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Vestibular Rehabilitation

An Effective, Evidence-Based Treatment

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Evidence has shown that vestibular rehabilitation can be effective in improving symptoms related to many vestibular (inner ear/balance) disorders.[1,2] People with vestibular disorders often experience problems with vertigo, dizziness, visual disturbance, and/or imbalance. These are the problems that rehabilitation aims to address. Other problems can also arise that are secondary to vestibular disorders, such as nausea and/or vomiting, reduced ability to focus or concentrate, and fatigue.

Symptoms due to vestibular disorders can diminish quality of life and impact all aspects of daily living. They also contribute to emotional problems such as anxiety and depression. Additionally, one of the consequences of having a vestibular disorder is that symptoms frequently cause people to adopt a sedentary lifestyle in order to avoid bringing on, or worsening, dizziness and imbalance. As a result, decreased muscle strength and flexibility, increased joint stiffness, and reduced stamina can occur.

Treatment strategies used in rehabilitation can also be beneficial for these secondary problems.

WHAT IS VESTIBULAR REHABILITATION?

Vestibular rehabilitation (VR), or vestibular rehabilitation therapy (VRT) is a specialized form of therapy intended to alleviate both the primary and secondary problems caused by vestibular disorders. It is an exercise-based program primarily designed to reduce vertigo and dizziness, gaze instability, and/or imbalance and falls. For most people with a vestibular disorder the deficit is permanent because the amount of restoration of vestibular function is very small. However, after vestibular system damage, people can feel better and function can return through compensation. This occurs because the brain learns to use other senses (vision and somatosensory, i.e. body sense) to substitute for the deficient vestibular system. The health of particular parts of the nervous system (brainstem and cerebellum, visual, and somatosensory sensations) is important in determining the extent of recovery that can be gained through compensation.

For many, compensation occurs naturally over time, but for people whose symptoms do not reduce and who

continue to have difficulty returning to daily activities, VRT can help with recovery by promoting compensation.[3]

The goal of VRT is to use a problem-oriented approach to promote compensation. This is achieved by customizing exercises to address each person's specific problem(s). Therefore, before an exercise program can be designed, a comprehensive clinical examination is needed to identify problems related to the vestibular disorder. Depending on the vestibular-related problem(s) identified, three principal methods of exercise can be prescribed: 1) Habituation, 2) Gaze Stabilization, and/or 3) Balance Training.[4]

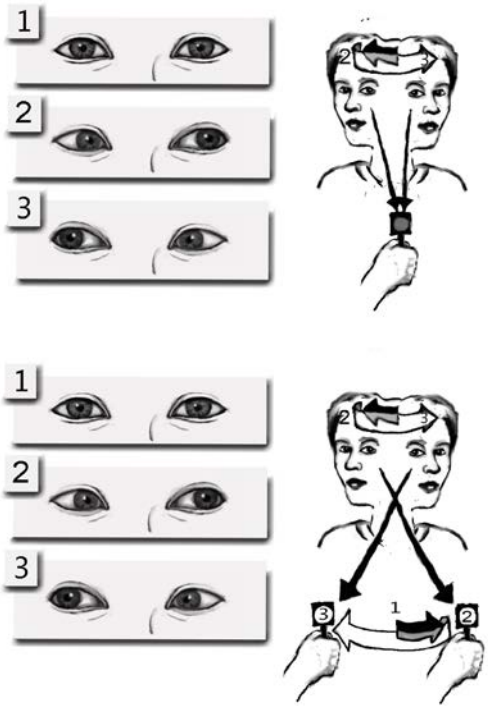
Habituation exercises are used to treat symptoms of dizziness that are produced because of self-motion[3] and/or produced because of visual stimuli[5,6]. Habituation exercise is indicated for patients who report increased dizziness when they move around, especially when they make quick head movements, or when they change positions like when they bend over or look up to reach above their heads. Also, habituation exercise is appropriate for patients who report increased dizziness in visually stimulating environments, like shopping malls and grocery stores, when watching action movies or T.V., and/or when walking over patterned surfaces or shiny floors.

Habituation exercise is not suited for dizziness symptoms that are spontaneous in nature and do not worsen because of head motion or visual stimuli. The goal of habituation exercise is to reduce the dizziness through repeated exposure to specific movements or visual stimuli that provoke patients' dizziness. These exercises are designed to mildly, or at the most moderately, provoke the patients' symptoms of dizziness. The increase in symptoms should only be temporary, and before continuing onto other exercises or tasks the symptoms should return completely to the baseline level. Over time and with good compliance and perseverance, the intensity of the patient's dizziness will decrease as the brain learns to ignore the abnormal signals it is receiving from the inner ear.

Gaze Stabilization exercises are used to improve control of eye movements so vision can be clear during head movement. These exercises are appropriate for patients who report problems seeing clearly because their visual world appears to bounce or jump around, such as when reading or when trying to identify objects in the environment, especially when moving about.

There are two types of eye and head exercises used to promote gaze stability. The choice of which exercise(s) to use depends on the type of vestibular disorder and extent of the disorder. One type of gaze stability exercise incorporates fixating on an object while patients repeatedly move their heads back and forth or up and down for up to a couple of minutes. The following pictures

demonstrate examples of this type of gaze stability exercise.



The other type of gaze stability exercise is designed to use vision and somatosensation (body sense) as substitutes for the damaged vestibular system. Gaze shifting and remembered target exercises use sensory substitution to promote gaze stability. These exercised are particularly helpful for patients with poor to no vestibular function, such as patients with bilateral (both sides) inner ear damage.[4]

Balance Training exercises are used to improve steadiness so that daily activities for self-care, work, and leisure can be performed successfully. Exercises used to improve balance should be designed to address each patient's specific underlying balance problem(s).[7] Also, the exercises need to be moderately challenging but safe enough so patients do not fall while doing them. Features of the balance exercises that are manipulated to make them challenging, include:

- Visual and/or somatosensory cues
- Stationary positions and dynamic movements
- Coordinated movement strategies (movements from ankles, hips, or a combination of both)
- Dual tasks (performing a task while balancing)

Additionally, balance exercises should be designed to reduce environmental barriers and fall risk. For example, the exercises should help improve patients' ability to walk outside on uneven ground or walk in the dark. Ultimately, balance training exercises are designed to help improve standing, bending, reaching, turning, walking, and if required, other more demanding activities like running, so that patients can safely and confidently return to their daily activities.

For patients with **Benign Paroxysmal Positional Vertigo (BPPV)** the exercise methods described above are not appropriate. First a clinician needs to identify the type of BPPV the patient is suffering from, and then different repositioning exercises can be performed.[8,9] For more details about BPPV, including diagnosis and treatment, see VEDA's article on this topic.

After BPPV has been successfully treated and spinning symptoms resolved, some patients will continue to report non-specific dizziness (symptoms other than spinning) and/or imbalance. In these cases, treatment using habituation exercise and/or balance training may be indicated.[4]

WHAT SHOULD PATIENTS EXPECT FROM VESTIBULAR REHABILITATION?

VRT is usually performed on an outpatient basis, although in some cases, the treatment can be initiated in the hospital. Patients are seen by a licensed physical or occupational therapist with advanced post-graduate training.

VRT begins with a comprehensive clinical assessment that should include collecting a detailed history of the patient's symptoms and how these symptoms affect their daily activities. The therapist will document the type and intensity of symptoms and discuss the precipitating circumstances.

Additionally, information about medications, hearing or vision problems, other medical issues, history of falls, previous and current activity level, and the patient's living situation will be gathered.

The assessment also includes administering different tests to more objectively evaluate the patient's problems. The therapist will screen the visual and vestibular systems to observe how well eye movements are being controlled. Testing assesses sensation (which includes gathering information about pain), muscle strength, extremity and spine range of motion, coordination, posture, balance, and walking ability.

A customized exercise plan is developed from the findings of the clinical assessment, results from laboratory testing and imaging studies, and input from patients about their goals for rehabilitation. For example, a person with BPPV may undergo a canal repositioning exercise for the spinning s/he experiences, whereas, someone with gaze instability and dizziness due to vestibular neuritis (a deficit from a weakened inner ear) may be prescribed gaze stability and habituation exercises, and if the dizziness affects their balance this may also include balance exercises.

An important part of the VRT is to establish an exercise program that can be performed regularly at home. Compliance with the home exercise program is essential to help achieve rehabilitation and patient goals.

Along with exercise, patient and caregiver education is an integral part of VRT. Many patients find it useful to understand the science behind their vestibular problems, as well as how it relates to the difficulties they may have with functioning in everyday life. A therapist can also provide information about how to deal with these

difficulties and discuss what can be expected from VRT. Education is important for patients because it takes away much of the mystery of what they are experiencing, which can help reduce anxiety that may occur as a result of their vestibular disorder.

ARE VESTIBULAR REHABILITATION EXERCISES DIFFICULT TO DO?

VRT exercises are not difficult to learn, but to achieve maximum success patients must be committed to doing them.

Since the exercises can sometimes be tedious, setting up a regular schedule so that the exercises can be incorporated into daily life is very important.

Exercises may, at first, make symptoms seem worse. But with time and consistent work, symptoms should steadily decrease, which means participation in activities of daily life will be easier for patients to do.

FACTORS THAT CAN IMPACT RECOVERY

When patients participate in VRT different factors can impact the potential for recovery. For example, the type of vestibular disorder affects recovery. Patients that have a stable vestibular disorder, such as vestibular neuritis or labyrinthitis, have the best opportunity to achive a satisfactory resolution of their symptoms. When patients have a progressive vestibular disorder, like multiple sclerosis, or a fluctuating condition, like migraine and Meniere's, which cause spontaneous attacks of dizziness or vertigo, compensation can be difficult to achieve, and therefore, success with VRT is more difficult.

To improve the chance for success with VRT for patients with progressive or fluctuating disorders it is important to manage these disorders medically. Patients with vestibular migraine may benefit more from VRT by implementing behavioral changes (reduction of migraine triggers and participation in cognitive behavioral treatment) and/or using pharmacological therapy to help reduce or eliminate the headache attacks. Although VRT does not treat the attacks of vertigo that patients with Meniere's disease experience, if the frequency of these attacks is reduced with diet and medication, or if indicated, with a more aggressive chemical or surgical type of intervention, then VRT can possibly help reduce symptoms that occur between attacks. The goal of medical management is to help stabilize the disorder as best as possible to allow for compensation to occur. As a consequence, the exercise strategies used in VRT will have a better chance to promote compensation and reduce vestibular-related symptoms.[10,11,12,13]

There are differences in potential recovery depending on the vestibular disorder. If patients have a unilateral lesion (only one ear affected by a vestibular disorder) they generally have a

better chance of recovery as compared to those with bilateral lesions (both ears are affected). VRT does assist with recovery in patients with bilateral lesions, just not the same amount and not as quickly as in patients with unilateral lesions.[14,15]

For patients with central vestibular disorders, the structures of the brain that allow for compensation are affected. This limits the amount and speed of recovery. However, research has shown that patients with central vestibular disorders can make gains with VRT.[3]

Other factors that can potentially limit recovery:

- **Sedentary lifestyle**
  Being inactive can lead to suboptimal levels of health and fitness, which can cause secondary problems. Also, this lifestyle can further decrease the tolerance to movement by decreasing the threshold that it takes to aggravate the symptoms of dizziness and unsteadiness. In turn, desire to be active is reduced even more, thus creating a vicious cycle. Slowly and progressively, training the body to increase tolerance to movement and promote physical fitness is a goal of VRT and can address this factor.

- **Pain**
  In general, pain contributes to imbalance and is associated with increased risk of falls in older adults.[16] People also restrict their movement and activity level to avoid pain, which leads to a more sedentary lifestyle and the negative consequences of this lifestyle. Additionally, to avoid pain patients may not be able to do the prescribed exercises, which restricts full participation in VRT and limits VRT's effectiveness. For these reasons, pain should be routinely assessed and managed with physical therapy and medical interventions as needed so that results can be maximized.

- **Presence of Other Medical Conditions**
  It is more difficult to accomplish the goals set out in VRT when patients have to deal with multiple medical conditions. In fact, any condition that reduces the ability to perform the exercises will lessen the chances of achieving success. Additionally, just as pain is a factor that increases the risk of falling, certain medical conditions (cardiovascular, arthritis, foot problems, vision problems, neurological diseases, cognitive impairments) are also factors that increase fall risk.[17] Assessment and proactive, comprehensive management of these conditions should be done.

- **Certain Medications and/or Multiple Medications**
  Use of medication is a "double edged sword" because on one side it provides needed benefits that are necessary for managing disease, but on the other hand it can cause side

effects like dizziness, sedation, muscle fatigue and weakness, and unsteadiness and falls, which magnifies the problems that already exist due to the vestibular disorder. Additionally, when multiple medications are prescribed, the side effects are compounded. Tinetti and colleague's work[17] has revealed that not only is taking four or more medications a factor that increases a patient's risk of falls, but also that certain types of medications like psychoactive medications (sedatives, antipsychotics, and antidepressants), anticonvulsants, and antihypertensive mediations are strongly associated with an increased risk of falling.

In particular, when it comes to medication usage for vestibular disorders, frequently patients are prescribed medication like meclizine (Antivert) and diazepam (Valium) for acute symptoms. The goal of these medicines is to act on the brain so that the intensity of dizziness and/or nausea is not as strong. Because these medications suppress brain function they can be counter-productive with promoting compensation, so it is best to not use them for extended periods of time.[3]

Since there can be a tradeoff between the benefits and risks of using medications, decisions about usage should be made on an individual basis and should include the priorities of each patient. For instance, certain medications that reduce blood pressure can cause lightheadedness, which can potentially lead to unsteadiness and/or falls. Determining which is more important, the risk of heart disease and stroke or the risk of falling and therefore causing injury, causes a dilemma in patient management. Physicians take into consideration which patients are at greater risk of having a stroke – in which case it would be in their best interest to control their blood pressure - as compared to patients who are at more risk of falling, in which case taking medication that lowers blood pressure too much may not be indicated.

Patients can be helpful with making decisions about medication usage by knowing what their medications are supposed do for them and understanding the possible side effects. This can lead to more effective discussions between patients and physicians about symptoms that might be experienced from as a result of taking a particular medication. From these conversations, physicians can work toward achieving the intended benefit of the medication while minimizing potential side effects by taking different actions:

- Make sure medications are being taken correctly
- Adjust medication dosage
- Eliminate unnecessary medications
- Prescribe a different medication

- **Emotional Concerns**
  Anxiety, panic, and depression occur frequently with vestibular disorders and can cause difficulty with managing symptoms.

  Frequently, patients will restrict their activity to avoid increasing their vestibular related symptoms. While this coping strategy may reduce the anxiety a patient experiences as a result of their symptoms, it limits compensation that is necessary to promote recovery.

  With slow, progressive exposure to movement and activity patients can experience improvement in their vestibular symptoms, which help reduce their anxiety. However, for many patients, it may be helpful to seek counseling to deal with the difficult emotional challenges that often accompany life with a chronic illness. Cognitive behavioral and/or pharmacological therapy can help address a patient's underlying anxiety so they can achieve the goals of VRT.[18,19]

- **Decompensation**
  With compensation, vestibular symptoms will decrease as the brain recalibrates and fine tunes incoming signals from the inner ear. However, when damage to the vestibular system is permanent there is the potential for symptoms to return.

  Symptomatic relapses can occasionally occur because the brain de-compensates. This can be due to different emotional and/or physical stressors, like personal or job-related pressures, periods of inactivity, a bad cold or flu, extreme fatigue or chronic lack of sleep, changes in medication, or sometimes surgery.[3] Although it is important for patients to consult with their physician to make sure nothing new has occurred, returning to the exercises that promoted the initial compensation can help promote recovery again. Additionally, recovery after de-compensation usually occurs more quickly as compared to the initial compensation.

Where can I find a vestibular rehabilitation specialist?

The Vestibular Disorders Association (VEDA) provides a directory of health professionals who are specially trained to assess and treat vestibular disorders. This online directory offers users the ability to search for providers according to specialty and geographical location. To locate this online directory, visit vestibular.org.

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