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Vestibular Rehabilitation

Rehabilitation Options for Patients With Dizziness and Imbalance

Introduction

Patients with peripheral vestibular dysfunction often present with more than simply symptoms of dizziness. Patients may have an array of physical and functional limitations that affect their everyday activities. For instance, persons with a unilateral vestibular hypofunction (unilateral weakness) may have difficulty driving because of an inability to quickly check their blind spot, and persons with benign paroxysmal positional vertigo (BPPV) may subconsciously avoid fully checking their review mirror for fear of provoking an episode of vertigo.

Often, patients who choose to limit their activities dramatically reduce their mobility and, consequently, report feelings of unsteadiness and imbalance when walking and performing other daily activities. Some elderly patients find that dizziness may be the symptom that prompts their entry into the medical system. They may have additional balance issues and be at a high risk of falling. With the near epidemic incidence rate and complications of falls in the elderly (Centers for Disease Control and Prevention, 2008a, 2008b; Lyons, 2004; Stuck, 1999), the identification and proper referral for care is a professional duty and public health priority.

Audiologists conduct vestibular evaluations in patients with balance and dizziness disorders. Audiologists may also provide rehabilitation of patients with BPPV and serve as members of multidisciplinary teams that manage patients with balance disorders. It is important for audiologists to be knowledgeable about the rehabilitation interventions that professionals such as physical and occupational therapists utilize to minimize the patients' symptoms and maximize their function. The evidence supporting the effectiveness of vestibular rehabilitation is quite strong (Hillier & Hollohan, 2007). A key ingredient to successful rehabilitation is proper identification of the problem and a systematic and progressive program of exercises. Exercises prescribed depend directly on the underlying pathology and symptom presentation.

Repositioning Maneuvers

Of the various rehabilitation interventions, the most noteworthy is the effectiveness of canalith repositioning treatment (CRT) for canalithiasis BPPV or liberatory maneuvers for cupulolithiasis BPPV. The use of CRT for BPPV of the posterior canal has been most widely studied. The recovery of BPPV with correct application of CRT results in a resolution of symptoms with a success rate of 65%-95% within one or two treatments (Asawavichianginda, Isipradit, Snidvongs, & Supiyaphun, 2000; Froehling et al., 1991; Lempert, Wolsley, Davies, Gresty, & Bronstein, 1997; Lynn, Pool, Rose, Brey, & Suman, 1995; Prokopakis et al., 2005; Richard, Brintjes, Oostenbrink, & van Leeuwen, 2005; Wolf, Hertanu, Novikov, & Kroonenberg, 1999; Yimtae, Srirompotong, Srirompotong, & Sae-seaw, 2003). The difference in success rate is unknown but may depend on accurate diagnosis, individual patient factors, and the skill of the professional performing the treatment. The less well-known liberatory maneuvers have also been shown to have success rates of 50%-93% after one to four treatments (Herdman, Tusa, Zee, Proctor, & Mattox, 1993; Ireland, 1994; Levrat, van Melle, Monnier, & Maire, 2003; Semont, Freyss, & Vitte, 1988). CRT (also referred to as the Epley maneuver) is the most well-known treatment for dizziness; however, there are several other interventions performed by rehabilitation specialists for the treatment of dizziness and imbalance.

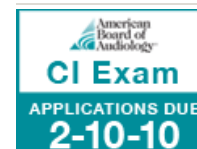
Adaptation Exercises

Treatment for decreasing symptoms of dizziness can be categorized as habituation exercises or adaptation exercises (Herdman & Whitney, 2007). For a person with a unilateral uncompensated hypofunction (UVH), prescribed exercises that focus on adaptation of the vestibular-ocular reflex (VOR) are indicated. The therapist must carefully instruct the patient in proper performance of the exercises for successful rehabilitation. Exercises consist of performing head movements while keeping

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a target in focus. For example, a patient is asked to look at a target in front of him and move his head side to side while keeping the target in focus. The patient should perform the exercise at a hertz (Hz) that results in subtle feelings of nausea at the end of 1-2 minutes of performance (Herdman & Whitney, 2007). The exercises are progressed in difficulty and performed at an intensity that induces an error signal. Therefore, the exercises should be progressed by pushing the speed to a level just slower than when the target falls off focus. Because adaptation is so precise, the exercise must be performed in various positions (i.e., sitting, standing, lying, walking) and at various distances and speeds. Adaptation of the VOR can be complicated by moving the target in the opposite direction of the head movement. Moving the arm and head in opposite directions forces a doubling of the gain needed for the eyes to stay on target. It also takes quite a bit of coordination to perform this combination exercise, making the exercises difficult to perform for many patients.

Another method of coordinating eye and head movements is accomplished by using two targets. The two targets are placed approximately 3-4 feet apart on a wall in front of the patient. First, the patient looks at one target with only her eyes then moves her head to be in alignment with the target without the eyes drifting off the target. Then without moving her head, the patient looks at the other target with her eyes only and then moves the head to be in alignment with the target. Again the eyes should not drift off the target. As with any VOR exercise, the adaptation is very specific, and the exercise should be performed at different speeds and in the vertical plane as well as the horizontal plane. Once various speeds are accomplished, the exercises can be further maximized by performing them with a complex background (Herdman & Whitney, 2007).

A typical adaptation program duration is between 6 and 8 weeks and results in a return to not only the ability to go grocery shopping without an increase in symptoms but to accomplish the shopping within a reasonable time frame and without resulting in excessive fatigue. Recently we had tremendous success with a patient who had a 95% unilateral vestibular loss. She was able to return to teaching fourth grade and was successful in the classroom environment because she no longer had to worry about her symptoms. She was able to walk backward down the hallway, turn quickly, and ascend and descend stairs without symptoms or loss of balance. This was remarkable considering that the entire time she was performing these activities she was also constantly moving her head to scan the children and keep them all in continual view.

Habituation Exercises

A person with motion or visual field sensitivity may be prescribed a similarly progressive exercise program; however, the mechanism behind these exercises is considered habituation (Herdman & Whitney, 2007). The phenomenon of habituation can be likened to the phenomenon that allows you to tune out a continuous repetitive tone. After a while of hearing it, your brain simply ignores it. A therapist can determine which specific movements or environments cause a moderate level of symptoms. Then, through a progressive program of repetitive exposure, the patient habituates to the sensation and as a result minimizes the symptoms.

One mechanism used to determine specific motion sensitivity is the Motion Sensitivity Quotient (Shepard & Telian, 1995). The test has been shown to have good reliability and validity in a study of 15 patients and is useful for determining the specific activities to perform (Akin & Davenport, 2003). The Motion Sensitivity test consists of a series of movements that the patient performs. After each movement, the patient assesses the level and duration of dizziness associated with the movement. The therapist identifies and selects up to four movements that cause moderate level symptoms for treatment. The patient is instructed to perform the movements repeatedly, usually at a frequency of two times per day with three repetitions per session (Herdman & Whitney, 2007). Unlike the Cawthorne (Cawthorne, 1944) and Cooksey (Cooksey, 1946) do-it-yourself exercises that were advocated in the 1940s, selective exercises may be more efficient for patients' recovery (Szturm, Ireland, & Lessing-Turner, 1994).

Although success rates of complete recovery of symptoms through rehabilitation of either adaptation or habituation exercises are not as great as those for BPPV, they are still very good. The vast majority of patients, 80%, will have at least a decrease in symptoms. Anywhere from 10% to 30% of patients with UVH will not have an improvement (Herdman & Whitney, 2007). However, indications of improvement in function as measured through the Dizziness Handicap Inventory (Jacobson & Newman, 1990) or other disability or functional ability questionnaires have been shown after participation in vestibular rehabilitation (Cohen & Kimball, 2003, 2004; Hillier & Hollohan, 2007).

Imbalance Exercises

The problems of "dizziness" in the elderly can often be a puzzle to solve. Dizziness is the term often used to describe many symptoms besides vertigo. Often the exact description is not fully investigated, and patients are referred for an electronystagmography (ENG) or videonystagmography (VNG) to determine whether vestibular weakness exists. Yet, when the patient is asked to describe the dizziness without using the word "dizzy," the true symptoms of imbalance or syncope may be

revealed. Many systems affect our sense of equilibrium, and each has to be examined. In addition to vestibular dysfunction, symptoms can arise from issues with circulation, breathing, cervical dysfunction, muscular weakness, peripheral neuropathy, and sensory processing dysfunction. The patient's subjective reports of symptoms will tell much of the story; however, dizziness is not always clearly described, and each patient has a different perception. A good case history is crucial.

Symptoms described as "lightheaded," "passing out," or "swooning" can indicate a cardiovascular issue. Some patients referred to our balance clinic for vestibular evaluation have had underlying pathologies such as a pacemaker malfunction, vertebral artery occlusion, obstructive pulmonary disease decompensation, orthostatic hypotension, and cardiac arrhythmia as causes of the symptoms. All patients seen in our balance clinic have their blood pressure, heart rate and rhythm, and oxygen saturation measured during their evaluation. Usually, cardiovascular and pulmonary conditions are treated under the medical management by the physician. However, some general conditioning or breathing exercises may be beneficial once the physician clears the patient for exercise. A rehabilitation professional with knowledge and skill in cardiopulmonary rehabilitation would be able to monitor the patient and modify the exercise program as needed.

When imbalance is a result of general vestibular hypofunction, rehabilitation exercises that challenge balance without vision, with disturbed vision, or on uneven surfaces are indicated. These balance exercises can enhance the use of the vestibular input and should be performed to challenge both static and dynamic balance. A patient may be instructed to stand with his feet together on a firm surface and then progress to a compliant surface. Then the exercise can progress to being performed with the eyes closed or while moving the arms or catching a ball. More dynamic balance activities would include having a patient perform "sit to stand" from various surfaces or walk while looking at objects, or with eyes closed, or while catching a ball.

Imbalance can also be a result of general disuse. Various exercise programs in the community or at home have been shown to improve balance and decrease the risk of falls (Brown, 1999; Davis, Donaldson, Ashe, & Khan, 2004; Marigold et al., 2005). Specific physical impairments should be addressed in addition to performing balance activities. If muscular weakness is identified, traditional strengthening with progressive resistive exercises is warranted. Likewise, if lack of flexibility is noted, traditional stretching may be beneficial (Whaley, Brubaker, & Otto, 2006). As with any rehabilitation program, exercises that focus on specific physical impairments must be combined with functional activities. As the patient's physical performance improves (i.e., greater strength or flexibility), the new ability has to be incorporated into functional activities for long-term maintenance.

Summary

Balance issues can be identified and addressed after a thorough examination and evaluation by a rehabilitation professional. Testing for both static and dynamic balance, strength, and flexibility, in addition to home safety, depression, cognition, and medications, is recommended.

Accurate diagnosis leading to appropriate interventions by skilled rehabilitation professionals can provide a great service for patients with complaints of dizziness or imbalance. Knowing and developing relationships with the rehabilitation professionals in your community will provide you with an excellent resource for yourself and your patients. The Vestibular Disorders Association, an excellent resource for both patients and professionals, maintains a database of vestibular rehabilitation professionals. There are many resources and methods for recovery currently available. The patient no longer has to "live with" being dizzy.

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