



DIZZINESS AND BALANCE PROBLEMS

Why Do You Feel Dizzy?

I. Dizziness

All of us have felt dizzy at times - after a ride on the Viper at Magic Mountain, spinning around fast and abruptly stopping, or when setting foot on solid ground after a long boat ride. These feelings of dizziness are short lived. Many people, however, have dizziness that is prolonged or that comes in unexpected severe episodes. These feelings can be annoying, disturbing or in some cases can be disabling. Significant alterations in life style may be necessary.

A malfunction of any one of the components of the balance system or an interruption of the supply of nutrients and oxygen causes dizziness. There are basically 3 sensations that people describe as dizziness. A sensation of spinning known as vertigo, or motion often described as seasickness is usually caused by a problem with the inner ear. This sensation can be appreciated after spinning around fast and coming to abrupt stop. A faint or light-headed feeling is often the result of a compromise in blood flow to the brain or processing centers of the brain. This sensation can be appreciated when arising too fast from bed in the morning. Sitting at the edge of the bed for a few seconds will relieve the faint feeling as the rate of blood flow to the brain increases. An insecure feeling or imbalance when walking is often caused by a partial loss of sensation in the feet or legs. The complex integration of the balance system components creates a challenging problem of diagnosis in some individuals with dizziness.

II. Balance

Most of us don't think much about our balance. We take it for granted that putting one foot in front of the other will get us to our destination.

The balance system that keeps us upright and our eyes focused where we want to go is precise, complex and highly integrated. It is so precise that it guides incredibly delicate feats of balance. Gymnasts, dancers, cyclists, skiers and surfers have precisely trained their balance systems to perform delicate balancing acts.

The four main components of the balance system are:

1. Vision
2. The inner ear
3. Muscle, joint, and skin sensation
4. Balance signal processing centers of the brain

These four components are highly integrated with each other through the complex wiring and circuitry of the nervous system. These system components then need nutrients and oxygen supplied by constant blood flow.

Maintaining our balance through the variety of three-dimensional movements we deal with each day is truly an incredible balancing act between the different components of the balance system

III. Do you know your stuff?

A. In conversation, your neighbor mentions that as he turned over in bed last night he felt violently dizzy. The sensation woke him up. The room was spinning for what seemed to be 1-2 minutes. Which of the four components of the balance system is the most likely culprit?

B. Your grandmother is worried because she has difficulty getting to the bathroom at night. She has to lean against the wall and inch along. She feels unsure and sometimes she feels a bit faint. Which components of the balance system could be involved?

Answers:

A. The inner ear

B. Aging results in a gradual deterioration of all components of the balance system. In this case, decrease in muscle, joint and skin sensation and/or compromise in the supply of nutrients and oxygen to the balance system appear to be causing the most problem.

Dizziness and Age

Function of the Ear

The ear is divided into three parts; the external ear (outer ear and ear canal), middle ear (ear drum and small bones of hearing), and inner ear (fluid-filled inner ear spaces, hearing and balance sensors and nerves). Each part performs an important function in hearing and/or maintenance of balance.

Movement of fluid in the balance portion of the inner ear (vestibule and semicircular canals) results in electrical impulses that travel along the balance nerves. Inner ear nerve pathways course into the brain or central nervous system where very complex information is processed. This is similar to, but a far more intricate and complex process than that performed by a computer processor. The inner ear senses posture (body position in relation to gravity), and rotation (acceleration and deceleration) in the three planes of space. The vestibular system is also responsible for visual fixation and stability during head and body movements.

How Balance is Maintained and Balance System Problems

Balance is the ability to maintain one's equilibrium and is maintained by the interaction and coordination of impulses received from three main systems - the inner ear, visual system and proprioceptive system. When one source disagrees with the others we sense dizziness. Dizziness (including vertigo) is a symptom, not a disease. It has many causes that are discussed later. It can have several definitions including disorientation

in space, a sense of unsteadiness, a feeling of movement within the head, swimming sensation, lightheadedness or a whirling sensation known as vertigo. Dizziness can result from disturbances in the inner ear, brain, eyes, neck, muscles and joints, or a combination of these systems. Since the mechanism of maintaining balance is so complex, it is in many instances impossible to find out the exact cause of the dizziness.

The inner ear balance system (vestibular system) is a fluid-filled system. Movement of fluid results in electrical impulses that are sent through the balance nerve to the brain where they are interpreted as motion. Any disturbance in the inner ear or its central connections may cause a feeling of dizziness with or without auditory symptoms (hearing loss or tinnitus).

Vision is responsible for giving accurate information about one's surroundings. If you look about and everything is vertical, you feel well. However, if you are in a funhouse where everything is on a slant, you may feel dizzy even if you are standing still. Age-related visual changes include decrease in acuity, adaptation to darkness, sensitivity to contrast, and accommodation. In addition, ocular diseases, including macular degeneration, glaucoma, and cataracts, are common.

The proprioceptive system is made up of the skin sensors, muscles, joints and tendons in the neck, trunk, arms and legs, the spinal cord, and multiple central nervous system connections. It is responsible for giving information to the brain regarding movement and body position. This system enables you to walk down steps without looking where to place your feet. The proprioceptive system helps orient you in space during position changes and while walking on uneven surfaces. Abnormalities in any component of the system may cause or exacerbate dysequilibrium. Arthritis and muscle weakness are common in the elderly. Peripheral neuropathy is also a common, especially related to diabetes or vitamin B12 deficiency.

Given the multiple connections and their complexity, essentially any central nervous system disorder may contribute to instability or dizziness. Multiple small lesions in the brain caused by small blood vessel blockage and death of brain cells are a common source of brain injury and subsequent dizziness in individuals over 60 years old. These lesions are commonly seen on CT and MRI scans of the brain.

Dizziness Due to Aging

As a person grows older, certain changes normally occur, such as a change in hair color and a decrease in the ability to hear. Just as these changes occur, there are also changes occurring in systems that are needed to maintain balance.

The overall prevalence of balance problems at age 70 is 36% (women) and 29% (men). Balance symptoms are more common among women than men, and increase with increasing age. At ages 88-90 years 51% of women and 45% of men complain of balance problems.

Symptoms and Causes of Dizziness Due to Aging

1. You may notice a lightheadedness, spinning sensation, giddiness, wooziness or unsteadiness that occurs when quickly turning or changing positions, when bending over and returning to an upright position or when looking up or down. These symptoms last for a short time.
2. You may notice a tendency to sway or veer from side to side when walking.

Just as the hearing portion of the inner ear loses its sensitivity to sound resulting in a hearing loss, the balance portion may lose its sensitivity to rotation (acceleration and deceleration) and body position.

An additional symptom is a gradual decrease in eye sight and blurred vision or eye fatigue when doing close work. This is caused by a decrease in the elasticity of the lens of the eye and is correctable by wearing bifocals. Other conditions, such as glaucoma or cataracts may also cause a decrease in vision and thereby decrease the amount of information the brain receives.

Finally, there are changes in the proprioceptive system (nerve endings in the skin, muscles, tendons and joints in the neck, trunk, arms and legs) due to aging. There may be exaggerated curvatures of the spine or a decrease in muscle mass causing generalized muscular weakness. Conditions such as diabetes and vitamin B12 deficiency may cause a decrease in feeling in the extremities, thus decreasing information the brain receives regarding body position and movement.

Age-related persistent (chronic) dizziness and instability when upright and especially when walking, most often results from the combined effects of disorders and impairments in the multiple systems contributing to stability and equilibrium. The sensation of equilibrium requires input from complex networks of sensory, motor, and central integrative neurologic systems. These systems are, in turn, influenced by cardiovascular, respiratory, metabolic, and psychologic factors. Dizziness may develop only when the degree of deterioration of the vestibular system exceeds the ability of the nervous system to compensate. If dizziness does occur, it can have significant psychological consequences, particularly in terms of loss of confidence in independent activity, and may lead to the development of anxiety disorders.

Drugs may cause dizziness through several mechanisms, including low blood pressure caused by sitting up or standing up rapidly, fatigue, dehydration, electrolyte disturbance, and disruption of central nervous system function.

Some Drugs That Can Cause Dizziness

There are many drugs that can cause dizziness. These are some of them:

- < Anticonvulsants (anti-seizure medications)

- < (e.g., phenytoin, carbamazepine)
- < High blood pressure medications (antihypertensives) and drugs with low blood pressure as a side effect
- < Adrenergic blockers (e.g., propranolol, terazosin)
- < Diuretics (e.g., furosemide or Lasix)
- < Vasodilators (e.g., isosorbide, nifedipine)
- < Tricyclic antidepressants (e.g., nortriptyline)
- < Phenothiazines (e.g., chlorpromazine)
- < Dopamine agonists (e.g., L-dopa/carbidopa)

Drugs toxic to the inner ear (ototoxic)

- < Some of the mycin antibiotics (e.g., gentamicin)
- < Loop diuretics (e.g. furosemide or Lasix)
- < Cancer chemotherapy (e.g. cis-platinum)

Balance system (vestibular) suppressants

- < Antihistamines and anticholinergics (e.g., transdermal scopolamine, promethazine, amitriptyline, meclizine)
- < Psychotropic agents
- < Sedatives (e.g., barbiturates and benzodiazepines)
- < Drugs with Parkinsonism as side effects (e.g., phenothiazines)
- < Drugs with anticholinergic side effects (e.g., amitriptyline)

Miscellaneous drugs

- < cimetidine

Evaluation of Dizziness

To evaluate the symptom of dizziness a complete medical history and physical examination, and audiogram (hearing test) and are generally needed. In some instances, an MRI scan and videonystagmogram (VNG or balance test) and blood work are also needed.

The medical history is by far the most important part of the evaluation. The physician needs to know what you feel like when you are dizzy, the duration of symptoms, what triggers or relieves the symptoms and whether auditory symptoms (hearing loss, ear pressure or tinnitus) are present.

An audiogram documents the present level of hearing. The VNG gives objective information as to how the inner ear balance mechanism is functioning. An MRI scan is obtained when a central nervous system disorder is suspected or when hearing nerve loss is worse in one ear to rule out the possibility of a benign tumor on the hearing or balance nerves. Blood tests for blood sugar, body fats (cholesterol and triglycerides), thyroid, and autoimmune inner ear disease (a process in which the body's immune system makes antibodies against the inner ear) may be ordered.

How to Minimize Symptoms

There are no medications that will alleviate age-related dizziness, but there are ways to help minimize them. The following are suggestions:

1. When getting up in the morning, sit on the edge of the bed for several minutes before trying to stand and walk.
2. Change positions or turn slowly. Have something nearby to hold onto to help stabilize yourself.
3. Realize that looking up or down, or bending over and returning to an upright position may cause unsteadiness and have something nearby to hold onto.
4. Never walk in the dark. When getting up at night, always turn on a bright light. Use a night light in the bathroom.
5. Use a cane, a 4-prong cane or walker if you have more severe problems when walking. Remember, you are not leaning on these devices, but are actually increasing the amount of information received through the extremities.
6. Keep other medical conditions, such as diabetes, glaucoma, high blood pressure or arthritis under control by taking your medication and /or following the prescribed diet.

Treatment Options

Treatment is ideally directed toward a specific cause. However, because the cause of age-related dizziness is usually multifactorial, the most effective treatment is often to ameliorate one or more contributing factors.

Drugs:

Balance system (vestibular) depressants (e.g., meclizine, diazepam) often used for severe vertigo, have little role in the treatment of chronic age-related dizziness. Because of their effects on the central nervous system and because they may suppress central adaptation, these drugs may even exacerbate dizziness.

Balance System Suppressants

Drug

Antihistamines

Meclizine (Antivert, Bonine)

Anticholinergics

Scopolamine (Transderm scopolamine)

Benzodiazepines

Diazepam (Valium)

Lorazepam (Atrivan)

Clonazepam (Klonopin)

Rehabilitation and exercise: Vestibular (balance system) rehabilitation includes combinations of exercises involving head and eye movements while sitting or standing. It also involves various dynamic balance exercises and exercises to improve gait stability during head movement, visual and balance system interactions, and balance system-spinal responses. Initially, the exercises may worsen the dizziness, but over time (weeks to months) movement-related dizziness improves, likely because of central nervous system adaptation. Vestibular rehabilitation has been shown to be effective in most vestibular disorders. Vestibular rehabilitation is best administered in a classroom setting or one to one with a qualified physical therapist. Alternatively, patients can perform the exercises independently at home, however, safety is very important to avoid falls and injury that can greatly prolong recovery or cause serious injury.

The Three Most Common Causes of Vertigo

- 1. Benign Postitional Vertigo (BPPV)**
- 2. Vestibular Neuritis**
- 3. Meniere's Disease**

Benign Positional Vertigo

Jeffrey P. Harris, M.D Ph.D.
UCSD School of Medicine
Otolaryngology

What is Benign Paroxysmal Positional Vertigo (BPPV)?

Benign Paroxysmal Positional Vertigo (BPPV) is an inner ear problem that results in short lasting, but severe, room-spinning vertigo. Its name, BPPV, indicates that it is benign, or not a very serious or progressive condition; paroxysmal, meaning sudden and unpredictable in onset; positional, because it comes about with a change in head position; and vertigo, causing a sense of room-spinning or whirling, often expressed as dizziness. Although called benign, those who suffer from this distressing and incapacitating condition do not trivialize BPPV.

What are the symptoms?

This condition often begins following head trauma or a severe cold. It can also arise simply as part of the aging process. It starts suddenly and is usually first noticed in bed,

when waking from sleep. Any turn of the head seems to bring on violent but brief bursts of dizziness. Patients often describe the occurrence of vertigo with tilting of the head, looking up or down (so called top-shelf vertigo), or rolling over in bed. It is not unusual for nausea and vomiting to accompany the vertigo. Even if a spell is brief, a feeling of queasiness may last several minutes or even hours.

There is no new hearing loss or severe ringing associated with these attacks, which helps to distinguish BPPV from other inner ear conditions.

What causes BPPV?

To understand the cause of BPPV it is helpful to understand how the inner ear works. The human ear is divided into three parts: the external, middle, and inner ear.

The external ear consists of the part of the ear you can see (the auricle) and the ear canal.

The middle ear includes the eardrum (tympanic membrane) and the three bones, or ossicles, of the middle ear, the malleus (hammer), incus (anvil), and the stapes (stirrup).

The inner ear is a fluid-filled series of chambers. One of these chambers, the cochlea, is responsible for converting sound vibrations into nerve impulses. It is these nerve impulses that the human brain interprets as sound and what we call hearing.

The inner ear also contains 3 semicircular canals which are responsible, in part, for sensing movement and maintaining balance. As you can see, these 3 canals (named anterior, lateral, and posterior) are oriented at roughly right angles to one another. The movement of the fluid within these canals allows the brain to sense rotation of the head through all three directions in space (e.g. left-right, forward-back, and up-down). All 3 canals are connected to a large chamber, called the vestibule.

It has been discovered that the probable cause of BPPV is dislodgement of small calcium carbonate crystals that float through the inner ear fluid and strike against sensitive nerve endings (the cupula) within the balance apparatus at the end of each semicircular canal (the ampulla). (Another name for BPPV is cupulolithiasis, meaning rocks in the cupula.)

These crystals, known as otoconia, usually dissolve or fall back into the vestibule within several weeks, and no longer cause any symptoms. However, in some patients, these crystals become trapped in the fluid of the balance chamber and periodically cause symptoms, as gravity and head movements cause them to repeatedly strike against the cupula. In these patients, the symptoms may not subside and they become severely incapacitated.

Interestingly, the loose otoconia tend to settle preferentially within the posterior semicircular canal. As you can imagine this is because the posterior canal hangs down like the water trap in a drain pipe, allowing the crystals to settle in the bottom of the canal.

How is BPPV diagnosed?

The most important means for diagnosing this condition is the physical examination and history of the patient. A patient with dizziness or vertigo without hearing problems suggests the diagnosis of BPPV. A normal ear exam, audiogram, and neurological exam are expected. A simple positional test, performed in the doctor's office, is usually all that is needed to confirm the diagnosis of BPPV.

One such test is the Dix-Hallpike test. First, the patient is positioned on the examining table, seated upright. Then the examiner brings the patient's head down over the edge of the table and turns the head to one side. If the patient has BPPV, the examiner will witness a characteristic movement of the eyes, called nystagmus that begins after a few seconds. If the nystagmus is seen and the patient becomes dizzy, then the ear which is pointing toward the floor is the one with the loose otoconia. If no nystagmus is seen the examiner will repeat the test, this time turning the head to the opposite side, thus testing the other ear.

This nystagmus and perception of vertigo will slow down and cease after 15 to 20 seconds. If the head is not moved, no further symptoms will occur. When the patient sits back up, the dizziness will recur, but for a shorter period of time. Lying down on the opposite side will not cause the vertigo. Occasionally, in order to confirm the extent of the inner ear dysfunction, an videonystagmogram (VNG) will be ordered.

What are the treatments for BPPV?

Once tests have confirmed the diagnosis of BPPV and the affected ear, patients are instructed to avoid lying down on the affected side. Usually, medications like Antivert (meclizine), Dramamine, Valium, or Phenergan are not recommended because they cause sedation. By carefully avoiding the provocative position, patients can usually avoid bringing about the symptoms. If left untreated, the condition usually clears within several weeks.

The Epley or Semont Maneuver

Recently, researchers have found that a simple and well-tolerated physical therapy technique performed in the office can relieve the vertigo in a high percentage of patients. The Otolith Repositioning Procedure of Semont and Epley has become well accepted and is based on using gravity to move the crystals away from the nerve

endings into an area of the inner ear that won't cause any problems. Sometimes, a vibrator is placed on the mastoid to liberate the particles and improve the procedure's success.

Watch the animation and notice that as the patient is moved into the various positions of the maneuver, the posterior semicircular canal is rotated in such a way as to deposit the displaced otoconia back into the vestibule where they can do no further harm.

In our experience, approximately 75% of patients are cured with one maneuver. This percentage increases with repeated treatments. Following the maneuver, patients must not lie flat for 48 hours, meaning they should sleep in a recliner or propped up on pillows. Also, after 48 hours, patients should not lay down on the affected ear for at least one week following the treatment. Even tying shoes or bending over should be avoided during this week. These instructions help prevent the crystals from falling back into the balance chamber.

Surgical Treatments

Rarely, when time and the otolith repositioning techniques have failed, severe cases may eventually require surgical intervention.

The Center for Sensory and Communication Disorders (CSCD) at Northwestern University Medical School also has an excellent web page on BPPV.

Vestibular Neuronitis

What is vestibular neuronitis?

Vestibular neuronitis (or neuritis) is an inflammation of the vestibular nerve or balance nerve located in the inner ear. The vestibular nerve carries balance signals from the inner ear to the brain. When this nerve is inflamed, it causes vertigo, a feeling that you or your surroundings are moving.

What causes vestibular neuronitis?

There is a balance nerve on each side of the head. At rest without head movement, the vestibular nerve will send signals to the brain's balance processing center at the same rate or frequency from both ears. With head movement, the signal frequency from one side decreases while the signal frequency from the other side increases. Vestibular neuronitis is most likely caused by a virus that inflames the balance nerve. The signal frequency it sends to the balance processing centers of the brain are then altered, usually decreasing on the side of the inflammation. Since the brain interprets this asymmetry as a signal that your head is rotating or moving, you feel vertigo.

What are the symptoms?

The main symptom of vestibular neuronitis is vertigo, which appears suddenly or over a few hours and is often accompanied by nausea and vomiting. Vertigo usually lasts for several days. As the vertigo subsides, head or body movement cause brief vertigo or motion sensation. This sensitivity to motions often takes a few weeks, and rarely can take months and very rarely several years to go away entirely.

Milder cases of vestibular neuritis cause only a sense of dysequilibrium with rapid head or body movement.

Vestibular neuronitis does not lead to loss of hearing, however, in some cases the same virus can cause inflammation of the hearing nerve that travels very close to the balance nerve from the inner ear to the brain. In this case hearing will decrease on the effected side. Recovery of hearing is variable and depends on severity and age.

Who is affected by vestibular neuronitis?

While anyone can get vestibular neuronitis, it typically affects middle-aged adults.

How is vestibular neuronitis treated?

Vestibular neuronitis usually goes away on its own without treatment. Since it appears to be caused by a virus, antibiotics are of no help. Steroids like prednisone are probably helpful if given within the first 48 hours of the onset of vertigo. Treatment involves comfort measures until the infection has run its course. Sometimes severe symptoms can be controlled with medications, such as antihistamines (for example, Antivert) or diazepam (Valium).

Vestibular neuronitis usually resolves on its own within a matter of days or weeks. The goal of treatment is to keep you comfortable until the symptoms pass.

Vestibular suppressant medications, which may be used to control symptoms of vertigo, include:

- < Antihistamines (such as Dramamine, Antivert, Benadryl).
- < Scopolamine (such as Transderm-Scope).
- < Sedatives (such as Valium, Klonopin).
- < Vestibular suppressants should only be taken for 1 to 2 weeks to control severe symptoms of vertigo. These medications usually do not stop vertigo completely but may help reduce nausea and vomiting. If the vertigo is severe, antiemetic medications may be used to better control nausea and vomiting. You should stop vestibular suppressant medications as soon as possible. Prolonged use of these medication can slow down the brain's natural process of compensation for the inner ear injury. This process of readjustment of the balance processing center deep within the brain is required to regain normal balance. See Home Treatment below.

Home Treatment

For the first 2 to 3 days of vestibular neuronitis when vertigo symptoms are most intense, bed rest and keeping your head still may make the vertigo easier to cope with.

If the vertigo symptoms last more than a few weeks, you may want to try vestibular (or balance) rehabilitation exercises. The exercises and other activity help the brain ignore false signals of motion more quickly. It is especially important to move your head as you normally would and to avoid holding it completely still so your body can adjust. Bed rest may help prevent attacks of vertigo, but it usually increases the time it takes for the body to adjust.

Other Places To Get Help

Vestibular Disorders Association (VEDA)
P.O. Box 13305
Portland, OR 97213-0305
Phone: (503) 229-7705
1-800-837-8428
Fax: (503) 229-8064
E-mail: veda@vestibular.org
Web Address: <http://www.vestibular.org>

This organization provides information and support for people with dizziness, balance disorders, and related hearing problems. A quarterly newsletter, fact sheets, booklets,

videotapes, a list of other members in your area, and information about centers and doctors specializing in balance disorders are available to members.

Meniere's Disease

Jeffrey P. Harris, M.D. Ph.D.
UCSD School of Medicine
Otolaryngology

Introduction

Meniere's disease is characterized by fluctuations in hearing, episodes of dizziness, tinnitus and a feeling of pressure in the ear. The classical type has attacks of dizziness lasting for minutes to hours, but there are several other forms that have fluctuating hearing loss, tinnitus and/or pressure but no dizziness, or just attacks of dizziness alone.

There are some associated and characteristic findings that help make the diagnosis and these include a typical sensorineural (nerve-type) deafness seen on audiometry and often an ear that, despite the hearing loss, perceives sounds as being too loud and quite annoying. Some patients sense that there is a slight ache in or behind the ear. Patients with severe Meniere's disease may have repeated spells of vertigo that may come frequently and without warning. Balance disorders can also make a patient lack concentration, have trouble focusing and have difficulty navigating through a supermarket or a shopping mall. The unpredictability of the vertigo spells can be dangerous, particularly when driving or working at any heights where precise balance is required. In severe cases, the incapacitating nature of this disorder and its unpredictability can create stress and some neurotic behavior that develops as a coping mechanism.

Over time, the severe cases gradually burn out, however, the price for this is usually good hearing. It may however, take many years before the attacks eventually disappear. It is rare for this disease to be hereditary (less than 10%). Up to 40% of the cases will eventually become bilateral. However, if bilateral disease has not occurred within the first five years, the chances of getting it in the other ear drops significantly.

Cause

There are many forms of Meniere's disease and several possible causes. It is generally felt that the majority of cases are idiopathic, that is, that no specific cause will be identified. Some cases can be caused by head or ear trauma, some by middle ear infection, some by autoimmune or allergic problems, some by inner ear syphilis and, on occasion, by a virus. It is known that the end result is that the inner ear cannot get rid of the inner ear fluid (endolymph) that is constantly being produced, somewhat akin to glaucoma developing in the eye. The normal site within the inner ear that resorbs fluid is the endolymphatic sac that lies under the mastoid bone and up against the brain covering known as dura mater. Because fluid overload of the inner ear is present, factors that affect the retention of fluid in the body will have an adverse effect on this disease. Total body salt content is very important as the more salt one has in the tissues, the more water that is retained. Similarly, in women, hormone shifts can cause fluid retention and aggravate the problem. In fact, some women will have exacerbations premenstrually, when they take birth control pills or estrogen replacement hormones.

Diagnosis

It is important to make sure that there is nothing seriously wrong that may be causing the symptoms of inner ear disease. In order to do this, a hearing test and some blood work will be ordered. Additionally, depending upon the results, several other tests may be ordered, such as BERA (brainstem evoked response audiometry) to look at the functioning of the auditory nerve and brain, an ENG (electronystagmography) to assess possible damage to the inner ear balance system, an ECoG (electrocochleography) to determine if the inner ear had an overabundance of fluid, and an MRI to visualize the nerves and brain.

Not all tests will be needed and each is ordered when the specific information that they produce is helpful in confirming the cause, the amount of damage, and, in some cases, to determine which ear is affected by the illness.

The ear will look normal in Meniere's disease and there will be no evidence of middle ear or Eustachian tube problems. Unfortunately, it is common for an untrained observer to conclude that ear infections are present and antibiotics and decongestants are often prescribed to be on the "safe side."

Medical Treatment

The mainstay of treatment for Meniere's disease involves drugs to reduce the dizziness and drugs to reduce the fluid overload of the inner ear. When dizziness is occurring, vestibular sedatives like Compazine, Dramamine, Antivert (meclizine), Phenergan, and Valium (diazepam) are prescribed. Since these provide symptomatic relief, they usually are needed only when dizziness is present. Some patients are having multiple spells on a daily basis and find that a low dose of these medications, taken around the clock, help them considerably. They do cause some drowsiness, however.

In order to treat the disease, we prescribe diuretics and a low salt diet. The diuretics alone will not help if a liberal salt intake is occurring, so we recommend a 1200-1500mg low salt diet. The diuretics that are most commonly prescribed are hydrochlorothiazide (HCTZ), Maxzide, aldactone, Lasix (furosemide), or Diamox (acetazolamide). Some diuretics also cause potassium to be lost in the urine, so potassium replacement is a must. Eating fresh bananas and oranges helps but is not usually sufficient to keep up with the potassium depletion. How long should diuretics be continued? We recommend that diuretics be continued until no symptoms remain in the ear, exclusive of tinnitus, which may never completely resolve. Once the dizziness ceases and inner ear pressure and hearing loss improve, a slow withdrawal of the medication can begin. Usually we suggest that if twice a day diuretics are prescribed then they be cut back to once a day for several weeks. If that is well tolerated then they should be reduced to every other day. At that point they can be stopped altogether and used on an as needed basis, being guided by pressure, lightheadedness, or hearing loss.

On occasion, we find in our blood work that there is an abnormality suggesting the possibility that an autoimmune disorder may underlie the disease. If so, a short course of steroids (Medrol or prednisone) may be recommended. The side effects of prolonged steroids are significant, so they must be used carefully. However, when an immune cause is identified, steroids plus diuretics may be the only effective treatment and the disease can be put into remission by such regimen.

What about alcohol and coffee? The information about their effects on Meniere's disease is spotty and anecdotal at best. However, you might wish to experiment by avoiding them for a period of time to see if they particularly effect you.

With close follow-up and the aforementioned medical therapy, approximately 80-85% of patients with Meniere's disease will be controlled. yes> Occasional spells of dizziness may occur, but with medication they can be minimized. Most experts feel that once a patient has developed classical spells, their ears will remain "prone" to relapses, even if they have been well-controlled by medication. As a result, one needs to be vigilant about diet, etc.

Surgical Treatment

Only a minority of patients need surgery, however, when medical treatment fails and there are incapacitating symptoms, patients and doctors then need to consider this next level of treatment. No patient should ever have to suffer from continued severe vertigo in this disease, as it can always be remedied. The types of therapy depend upon how good the hearing is. There are destructive procedures and more physiologic ones which will now be described.

Endolymphatic Sac Surgery

This is an ear operation that is done to drain and open the endolymphatic sac, the site that is responsible for resorbing inner ear fluid. This is a mastoid operation that takes approximately 1-2 hours. This is done under general anesthesia and the patient may stay overnight or, if doing well, go home that afternoon. This operation will usually not cause hearing loss and carried with it the risks associated with any ear operation: hearing loss, dizziness, and facial nerve weakness. This surgery had a success rate of 60-70% in control of vertigo. We usually do not perform this surgery solely for hearing loss, as it is impossible to predict if hearing will improve after the surgery in time. Sometimes there will be dramatic hearing improvement however tinnitus is rarely affected. Why doesn't this surgery work every time? Since this site of drainage for the inner ear is at the end of the drainage system, it requires that the ducts (tubes) that carry the fluid be open all the way to it, for the surgery to be successful. If the ducts are blocked upstream, then opening the sac will not have the desired effect. Unfortunately, there is no way to determine this preoperatively. This is a conservative, nondestructive procedure that is often recommended as a first step in attempting to control the illness.

Vestibular Nerve Sectioning

This procedure is done with a neurosurgeon and is an intracranial approach. The procedure takes approximately 1-2 hours and requires a three to five day hospital stay. In this microsurgery, the facial nerve is first positively identified by electrical stimulation and then the eighth nerve is exposed and the balance portion is identified and cut. The hearing nerve is spared. Sometimes the separation between the hearing and vestibular nerves is not distinct. In this case, the surgeon must estimate the percentage of the nerve that is balance and perform the neurectomy without exact knowledge of how much of the nerve carries hearing fibers and how much carries balance. Since vertigo is the compelling reason for doing the surgery, we usually recommend that we err on the side of taking more of the nerve rather than less, in order to ensure relief from vertigo, even at the expense of some hearing. The risks of the surgery include: deafness, persistent dizziness, facial nerve weakness, meningitis, cerebrospinal fluid leakage, stroke and bleeding. While these risks are exceedingly small, they nevertheless need to be considered.

This operation is reserved for patient who have good hearing, severe vertigo, and who either have failed the endolymphatic sac procedure or only wish to undergo one, definitive operation. The success rate for relief of attacks of vertigo is 90-95%. Since the balance nerve has been cut and no information gets to the brain from the diseased labyrinth, some unsteadiness, particularly in the dark or with quick turns, can remain permanently.

Cochleosacculotomy

This is a procedure that attempts to drain fluid and create a fistula upstream rather than down at the endolymphatic sac. It is a procedure that can be performed in thirty minutes under local anesthesia and as an outpatient. It does not destroy balance function but tries to restore normal physiological function. It is a good choice for patients with severe dizziness and relatively poor hearing, especially if they are elderly and might have a hard time compensating from destruction of their balance system. The major drawback to this procedure is that there may be significant hearing loss from it (especially high frequency) and, over time, symptoms might return due to closure of the internal fistula. The success rate is approximately 65-70%.

Labyrinthectomy

This is an excellent, safe, definitive destructive procedure in which the balance organs are systematically drilled away under general anesthesia. Hospital stay is usually three to five days. Hearing will be lost from the procedure so it is recommended for patients with severe vertigo and poor hearing. This has a high cure rate for vertigo (90-95%), but in elderly with poor vision, or any preexistent brain dysfunction, there can be a problem adjusting to the loss of balance function. Risks include persistent dizziness, definite, profound deafness in the operated ear, tinnitus, and facial nerve weakness.

Gentamycin Chemical Labyrinthectomy

This is an outpatient procedure that capitalizes on the known toxicity of this antibiotic to the inner ear. This drug, in drop preparation, is instilled on a daily basis into the ear canal or through a catheter into the middle ear through a small hole made in the eardrum.

Over time, enough of the antibiotic will be absorbed into the inner ear to cause a destructive effect on the balance system. Unfortunately, the drops also have a potential to destroy hearing and cause tinnitus, so that it must be used with great caution in hearing ears. Because absorption of the drops is unpredictable and susceptibility varies, the end result will vary from patient to patient. Therefore, patients may still have instability because of the incomplete "labyrinthectomy." This is a good technique in patients too ill to undergo surgery or who have poor hearing, but it is still a destructive procedure and compensation issues raised above pertain to this procedure as well.

Comment

Each of these techniques are designed to alleviate the symptoms of a patient with intractable Meniere's disease. This discussion is to allow you to reiterate what your doctor has told you and should not be substituted for a frank discussion about your own personal case.

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