DISCUSSION OF DIZZINESS

Dizziness is a symptom not a disease. It may be defined as a sensation of unsteadiness, imbalance, or disorientation in relation to an individual's surroundings. The symptom of dizziness may vary widely from person to person and be caused by many difference diseases. It varies from a mild unsteadiness to a severe whirling sensation known as vertigo. As there is little representation of the balance system in the conscious mind, it is not unusual for it to be difficult for the patient to describe his symptom of dizziness to the physician. In addition, because the symptom of dizziness varies so widely from patient to patient and may be caused by many different diseases, the physician commonly requires testing to be able to provide the patient with some knowledge about the cause of his dizziness. Dizziness may or may not be accompanied by a hearing impairment

FUNCTION OF THE NORMAL EAR

The ear is divided into three parts: external ear, middle ear, and inner ear.

The external ear structures gather sound and direct it toward the eardrum. The middle ear chamber consists of an eardrum and three small ear bones. These structures transmit sound vibrations to the inner ear fluid.

The inner ear chamber (labyrinth) is encased in bone and filled with fluid (endolymph and perilymph). This fluid bathes the delicate nerve endings of the hearing and the balance mechanism.

Fluid waves in the hearing chamber (cochlea) stimulate the hearing nerve endings which generate an electrical impulse. These impulses are transmitted to the brain for interpretation as sound. Movement of fluid in the balance chambers (vestibule and three semicircular canals) also stimulates nerve endings, resulting in electrical impulses to the brain, where they are interpreted as motion.

MAINTENANCE OF BALANCE

The human balance system is made up of four parts. The brain acts as a central computer receiving information in the form of nerve impulses (messages) from its three input terminals: the eyes, the inner ear, and the muscles and joints of the body. There is a constant stream of impulses arriving at the brain from these input terminals. All three systems work independently and yet work together to keep the body in balance.

The eyes receive visual clues from light receptors that give the brain information as to the position of the body relative to its surroundings. The receptors in the muscles and joints are called proprioceptors. The most important ones are in the head and neck (head position relative to the rest of the body) and the ankles and joints (body sway relative to the ground).

The inner ear balance mechanism has two main parts: the three semicircular canals and the vestibule. Together they are called the vestibular labyrinth and are filled with fluid. When the head moves, fluid within the labyrinth moves and stimulates nerve endings that send impulses along the balance nerve to the brain. Those impulses are sent to the brain in equal amounts from

both the right and left inner ear. Nerve impulses may be started by the semicircular canals when turning suddenly, or the impulses may come from the vestibule, which responds to changes of position, such as lying down, turning over or getting out of bed.

When one inner ear is not functioning correctly the brain receives nerve impulses that are no longer equal, causing it to perceive this information as distorted or off balance. The brain sends messages to the eyes, causing them to move back and forth, making the surroundings appear to spin. It is this eye movement (called nystagmus) that creates a sensation of things spinning.

Remember to think of the brain as a computer with three input terminals feeding it constant up-to-date information from the eye, inner ear and muscles and joints (proprioceptors). The brain itself is divided into several different parts. The most primitive area is known as the brainstem, and it is here that processing of the input from the three sensory terminals occurs. The brainstem is affected by two other parts of the brain, the cerebral cortex and the cerebellum.

The cerebral cortex is where past information and memories are stored. The cerebellum, on the other hand, provides automatic (involuntary) information from activities which have been repeated often.

The brainstem receives all these nerve impulses: sensory from the eyes, inner ear, muscles and joints; regulatory from the cerebellum; and voluntary from the cerebral cortex. The information is then processed and fed back to the muscles of the body to help maintain a sense of balance.

Because the cortex, cerebellum and brainstem can eventually become used to (ignore) abnormal or unequal impulses from the inner ear, exercise may be helpful. Exercise often helps the brain to habituate to (get used to) the dizziness problem so that is does not respond in an abnormal way, does not result in the individual feeling dizzy. An example of habituation is seen with the ice skaters who twirl around, stop suddenly, and do not apparently have any balance disturbance.

TYPES OF DIZZINESS

Sensations of unsteadiness, imbalance or disorientation in relationship to one's surroundings may result from disturbances in the ear, neck, muscles and joints, the eyes, the nervous system connections of these structures, or a combination of any of the above.

Ear Dizziness

Ear dizziness, one of the most common types of dizziness, results from disturbances in the blood circulation or fluid pressure in the inner ear chambers, from direct pressure on the balance nerve, or physiologic changes involving the balance nerve. Inflammation or infection of the inner ear or balance nerve is also a major cause of ear dizziness.

The inner ear mechanism is about the size of a pea, and is extremely sensitive. There are two inner ear chambers: One for hearing (cochlea), and one for balance (vestibule and semicircular canals). These chambers contain a fluid which bathes the delicate nerve endings. These nerve endings are stimulated when there is movement of the fluid. Nerve impulses are then transmitted to the brain by the hearing and balance nerves. The nerves pass through a small bony canal (internal auditory canal), accompanied by the facial nerve.

Any disturbance in pressure, consistency or circulation of the inner ear fluids may result in acute, chronic, or recurrent dizziness, with or without hearing loss and head noise. Likewise, any disturbance in the blood circulation to this area or infection of the region may result in similar symptoms. Dizziness may also be produced by over stimulation of the inner ear fluids, such as one encounters when he spins very fast and then stops suddenly.

Central Dizziness

Central dizziness is usually an unsteadiness brought about by failure of the brain to correctly coordinate or interpret the nerve impulses which it receives. An example of this is the "swimming feeling" or unsteadiness that may accompany emotional stress, tension states, and excessive alcohol intake. Circulatory inefficiency, tumors, or injuries may produce this type of unsteadiness, with or without hearing impairment. A feeling of pressure or fullness in the head is common. Occasionally true vertigo (spinning) may be caused by central problems.

Neck Dizziness

Neck Dizziness (cervical vertigo) results from abnormal or uncoordinated nerve impulses being sent to the brain from the neck muscles.

The neck muscles are constantly sending nerve impulses to the balance centers of the brain to help maintain equilibrium. Spasm (tenseness) of the muscles may result in an abnormal nerve discharge, leading to unsteadiness or dizziness. This spasm may result from injury, arthritis of the spine, or from pressure on nerves in the neck.

Muscle-Joint Dizziness

Muscle-joint dizziness is relatively uncommon. Any disturbance of sensation arising from the muscles and joints in the limbs (such as occurs in the muscular dystrophies and other abnormalities) produces this type of unsteadiness. Such an example is the unsteadiness experienced when one tries to walk on a leg that has "gone to sleep."

Visual Dizziness

Eye Muscle imbalance or errors of refraction may produce unsteadiness. An example of this is the unsteadiness which may result when one attempts to walk while wearing glasses belonging to another individual.

Another example of visual dizziness is that occasionally produced if one is seated in a car looking out the side window at passing objects. The eyes respond by sending a rapid series of impulses to the brain indicating that the body is rotating. On the other hand, the ears and the muscle-joint systems send impulses to the brain indicating that the body is not rotating, only moving foreword. The brain, receiving these confused impulses (from the eyes indicating rotation, from the ears and muscle-joint systems indicating forward motion) sends out equally confusing orders to various muscles and glands that may result in sweating, nausea and vomiting. When one sits in the front seat looking forward, the eyes, ears, and muscle- joint systems work more uniformly and one is less likely to develop car sickness.

A visual disturbance may be caused by dizziness from other sources. Intermittent inability to focus the eyes, difficulty reading or intermittent blurring of vision, although at times the result of

anxiety or tension may result from small reflex movements of the eye called nystagmus. This nystagmus is common during severe dizziness.

WARNING

Persons subject to dizziness should exercise caution when swimming. Buoyancy of the water results in an essentially weightless condition, and visual orientation is greatly impaired if one's head is under water. As a result, orientation depends almost entirely on the inner ear balance canals. An attack of dizziness at this time could be very dangerous. Similarly, individuals who have lost both inner ear balance canals should avoid underwater swimming.

EAR DIZZINESS: SYMPTOMS

Any disturbance affecting the function of the inner ear or its central connections may result in dizziness, hearing loss or tinnitus (head noise). These symptoms may occur singly or in combination, depending upon which functions of the inner ear are disturbed.

Ear dizziness may appear as a whirling or spinning sensation (vertigo), unsteadiness, or giddiness and lightheadedness. It may be constant, but is more often intermittent, and is frequently aggravated by head motion or sudden positional changes, nausea and vomiting may occur, but one does not lose consciousness as a result of inner ear dizziness.

DIAGNOSING THE CAUSE OF DIZZINESS

Dizziness may be caused by any disturbance in the inner ear, the balance nerve or its central connections. This can be due to a disturbance in circulation, fluid pressure or metabolism, infections, neuritis, drugs, injury, or growths.

At times an extensive evaluation is required to determine the cause of dizziness. The tests necessary are determined at the time of examination and may include detailed hearing and balance tests, x-rays, and blood tests. A general physical examination and neurological tests may be advised.

The object of this evaluation is to be certain that there is no serious or life-threatening disease, and to pinpoint the location of the problem. This lays the groundwork for effective medical or surgical treatment.

CIRCULATION CHANGES

Any interference with the circulation to the delicate inner ear structures or their central connections may result in dizziness and, at times, hearing loss and tinnitus. These circulatory changes may be the result of blood vessel spasm, partial or total occlusion (blockage), or rupture with hemorrhage.

Atypical Migraine or Basilar Migraine

Inner ear dizziness due to blood vessel spasm is usually sudden in onset and intermittent in

character. It may occur as an isolated event in the patient's life or repeatedly in association with other symptoms. If it is recurrent it usually is associated with migraine headache-type symptoms. Predisposing causes include fatigue and emotional stress. Certain drugs such as caffeine (coffee) and nicotine (cigarettes) tend to produce blood vessel spasm or constriction and should be avoided. Blood vessel spasm has been noted to occasionally begin after head injury. Although there may have been no direct injury to the inner ear by the trauma, the spasm may begin to damage the ear.

Occlusion

As one gets older, blood vessel walls tend to thicken due to an aging process known as arteriosclerosis. This thickening results in partial occlusion, with a gradual decrease of blood flow to the inner ear structures. The balance mechanism usually adjusts to this, but at times persistent unsteadiness develops. This may be aggravated by sudden position changes such as that encountered when one gets up quickly or turns suddenly.

Complete occlusion of an inner ear blood vessel (thrombosis) results in acute dizziness often associated with nausea and vomiting. Symptoms may persist for several days, followed by a gradual decrease of dizziness over a period of weeks or months as the central nervous system and uninvolved ear compensates for the loss of the involved ear.

Hemorrhage

Occasionally one of the small blood vessels of the balance mechanism ruptures. This may occur spontaneously, for no apparent reason, or it may be the result of high blood pressure or head injury. Symptoms are the same as those of occlusion.

Treatment

Treatment of dizziness due to changes in circulation consists of anti-dizziness medications to suppress the symptoms. They also stimulate the circulation and enhance the effectiveness of the brain centers in controlling the symptoms. An individual with this type of dizziness should avoid drugs that constrict the blood vessels, such as caffeine (coffee) and nicotine (tobacco). Emotional stress, anxiety and excessive fatigue should be avoided as much as possible. Often, increased exercise will aid in the suppression of dizziness in many patients by stimulating the remaining function to be more effective.

BENIGN POSITIONAL VERTIGO
Postural or Positional Dizziness

Postural or positional dizziness is a common form of balance disturbance due to circulatory changes or to loose calcium deposits in the inner ear. It is characterized by sudden, brief episodes of imbalance when moving or changing head position. Commonly it is noticed when lying down or arising or when turning over in bed. This type of dizziness is rarely progressive and usually responds to treatment, but it may recur. Treatment usually consists of exercises designed to provoke the dizziness until it fatigues. This type of exercise may be recommended by your physician to cause the positional dizziness to run its course more quickly. Occasionally, postural dizziness may be permanent and surgery may be required.

IMBALANCE RELATED TO AGING

Some individuals develop imbalance as a result of the aging process. In many cases this is due to circulatory changes in the very small blood vessels supplying the inner ear and balance nerve mechanism. Fortunately, these disturbances, although they may persist, rarely become worse.

Postural or positional vertigo (see above) is the most common balance disturbance of aging. This may develop in younger individuals as a result of head injuries or circulatory disturbances. Dizziness on change of head position is a distressing symptom, which is often helped by vestibular exercises.

Temporary unsteadiness upon arising from bed in the morning is not uncommon in older individuals. At times this feeling of imbalance may persist for an hour or two. Arising from bed slowly usually minimized the disturbance. Unsteadiness when walking, particularly on stepping up or down, or walking on uneven surfaces, develops in some individuals as they progress in age. Using a cane and learning to use the eyes to help the balance is often helpful.

INFECTION

Symptoms

Imbalance due to ear infection is usually insidious and mild in onset. Such imbalance may occur with or without hearing impairment. As the infection gets closer to the vital balance mechanism in the inner ear, the dizziness becomes more constant and severe in nature, and is often associated with nausea and vomiting.

Treatment

Control of an ear infection is imperative in this type of dizziness in order to prevent spread of the infection directly into the balance center of the inner ear. Should this develop, serious complications including total loss of hearing in the involved ear may result. If the infection cannot be eliminated by medical treatment, surgery is indicated to remove the infection.

NEURITIS

Neuritis is a physiological change which occurs in the nerve after injury by trauma, a virus, autoimmune disease, or vascular compression. When this occurs, the balance function is impaired, resulting in a severe, and at times prolonged, episode of dizziness, often followed by some unsteadiness or motion for weeks to years. Fortunately, this balance disturbance usually subsides in time and usually does not recur in the majority of cases. It may be, however, very chronic at a moderate to mild level. Medical treatment is helpful in eliminating symptoms until the central nervous system can compensate for the injured nerve. This usually consists of dizziness- suppressing drugs. On occasion, the central nervous system cannot compensate and surgery may be necessary

METABOLIC DISTURBANCES

Occasionally metabolic disturbances produce dizziness with or without associated hearing loss by interfering with the function of the inner ear or the central nervous system. Occasionally hearing

loss may occur without the presence of dizziness.

A change of thyroid function or abnormalities in the blood sugar are the most common metabolic disturbances resulting in dizziness. Rarely, fat metabolism abnormalities may also cause problems resulting in hearing loss and/or dizziness. Thyroid dysfunction is diagnosed by blood tests and treatment consists of taking a thyroid hormone. Abnormalities in the blood sugar are diagnosed, again by blood studies, and treatment usually consists of diet control and/or drug therapy. Fat metabolism problems and diagnosed by studies of the fatty acids and cholesterol in the blood. Treatment of these may consist of diet control with or without drug therapy.

ALLERGIES

Rarely, allergies may cause dizziness and/or vertigo. Allergies are usually diagnosed by obtaining a careful history and occasionally performing a series of skin tests with inhalants and food, and/or blood tests. Treatment usually consists of elimination of the offending agents when possible, or, if this is not possible, by allergy shots to stimulate immunity.

INJURY

Injury to the head occasionally results in dizziness of long-standing origin. If the trauma is severe, it is usually due to the combined damage to the inner ear, balance nerve, and central nervous system. Lesser injury may damage any one, or a combination of these components. The unsteadiness is at times prolonged, and may or may not be associated with hearing loss and head noise as well as other symptoms.

Trauma and Inner Ear Concussion

In head trauma the inner ear structures may be damaged by the severe sudden shaking that occurs. The pressure in the inner ear often begins to rise or calcium crystals may be dislodged. There may also be bleeding into the inner ear. This is called inner ear concussion. Although present over a period of months, the dizzy symptoms will often subside, but at times a mild persistent dizziness occurs. In other patients a post-traumatic endolymphatic hydrops (Meniere's disease) begin to develop some months to years after the injury. In these cases continual medicine may be required, or surgery may be necessary.

Trauma and Chronic Vestibular Neuritis

In more severe trauma, the balance and hearing nerve may be sheared. This occurs when the skull suddenly stops and the brain continues to move for a fraction of a second. The nerve is damaged at the entrance to the temporal (ear) bone. Symptoms are usually unresponsive to medical treatment and require surgery.

Trauma and Brain Damage

Again in severe trauma the base of the brain and/or the cerebellum may be injured. These structures are slow to heal and there is often a residual dizziness that is severely resistant to any treatment. Fortunately, the symptoms are usually relatively mild and do not preclude some type of work. However, occasionally they may be quite incapacitating. Medication is not often

beneficial, but rehabilitation therapy can be quite helpful.

A perilymphatic fistula is a leak of inner ear fluid into the middle ear. Relatively minor closed head injuries may cause a fistula, the fistula occurs at either the oval window (window where the stapes bone fits) or the round window membrane (an opening from the cochlea to the middle ear). Fistulas change the pressure in the inner ear and lead to a variety of symptoms, some of which can be incapacitating. Persistent daily low grade dizziness is often associated with fistulas, but the patient may also experience severe episodes of vertigo similar to those seen in Meniere's disease. Surgery is usually required to close a fistula and stop the symptoms. If the fistula is large, or has been present for some time, there may be permanent damage to the inner ear and symptoms may persist even after closure of the fistula. In these cases a vestibular nerve section is necessary to stop the persistent dizziness.

TUMORS

A noncancerous tumor occasionally develops on the balance nerve between the ear and the brain. When this occurs, unsteadiness, hearing loss and head noise may develop. Extensive hearing tests, balance tests, and x-rays are necessary to diagnose such tumors.

If the diagnosis of a tumor is established, surgical removal is imperative. Continued growth of the tumor would lead to complications by producing pressure on vital adjacent nerves and the brain. An operation has been developed which allows the removal of these tumors at an early stage. Best results can be obtained if the tumor is diagnosed early and removed while the only symptoms are hearing loss, dizziness, and tinnitus (head noise).

Dandy's Syndrome

A total loss of inner ear balance function in both ears is rare. It results in a condition called Dandy's syndrome. This may result from infections, injuries or tumor removal. There may be serious dizziness at the time the individual first loses the balance mechanism. Other portions of the balance mechanism (eyes, muscles and joints) help the individual to compensate for the loss of inner ear function. Most do quite well except in the dark or when swimming. Many notice oscillopsia, a tendency for objects to appear to move up and down while in motion.

There is no treatment for Dandy's syndrome. Most patients compensate well and lead normal lives. One should avoid movement in total darkness and avoid underwater swimming.

VASCULAR COMPRESSION SYNDROME

The vestibular (balance) nerve is located in a very complex part of the skull called the posterior fossa. A number of blood vessels are in close proximity to the nerve. If a blood vessel happens to compress or pulsate against the vestibular nerve, dizziness may result.

The diagnosis of this syndrome is difficult. A careful history and the results of specialized auditory and balance tests provide the physician with the suspicion of a vascular compression syndrome. The treatment is microvascular vestibular nerve decompression.

LABYRINTHINE DYSFUNCTION

Labyrinthine dysfunction describes one of the non-specific conditions where the inner ear is not functioning properly. Although the cause is often unknown, viral illnesses, medication, and trauma are known at times to cause this condition. In order to reach this diagnosis definitively, hearing and balance testing must be done.

Symptoms may be highly variable. They can range from occasional unsteadiness to episodic vertigo or constant unsteadiness. Hearing loss is occasionally present.

Initially, treatment is medical and a wide variety of medications may be used. Occasionally, vertigo exercises are helpful. When vertigo cannot be controlled with medication or exercises, surgery is sometimes indicated.

ENDOLYMPHATIC HYDROPS

Endolymphatic hydrops is a term which describes increased fluid pressure in the inner ear. In this respect it is similar but not related to glaucoma of the eye fluids. A special clinical form of endolymphatic hydrops is called Meniere's disease, described elsewhere in this book. All patients with Meniere's disease have endolymphatic hydrops, but not all patients with hydrops have Meniere's disease.

There may be many causes of endolymphatic hydrops. It occurs widely in people of European decent and rarely in oriental or black people. It may be caused or aggravated by excessive salt intake or certain mediations. The symptoms are highly variable. The patient may have one symptom or a combination. Often there is a combination of hearing changes, disequilibrium, motion intolerance, or short dizzy episodes. There may be tinnitus and/or a pressure feeling in the head or ears. The patient does not have the well defined attacks of Meniere's disease (fluctuating hearing loss, tinnitus and episodes of spinning lasting minutes to hours). Often the division between the two diagnoses may be blurred and difficult to separate, even for the patient. Endolymphatic hydrops may progress to Meniere's disease in some patients.

The treatment of endolymphatic hydrops is similar to that for Meniere's disease. Medications are first used. Diuretics (water pills) are almost always used. Their purpose is to decrease the fluid pressure in the inner ear. In addition to diuretics, other medications may be indicated, depending on the cause of symptoms in each patient's case. If these fail, surgery is sometimes indicated. (See Surgery for vertigo elsewhere in this document).

MENIERE'S DISEASE

Meniere's disease is a common cause of repeated attacks of dizziness, and is thought to be due (in most cases) to increased pressure of the inner ear fluids due to impaired metabolism of the inner ear. Fluids in the inner ear chamber are constantly being produced and absorbed by the circulatory system. Any disturbance of this delicate relationship results in overproduction of underabsorption of the fluid. This leads to an increase in the fluid pressure (hydrops) that may, in turn, produce dizziness which may or may not be associated with fluctuating hearing loss and tinnitus.

A thorough evaluation is necessary to determine the cause of Meniere's disease, if possible. Circulatory, metabolic, toxic and allergic factors may play a part in any individual. Emotional stress, while making the disease worse, does not cause it.

Symptoms

Meniere's disease is usually characterized by attacks consisting of vertigo (spinning) that varies in duration from a few minutes to several hours. Hearing loss and head noise, usually accompanying the attacks, may occur suddenly. Violent spinning, whirling, and falling associated with nausea and vomiting are common symptoms. Sensations of pressure and fullness in the ear or head are usually present during the attacks. The individual may be very tired for several hours after the overt spinning stops.

Attacks of dizziness may recur at irregular intervals and the individual may be free of symptoms for years at a time, only to have them recur again. In between major attacks, the individual may have minor episodes occurring more frequently and consisting of unsteadiness lasting for a few seconds to minutes.

Occasionally hearing impairment, head noise, and ear pressure occur without dizziness. This type of Meniere's disease is called cochlear hydrops. Similarly episodic dizziness and ear pressure may occur without hearing loss or tinnitus, and this is called vestibular hydrops.

Treatment of Meniere's Disease

Treatment of cochlear and vestibular hydrops is the same as for classic Meniere's disease. The treatment of Meniere's disease may be medical or surgical, depending upon the patient's stage of the disease, life circumstances, and the condition of the ears. The purpose of the treatment is to prevent the hearing loss, and stop the vertigo (spinning).

It is aimed at improving the inner ear circulation and controlling the fluid pressure changes of the inner ear chambers. At times it is necessary to cut the balance nerve or remove the inner ear structures.

Medical treatment of Meniere's disease varies with the individual patient according to suspected cause and magnitude and frequency of symptoms. It is effective in decreasing the frequency and severity of attacks in 80% of patients. Treatment may consist of medication to decrease the inner ear fluid pressure or prevent inner ear allergic reactions. Various drugs are used as anti-dizziness medication. Vasoconstricting substances have an opposite effect and, therefore, should be avoided. Such substances are caffeine (coffee) and nicotine (cigarettes).

Diuretics ("water pills") may be prescribed to decrease the inner ear fluid pressure.

Meniere's disease may be caused or aggravated by metabolic or allergic disorders. Special diets or drug therapy are indicated at times to control these problems.

On rare occasions we may use gentamycin injections which selectively destroy balance function. This treatment is reserved for patients with Meniere's disease in their only hearing ear or with Meniere's disease in both ears.

DIZZINESS: SURGICAL TREATMENT

Surgery is indicated when medical treatment fails to control the vertigo. The type of operation selected depends on the degree of hearing impairment in the affected ear, the life circumstances of the individual, and the status of the individual's disease. In some operations the hearing may

be occasionally improved following surgery, and in others it may become worse. In most cases it remains the same. Head noise may or may not be relieved, and in some cases may become even more marked. In most cases it is not relieved.

Surgery is most successful in relieving acute attacks of dizziness in the majority of patients. Some unsteadiness may persist over a period of several months until the opposite ear and the central nervous system are able to compensate and stabilize the balance system.

Surgical Procedures Include:

GEndolymphatic Shunt

This operation drains excess endolymph from the inner ear. It is usually performed under general anesthesia and requires hospitalization for one to two days.

An incision is made behind the ear. A mastoid operation is performed and a tube is inserted into the endolymphatic sac of the inner ear to control the abnormal fluid pressure.

A shunt operation usually is advised when hearing is relatively good in the involved ear. Further loss of hearing may occur in 25% of cases due to progression of the disease. Total loss of hearing in the operated ear following surgery is uncommon, but does occur in about 3% of operations.

GTranslabyrinthine labyrinthectomy and section of the vestibular (balance) nerve.

The operation is performed under general anesthesia and requires hospitalization for approximately five to seven days. Through an incision behind the ear, a mastoidectomy is performed, the inner ear balance chambers are removed, and the balance nerve is cut. In order to fill in the cavity where bone was removed, a superficial incision made on the abdomen and a small amount of fat is obtained and placed in the mastoid.

In cases selected for labyrinthectomy and section of the vestibular nerve, hearing is severely impaired. The operation results in total loss of hearing in the operated ear, and frequently, a temporary increase in dizziness. Fortunately, the attacks of dizziness are eliminated in nearly every instance. Persistent unsteadiness, however, may continue for a period of weeks or months until the central nervous system stabilizes the balance system. When necessary, this operation can be performed if other surgery is not successful.

Middle fossa section of the vestibular (balance) nerve

This procedure is performed under general anesthesia, and usually requires five to seven days of hospitalization. Through an incision above the ear, the balance nerve is cut before it enters the inner ear chamber.

Middle fossa section of the vestibular nerve may be advised when hearing is good in the involved ear. Up to 5% of patients may develop a severe hearing impairment in the operated ear. Fortunately, the attacks of dizziness are eliminated in nearly every instance. Persistent unsteadiness, however, may continue for a period of weeks or months until the central nervous

system stabilizes the balance system. Temporary paralysis of half the body has occurred following a middle fossa nerve section, due to brain swelling. This complication is, however, extremely rare.

Retrosigmoid section of the vestibular (balance) nerve

This operation is performed in the hospital under general anesthesia and requires hospitalization for about five to seven days. Through an incision well behind the ear, the balance nerve is cut before it enters the inner ear. In order to fill in the cavity where bone was removed, a superficial incision is made on the abdomen and a small amount of fat is obtained and placed in the space where the bone was removed.

This procedure allows examination of the anatomy between the inner ear and the brain, particularly the vessels. This operation may be advised when the hearing is good in the involved ear, and the patient is somewhat older. Up to 15% of patients may develop a severe hearing impairment in the operated ear after surgery. Fortunately, the attacks of dizziness are eliminated in nearly every instance (90% - 95%). Persistent unsteadiness may continue for several weeks to months until the central nervous system has stabilized the balance system. Temporary paralysis of half the body has occurred following a surgery due to brain swelling. Fortunately, this complication is extremely rare.

RISKS AND COMPLICATIONS OF SURGERY FOR DIZZINESS

Hearing Loss

Further hearing impairment in the operated ear may occur following any of the procedures, and is the expected result following some. This has been commented on for each procedure.

Tinnitus

Tinnitus (head noise) usually remains the same as before surgery. If the hearing is worse following surgery, tinnitus may likewise be more noticeable.

Taste Disturbance and Mouth Dryness

Taste disturbance and mouth dryness are not uncommon for a few weeks following surgery. In 5% if the patients this disturbance is prolonged.

Weakness of the Face

The facial nerve travels through the ear bone in close association with the hearing and balance nerves, the inner ear and mastoid (refer to the diagram). Temporary weakness of one side of the face is an uncommon postoperative complication of ear surgery. It may occur as the result of an abnormality or swelling of the nerve. Permanent paralysis of the face is extremely rare. Should it occur, however, eye complications could develop requiring treatment by an eye specialist.

Spinal Fluid Leak

All of the operations described above can result in a leak of cerebrospinal fluid (fluid surrounding the brain). Further surgery may be necessary to stop it.

Infection

Infection is a rare occurrence following surgery for dizziness. Should it develop, however, it could lead to meningitis (an infection of the fluid surrounding the brain) and may require prolonged hospital treatment. Fortunately, this complication is very rare.

Hematoma

A hematoma (collection of blood under the skin incision) develops in a small percentage of cases, prolonging hospitalization and healing. Reoperation to remove the clot may be necessary if this complication occurs.

DIZZINESS: NONSURGICAL TREATMENT

Vestibular Rehabilitation

Current retrospective studies indicate that 85% of patients with chronic vestibular dysfunction gain at least partial relief of their symptoms after undergoing vestibular rehabilitation.

Typically, a physical therapist evaluation of patients with vestibular or balance disorders take approximately 60-90 minutes. The evaluation begins with a history of the patient's symptoms. This includes how long the patient has been symptomatic, how long the symptoms last, general activity level and medications that the patient is currently taking. Range of motion, strength, coordination, balance and various sensory systems are also assessed. Patients are asked to perform; transitional movements such as rolling, supine to sit and sit to stand. This is to determine whether these motions produce or increase symptoms. One of the most difficult things for patients with vestibular disorders to do is walk and move the head. Different combinations of head and neck movements are performed during gait to provoke symptoms. Balance is also tested on a firm surface and again on a compressible surface with eyes open and closed. Time tests of balance are performed with eyes open and closed, while standing on one foot and with feet aligned as if on a tightrope.

Following the evaluation, a treatment plan is developed. The treatment consists of habitual exercises, balance retraining exercise, and usually a general conditioning program. The goal of habituation exercises is to decrease the patient's symptoms of motion provoked dizziness or lightheadedness. The exercises are chosen to address the patient's particular problems that were discovered during the evaluation. These exercises use repetitive movements or positional stimuli to physiologically fatigue the response of the vestibular system. This, in turn, increases the patient's tolerance for these movements. Controlled provocation of symptoms with the home program "desensitizes" the patient's response to movements that previously stimulated dizziness. Patients that have non-reproducible or spontaneous symptoms (ones that appear unexpectedly and independently of whether the patient is moving); do not respond as well to these exercises as a means to control their symptoms. Balance retraining exercises are also given when appropriate and consist of activities directed towards improving the patient's balance. Exercises are chosen according to the problem areas discovered in the evaluation and often involve interaction among the three sensory inputs involved in balance: vision, somatosensory cues and vestibular inputs. Thus the patient may be asked to perform exercises with eyes closed or

standing on a compressible surface. A general conditioning program usually consists of a walking program or another fitness program that the patient is interested in. The length and intensity of the general conditioning program depends upon the patient's previous activity level and how easily their symptoms are provoked. The patient must consistently perform all the exercises as described in their treatment program to achieve the goals of improving their balance and decreasing their dizziness. Typically the exercises are performed twice a day. Patients are advised not to avoid positions that provoke symptoms unless they are unsafe.

Usually the patient is given a home exercise program to perform, and asked to return to the office in two to four weeks for a follow-up visit to monitor their progress and modify their home program as necessary. If the patient lives very far way, this can sometimes be done over the phone. Occasionally, if the patient's problems are significant enough, he or she may be asked to come into to office for balance/vestibular training that can be supervised by the physical therapist.

SUMMARY

There are many causes of dizziness. This dizziness may or may not be associated with hearing loss. In most instances the distressing symptoms of dizziness can be greatly benefited or eliminated by medical or surgical management.