of this misconception, older patients with treatable causes of dizziness, for example benign paroxysmal positional vertigo (BPPV), will often experience a longer duration of symptoms prior to receiving a diagnosis [11].

History and physical examination of the older dizzy patient

When taking a history from older dizzy patients the clinician should be aware that the causes of dizziness are somewhat different for the older age group. In particular, most dizziness is nonvestibular and patients may have both vestibular and nonvestibular dizziness. Basic principles regarding the etiology of dizziness in older versus younger patients are as follows:

1. common etiologies are still common,
2. multisensory deficits are common,
3. a multifactorial etiology is common,
4. disequilibrium of aging secondary to microvascular disease is common,
5. migraine-related dizziness is highly unusual,
6. psychological factors as a primary cause of dizziness are unusual.

Katsarkas [12] in a study of nearly 1200 patients over the age of 70 with dizziness found that nearly 40% had benign positional vertigo and only 4% had Meniere’s disease. When taking a history from the older patient, it is often helpful to consider having a friend or family member assist with eliciting the history, including filling out a dizziness questionnaire. The clinician should specifically ask about medications. Medications most often associated with dizziness are [13] as follows:

1. anticonvulsants,
2. antidepressants,
3. anxiolytics,
4. sedatives, including hypnotics,
5. strong analgesics,
6. muscle relaxants,
7. antiarrhythmics.

Also, older patients may not specifically complain of vertigo even when they are manifesting BPPV and nystagmus. Thus, a Dix–Hallpike maneuver should be performed in all older dizzy patients. The physical examination of the older patient with dizziness is similar to that of the younger individual except as follows: definitely obtain orthostatic signs, perform a mini-mental status examination, check for extremity and postural tremor, and perform a Dix–Hallpike maneuver. In a recent article, Dominquez and Magro [14] reviewed bedside balance tests that can easily be performed with older patients. These include an assessment of spontaneous nystagmus, head impulse testing, dynamic visual acuity, head-shaking nystagmus, Dix–Hallpike maneuvers, foam and dome, and timed up and go tests.

Laboratory assessment of the older dizzy patient

The decision regarding whether or not to obtain vestibular laboratory testing depends upon the nature of the patient's condition, the clinician's expertise, and the availability of laboratory testing. In a recent review, Maes et al. [15] found that only subtle age effects are seen on caloric and rotational testing, suggesting that results on these tests can be interpreted largely the same in younger and older individuals. Vestibular evoked myogenic potentials (VEMPs), however, have been shown to change somewhat with age [15–17]. VEMP thresholds increase and response amplitudes decrease with advanced age. A new laboratory test, the Gaze Stability Test, which is comparable to the Dynamic Visual Acuity Test, has been shown to be affected by advanced age [18], which should be noted when interpreting the results of this test.

Management of the older patient with vestibulopathy

The incidence of BPPV is most likely underestimated [19]. Oghalai et al. [20] noted a 9% incidence of unrecognized BPPV in older adults. The most common disorder in the older dizzy population is BPPV and may be more challenging because of the presence of kyphosis and decreased range of motion in the cervical spine. It is appropriate to have an assistant in the room during the particle-repositioning maneuver and to perform slow/ gentle rather than abrupt movements. Older adults are also more likely to have large vessel compromise. Care should be exercised in performing extension of the cervical spine in persons with a history of vertebrobasilar compromise or prior stroke. Note also that downbeating nystagmus can be misdiagnosed as BPPV [21], so care should be taken to insure that the person's nystagmus fatigues and has short onset latency with onset based on a change of head position.

There is no need to hyperextend the neck in that the orientation of the head relative to gravity rather than the orientation of the head with respect to the body is the key to a successful particle-repositioning maneuver. Putting the treatment bed in the Trendelenburg position or using a foam wedge may be helpful. It does not appear that vibration has any value in enhancing the effectiveness of the particle-repositioning maneuver [22,23]. Regarding postparticle repositioning instructions it is probably inappropriate to ask older patients to sleep upright in that eliminating postparticle repositioning maneuver positional restrictions did not influence outcome [24,25, 26–28]. Additionally, poor sleep may lead to an increased risk of falls, especially in older individuals [29].

Recently investigators have suggested that chronic persistent dizziness in older adults may be from extremely weak, horizontal, direction-changing apogeotropic positional nystagmus that is seen with horizontal canal BPPV [30]. Forty-nine percent of their 200 older adults with chronic dizziness had weak horizontal, direction-changing apogeotropic positional nystagmus, suggesting that this mild form of BPPV is fairly common in older people [30]. In older adults with BPPV, there may be an association with osteopenia or osteoporosis [31], although the investigation was conducted on young and older rats.

Older adults with BPPV may also experience greater postural instability than younger people postrepositioning [29], although others report that there are no differences in treatment responsiveness of older versus young adults [32]. Angeli et al. [33] reported that in older adults, a particle-repositioning maneuver combined with vestibular rehabilitation was more effective than only performing the repositioning maneuver. Recent evidence suggests that patients postrepositioning improve their gait immediately after repositioning [34]. It is always imperative to check both ears in older adults with BPPV, especially if they have fallen recently. Bilateral BPPV is much more common after head trauma [35]. Many older adults, after experiencing BPPV, become afraid of falling and treating BPPV enhances quality of life [36,37]. Daily Brandt–Daroff exercises do not appear to be effective at preventing recurrence of BPPV [38,39].

The management of Meniere's disease in the older patient is made more challenging by the risk of poor compensation in the older patient following ablative procedures. Ablative procedures can replace vertigo with chronic dysequilibrium. Note however that many older patients can compensate well after transmastoid labyrinthectomy [40–42], so surgical treatment is an option. Vestibular rehabilitation, even in the early stages, may decrease dizziness symptoms in persons with Meniere's disease [43].

Vestibular rehabilitation for the older dizzy patient

Vestibular rehabilitation is known to be helpful for patients with vestibular disorders of all ages [44–48]. Enticott et al. [49] recently conducted a small randomized trial that suggests that persons undergoing a customized exercise program had enhanced outcomes compared with a similar exercise group who performed strength and endurance exercises. It may be beneficial to begin exercises early with patients, as they improved faster with an early exercise program compared with a control group [50]. Vestibular rehabilitation has been shown to be helpful for patients with dysequilibrium of aging [51]. In a recent evaluation of 240 patients older than 70 years, Jung et al. [52] found that vestibular rehabilitation therapy was helpful in reducing dizziness even in patients without a specific diagnosis. The American Geriatric Society's guidelines suggest that balance exercises in standing are of particular benefit to older adults at risk for falling [53]. Vestibular rehabilitation has been shown to result in changes in dynamic visual acuity, that is, the ability to move the head while gazing at an optotype [54].

Reducing the risk of falls in older individuals with dizziness is especially important [46]. Simple measures that can reduce fall risk are as follows:

1. reduce orthostatic hypotension,

2. reduce medications, if possible, that worsen balance[55],
3. improve visual acuity with appropriate eyeglasses[56–58],
4. refer patients with a history of falls, instability, gait or balance abnormalities to a vestibular therapist,
5. encourage home safety nightlights, no loose rugs, grab bars [59,60],
6. consider assistive devices (bed alarms, canes, walkers, hip protectors) [53,61,62],
7. encourage exercise [53,63],
8. encourage wearing sturdy shoes [64],
9. increase walking speed.

The above list outlines some simple measures that should be undertaken to reduce fall risk in the older dizzy patient [65]. Both the American Geriatric Society and the American Academy of Neurology have developed new guidelines for fall risk [53,66]. Falls are common in persons with vestibular disorders and often require intervention as older adults often change their behavior as a result of a fall. The definition of what investigators define as a fall is often not included in current manuscripts describing falls, making comparisons among studies difficult [67].

Restriction of activities and changes in older adults' quality of life are common after a fall [68]. The restriction of activities by older adults results in reductions in gait velocity, a key factor related to general health. Generally, as people walk more slowly they are at greater risk for falling and have associated increased mortality rates. Increasing older adults' strength [63], particularly in the foot [69], appears to reduce the risk of falling [70]. Consideration should be given to referring patients with central vestibular disorders as well as patients with peripheral vestibular hypofunction for vestibular rehabilitation [71,72].

Tai Chi has been used with persons with vestibular disorders with some success [73,74]. Distal sensation appears to be enhanced in older adults after Tai Chi training in both control individuals and in persons with distal sensory loss [75]. The enhanced distal sensation is most likely due to making the individuals more aware of their distal extremities. There are no large trials of the effectiveness of Tai Chi in persons with vestibular disorders, but the results are promising for the two smaller trials that have studied Tai Chi effectiveness in persons with vestibular disorders [73,74]. Tai Chi appears to be an effective intervention for older adults at risk for falling [53,76].

There are several new interventions that may assist older adults with balance and vestibular disorders in the future, including the use of augmented sensation through vibration [77], special shoe inserts to prevent falls, and the use of virtual reality. Recently, Dozza et al. [78] and others have reported that gait improves and fall risk decreases in persons with balance and vestibular disorders when using an instrumented vibrotactile vest in a gait laboratory. Vibrotactile devices are currently being tested in older adults' shoes [79–81], in vests applied around the trunk [82], and even on the head [83]. Subthreshold vibration has been shown to decrease postural sway in standing in older adults, persons post-stroke and in

persons with diabetes and has been tested recently during gait in older adults [84]. Older adults appear to be able to process the vibratory information to enhance postural control at the trunk, head and foot whether the sensation is perceived or is not perceptible. It is not clear yet which of the devices will work most effectively to improve balance in older adults.

Special shoe inserts may also be used to provide augmented somatosensory inputs to assist the older adults' postural control [85]. Perry et al. [85] have devised a shoe insert that provides input on the outer borders of the sole of the foot in order to provide increased input concerning whether the person has exceeded or will soon exceed their limits of stability. The preliminary results are promising as persons who wore the insoles fell less frequently than a control group who wore a traditional shoe insert [85]. Shoe inserts and vibration are particularly attractive for older adults who refuse to exercise to enhance their postural control.

Small accelerometers have recently been used with older adults, primarily older adults with neurologic disorders, to determine the quality of their movement. The accelerometry technology is reasonable in cost and most likely will be used to assess balance in the future in older adults. With Bluetooth technology, it is probable that accelerometers will be used in people's homes as activity monitors to determine whether patients have increased their participation in daily activities after medical intervention. Accelerometers can also be instrumented as a reasonable method to record changes in gait [86,87].

Conclusion

The management of the older dizzy patient, similar to the care of patients of all ages, requires careful attention to symptoms, signs and laboratory abnormalities. For the older patient, however, several points should be kept foremost. Always assess medication; perform a Dix–Hallpike maneuver; obtain orthostatic vital signs; ablative surgery should be performed only after very careful consideration; enact fall risk precautions; and consider referral for vestibular rehabilitation.

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