EAR:

Autoimmune Inner Ear Disease

What is AIED?

Autoimmune inner ear disease (AIED) is an inflammatory condition of the inner ear. It occurs when the body's immune system attacks cells in the inner ear that are mistaken for a virus or bacteria. AIED is a rare disease occurring in less than one percent of the 28 million Americans with a hearing loss.

How Does the Healthy Ear Work?

The ear has three main parts: the outer, middle and inner ear. The outer ear (the part you can see) opens into the ear canal. The eardrum separates the ear canal from the middle ear. Small bones in the middle ear help transfer sound to the inner ear. The inner ear contains the auditory (hearing) nerve, which leads to the brain.

Any source of sound sends vibrations or sound waves into the air. These funnel through the ear opening, down the ear, canal, and strike your eardrum, causing it to vibrate. The vibrations are passed to the small bones of the middle ear, which transmit them to the hearing nerve in the inner ear. Here, the vibrations become nerve impulses and go directly to the brain, which interprets the impulses as sound (music, voice, a car horn, etc.).

Symptoms Of AIED

The symptoms of AIED are sudden hearing loss in one ear progressing rapidly to the second ear. The hearing loss can progress over weeks or months. Patients may feel fullness in the ear and experience vertigo. In addition, a ringing, hissing, or roaring sound in the ear may be experienced. Diagnosis of AIED is difficult and is often mistaken for otitis media until the patient develops a loss in the second ear. One diagnostic test that is promising is the Western blot immunoassay.

Treatment For AIED?

Most patients with AIED respond to the initial treatment of steroids, prednisone, and methotrexate, a chemotherapy agent. Some patients may benefit from the use of hearing aids. If patients are unresponsive to drug therapy and hearing loss persists, a cochlear implant maybe considered.

History Of AIED

Until recently it was thought that the inner ear could not be attacked by the immune system. Studies have shown that the perisacular tissue surrounding the endolymphatic sac

contains the necessary components for an immunological reaction. The inner ear is also capable of producing an autoimmune response to sensitized cells that can enter the cochlea through the circulatory system.

AIED Research

A multi-institutional clinical study, Otolaryngology Clinical Trial Cooperative Group (OCTCG) co-sponsored by the NIH and the American Academy of Otolaryngology-Head and Neck Surgery Foundation, is being conducted to measure the benefits and risks of treating AIED with two different immunosuppressive drugs: prednisone and methotrexate, a chemotherapy drug.

Cholesteatoma

What Is A Cholesteatoma?

A cholesteatoma is a skin growth that occurs in an abnormal location, the middle ear behind the eardrum. It is usually due to repeated infection, which causes an ingrowth of the skin of the eardrum. Cholesteatomas often take the form of a cyst or pouch that sheds layers of old skin that builds up inside the ear. Over time, the cholesteatoma can increase in size and destroy the surrounding delicate bones of the middle ear. Hearing loss, dizziness, and facial muscle paralysis are rare but can result from continued cholesteatoma growth.

Causes Of Cholesteatoma

A cholesteatoma usually occurs because of poor eustachian tube function as well as infection in the middle ear. The eustachian tube conveys air from the back of the nose into the middle ear to equalize ear pressure ("clear the ears"). When the eustachian tubes work poorly perhaps due to allergy, a cold or sinusitis, the air in the middle ear is absorbed by the body, and a partial vacuum results in the ear. The vacuum pressure sucks in a pouch or sac by stretching the eardrum, especially areas weakened by previous infections. This sac often becomes a cholesteatoma. A rare congenital form of cholesteatoma (one present at birth) can occur in the middle ear and elsewhere, such as in the nearby skull bones. However, the type of cholesteatoma associated with ear infections is most common.

Cholesteatoma Symptoms

Initially, the ear may drain, sometimes with a foul odor. As the cholesteatoma pouch or sac enlarges, it can cause a full feeling or pressure in the ear, along with hearing loss. (An ache behind or in the ear, especially at night, may cause significant discomfort.) Dizziness, or muscle weakness on one side of the face (the side of the infected ear) can also occur. Any, or all, of these symptoms are good reasons to seek medical evaluation.
Is It Dangerous?

Ear cholesteatomas can be dangerous and should never be ignored. Bone erosion can cause the infection to spread into the surrounding areas, including the inner ear and brain. If untreated, deafness, brain abscess, meningitis, and rarely death can occur.

Treatments For Cholesteatoma

An examination by an otolaryngologist-head and neck surgeon can confirm the presence of a cholesteatoma. Initial treatment may consist of a careful cleaning of the ear, antibiotics, and ear drops. Therapy aims to stop drainage in the ear by controlling the infection. The extent or growth characteristics of a cholesteatoma must also be evaluated.

Large or complicated cholesteatomas usually require surgical treatment to protect the patient from serious complications. Hearing and balance tests, x-rays of the mastoid (the skull bone next to the ear), and CAT scans (3-D x-rays) of the mastoid may be necessary. These tests are performed to determine the hearing level remaining in the ear and the extent of destruction the cholesteatoma has caused.

Surgery is performed under general anesthesia in most cases. The primary purpose of the surgery is to remove the cholesteatoma and infection and achieve an infection-free, dry ear. Hearing preservation or restoration is the second goal of surgery. In cases of severe ear destruction, reconstruction may not be possible. Facial nerve repair or procedures to control dizziness are rarely required. Reconstruction of the middle ear is not always possible in one operation; and therefore, a second operation may be performed six to twelve months later. The second operation will attempt to restore hearing and, at the same time, inspect the middle ear space and mastoid for residual cholesteatoma.

Admission to the hospital is usually done the morning of surgery, and if the surgery is performed early in the morning, discharge maybe the same day. For some patients, an overnight stay is necessary. In rare cases of serious infection, prolonged hospitalization for antibiotic treatment may be necessary. Time off from work is typically one to two weeks.

Follow-up office visits after surgical treatment are necessary and important, because cholesteatoma sometimes recurs. In cases where an open mastoidectomy cavity has been created, office visits every few months are needed in order to clean out the mastoid cavity and prevent new infections. In some patients, there must be lifelong periodic ear examinations.
Summary

Cholesteatoma is a serious but treatable ear condition which can only be diagnosed by medical examination. Persisting earache, ear drainage, ear pressure, hearing loss, dizziness, or facial muscle weakness signals the need for evaluation by an otolaryngologist-head and neck surgeon.

Cochlear Implants

205A cochlear implant is an electronic device that restores partial hearing to the deaf. It is surgically implanted in the inner ear and activated by a device worn outside the ear. Unlike a hearing aid, it does not make sound louder or clearer. Instead, the device bypasses damaged parts of the auditory system and directly stimulates the nerve of hearing, allowing individuals who are profoundly hearing impaired to receive sound.

Read more about cochlear implants and meningitis.

What Is Normal Hearing?

Your ear consists of three parts that play a vital role in hearing—the external ear, middle ear, and inner ear.

* Conductive hearing: Sound travels along the ear canal of the external ear causing the ear drum to vibrate. Three small bones of the middle ear conduct this vibration from the ear drum to the cochlea (auditory chamber) of the inner ear.

* Sensorineural hearing: When the three small bones move, they start waves of fluid in the cochlea, and these waves stimulate more than 16,000 delicate hearing cells (hair cells). As these hair cells move, they generate an electrical current in the auditory nerve. It travels through inter-connections to the brain area that recognizes it as sound.

How Is Hearing Impaired?

If you have disease or obstruction in your external or middle ear, your conductive hearing may be impaired. Medical or surgical treatment can probably correct this.

An inner ear problem, however, can result in a sensorineural impairment or nerve deafness. In most cases, the hair cells are damaged and do not function. Although many auditory nerve fibers may be intact and can transmit electrical impulses to the brain, these nerve fibers are unresponsive because of hair cell damage. Since severe sensorineural hearing loss cannot be corrected with medicine, it can be treated only with a cochlear implant.

How Do Cochlear Implants Work?

Cochlear implants bypass damaged hair cells and convert speech and environmental sounds into electrical signals and send these signals to the hearing nerve.

The implant consists of a small electronic device, which is surgically implanted under the skin behind the ear and an external speech processor, which is usually worn on a belt or in a pocket. A microphone is also worn outside the body as a headpiece behind the ear to

capture incoming sound. The speech processor translates the sound into distictive electrical signals. These 'codes' travel up a thin cable to the headpiece and are transmitted across the skin via radio waves to the implanted electrodes in the cochlea. The electrodes' signals stimulate the auditory nerve fibers to send information to the brain where it is interpreted as meaningful sound.

Cochlear Implant Benefits

Implants are designed only for individuals who attain almost no benefit from a hearing aid. They must be 12 months of age or older (unless childhood meningitis is responsible for deafness).

Otolaryngologists (ear, nose, and throat specialists) perform implant surgery, though not all of them do this procedure. Your local doctor can refer you to an implant clinic for an evaluation. The evaluation will be done by an implant team (an otolaryngologist, audiologist, nurse, and others) that will give you a series of tests:

* Ear (otologic) evaluation: The otolaryngologist examines the middle and inner ear to ensure that no active infection or other abnormality precludes the implant surgery.

* Hearing (audiologic) evaluation: The audiologist performs an extensive hearing test to find out how much you can hear with and without a hearing aid.

* X-ray (radiographic) evaluation: Special X-rays are taken, usually computerized tomography (CT) or magnetic resonance imaging (MRI) scans, to evaluate your inner ear bone.

* Psychological evaluation: Some patients may need a psychological evaluation to learn if they can cope with the implant.

* Physical examination: Your otolaryngologist also gives a physical examination to identify any potential problems with the general anesthesia needed for the implant procedure.

Cochlear Surgery

Implant surgery is performed under general anesthesia and lasts from two to three hours. An incision is made behind the ear to open the mastoid bone leading to the middle ear. The procedure may be done as an outpatient, or may require a stay in the hospital, overnight or for several days, depending on the device used and the anatomy of the inner ear.

Is There Care And Training After The Operation?

About one month after surgery, your team places the signal processor, microphone, and implant transmitter outside your ear and adjusts them. They teach you how to look after the system and how to listen to sound through the implant. Some implants take longer to fit and require more training. Your team will probably ask you to come back to the clinic for regular checkups and readjustment of the speech processor as needed.

What Can I Expect from An Implant?

Cochlear implants do not restore normal hearing, and benefits vary from one individual to another. Most users find that cochlear implants help them communicate better through improved lipreading, and over half are able to discriminate speech without the use of visual cues. There are many factors that contribute to the degree of benefit a user receives from a cochlear implant, including:

* how long a person has been deaf,
* the number of surviving auditory nerve fibers, and
* a patient's motivation to learn to hear.

Your team will explain what you can reasonably expect. Before deciding whether your implant is working well, you need to understand clearly how much time you must commit. A few patients do not benefit from implants.

FDA Approval For Implants

The Food and Drug Administration (FDA) regulates cochlear implant devices for both adults and children and approves them only after thorough clinical investigation.

Be sure to ask your otolaryngologist for written information, including brochures provided by the implant manufacturers. You need to be fully informed about the benefits and risks of cochlear implants, including how much is known about how safe, reliable, and effective a device is, how often you must come back to the clinic for checkups, and whether your insurance company pays for the procedure.

Costs Of Implants

More expensive than a hearing aid, the total cost of a cochlear implant including evaluation, surgery, the device, and rehabilitation is around $40,000. Most insurance companies provide benefits that cover the cost. (This is true whether or not the device has received FDA clearance or is still in trial.)

Doctor, Please Explain Ear Tubes

Painful ear infections are a rite of passage for children – by the age of five, nearly every child has experienced at least one episode. Most ear infections either resolve on their own (viral) or are effectively treated by antibiotics (bacterial). But sometimes, ear infections and/or fluid in the middle ear may become a chronic problem leading to other issues such

as hearing loss, behavior, and speech problems. In these cases, insertion of an ear tube by an otolaryngologist (ear, nose, and throat surgeon) may be considered.

What Are Ear tubes?

Ear tubes are tiny cylinders placed through the ear drum (tympanic membrane) to allow air into the middle ear. They also may be called tympanostomy tubes, myringotomy tubes, ventilation tubes, or PE (pressure equalization) tubes. These tubes can be made out of plastic, metal, or Teflon and may have a coating intended to reduce the possibility of infection. There are two basic types of ear tubes: short-term and long-term. Short-term tubes are smaller and typically stay in place for six months to a year before falling out on their own. Long-term tubes are larger and have flanges that secure them in place for a longer period of time. Long term tubes may fall out on their own, but removal by an otolaryngologist is often necessary.

Who Needs Ear Tubes?

Ear tubes are often recommended when a person experiences repeated middle ear infection (acute otitis media) or has hearing loss caused by the persistent presence of middle ear fluid (otitis media with effusion). These conditions most commonly occur in children, but can also be present in teens and adults and can lead to speech and balance problems, hearing loss, or changes in the structure of the ear drum. Other less common conditions that may warrant the placement of ear tubes are malformation of the ear drum or Eustachian tube, Down Syndrome, cleft palate, and barotrauma (injury to the middle ear caused by a reduction of air pressure), usually seen with altitude changes such as flying and scuba diving.

Each year, more than half a million ear tube surgeries are performed on children, making it the most common childhood surgery performed with anesthesia. The average age of ear tube insertion is one to three years old. Inserting ear tubes may:

* reduce the risk of future ear infection,
* restore hearing loss caused by middle ear fluid,
* improve speech problems and balance prob-lems, and
* improve behavior and sleep problems caused by chronic ear infections.

How Are Ear Tubes Inserted?

Ear tubes are inserted through an outpatient surgical procedure called a myringotomy. A myringotomy refers to an incision (a hole) in the ear drum or tympanic membrane. This is most often done under a surgical microscope with a small scalpel (tiny knife), but it can also be accomplished with a laser. If an ear tube is not inserted, the hole would heal and close within a few days. To prevent this, an ear tube is placed in the hole to keep it open and allow air to reach the middle ear space (ventilation).

Ear Tube Surgery

A light general anesthetic (laughing gas) is administered for young children. Some older children and adults may be able to tolerate the procedure without anesthetic. A myringotomy is performed and the fluid behind the ear drum (in the middle ear space) is suctioned out. The ear tube is then placed in the hole. Ear drops may be administered after the ear tube is placed and may be necessary for a few days. The procedure usually lasts less than 15 minutes and patients awaken quickly. Sometimes the otolaryngologist will recommend removal of the adenoid tissue (lymph tissue located in the upper airway behind the nose) when ear tubes are placed. This is often considered when a repeat tube insertion is necessary. Current research indicates that removing adenoid tissue concurrent with placement of ear tubes can reduce the risk of recurrent ear infection and the need for repeat surgery.

What To Expect After Surgery

After surgery, the patient is monitored in the recovery room and will usually go home within an hour if no complications are present. Patients usually experience little or no postoperative pain but grogginess, irritability, and/or nausea from the anesthesia can occur temporarily. Hearing loss caused by the presence of middle ear fluid is immediately resolved by surgery. Sometimes children can hear so much better that they complain that normal sounds seem too loud. The otolaryngologist will provide specific postoperative instructions for each patient including when to seek immediate attention and follow-up appointments. He or she may also prescribe antibiotic ear drops for a few days.

To avoid the possibility of bacteria entering the middle ear through the ventilation tube, physicians may recommend keeping ears dry by using ear plugs or other water-tight devices during bathing, swimming, and water activities. However, recent research suggests that protecting the ear may not be necessary, except when diving or engaging in water activities in unclean water such as lakes and rivers. Parents should consult with the treating physician about ear protection after surgery.

Possible Complications

Myringotomy with insertion of ear tubes is an extremely common and safe procedure with minimal complications. When complications do occur, they may include:

* Perforation – This can happen when a tube comes out or a long-term tube is removed and the hole in the tympanic membrane (ear drum) does not close. The hole can be patched through a minor surgical procedure called a tympanoplasty or myringoplasty.
* Scarring – Any irritation of the ear drum (recurrent ear infections), including repeated in-sertion of ear tubes, can cause scarring called tympanosclerosis or myringosclerosis. In most cases, this causes no problems with hearing.
* Infection – Ear infections can still occur in the middle ear or around the ear tube. How-ever, these infections are usually less frequent, result in less hearing loss, and are easier to treat – often only with ear drops. Sometimes an oral antibiotic is still needed.
* Ear Tubes Come Out Too Early Or Stay In Too Long – If an ear tube expels from the ear drum too soon (which is unpredictable), fluid may return and repeat surgery may be needed. Ear tubes that remain too long may result in perforation or may require removal by the otolaryngologist.

Consultation with an otolaryngologist (ear, nose, and throat surgeon) may be warranted if you or your child has experienced repeated or severe ear infections, ear infections that are not resolved with antibiotics, hearing loss due to fluid in the middle ear, barotrauma, or have an anatomic abnormality that inhibits drainage of the middle ear.

Ear Infections and Earache

What Is Otitis Media?

Otitis media means inflammation of the middle ear. The inflammation occurs as a result of a middle ear infection. It can occur in one or both ears. Otitis media is the most frequent diagnosis recorded for children who visit physicians for illness. It is also the most common cause of hearing loss in children.

Although otitis media is most common in young children, it also affects adults occasionally. It occurs most commonly in the winter and early spring months.

Is Otitis Media Serious?

Yes, it is serious because of the severe earache and hearing loss it can create. Hearing loss, especially in children, may impair learning capacity and even delay speech development. However, if it is treated promptly and effectively, hearing can almost always be restored to normal.

Otitis media is also serious because the infection can spread to nearby structures in the head, especially the mastoid. Thus, it is very important to recognize the symptoms (see list) of otitis media and to get immediate attention from your doctor.

How Does The Ear Work?

The outer ear collects sounds. The middle ear is a pea sized, air-filled cavity separated from the outer ear by the paper-thin eardrum. Attached to the eardrum are three tiny ear bones. When sound waves strike the eardrum, it vibrates and sets the bones in motion that transmit to the inner ear. The inner ear converts vibrations to electrical signals and sends these signals to the brain. It also helps maintain balance.

A healthy middle ear contains air at the same atmospheric pressure as outside of the ear, allowing free vibration. Air enters the middle ear through the narrow eustachian tube that connects the back of the nose to the ear. When you yawn and hear a pop, your eustachian tube has just sent a tiny air bubble to your middle ear to equalize the air pressure.

What Causes Otitis Media?

Blockage of the eustachian tube during a cold, allergy, or upper respiratory infection and the presence of bacteria or viruses lead to the accumulation of fluid (a build-up of pus and mucus) behind the eardrum. This is the infection called acute otitis media. The build up of pressurized pus in the middle ear causes earache, swelling, and redness. Since the eardrum cannot vibrate properly, you or your child may have hearing problems.

Sometimes the eardrum ruptures, and pus drains out of the ear. But more commonly, the pus and mucus remain in the middle ear due to the swollen and inflamed eustachian tube. This is called middle ear effusion or serous otitis media. Often after the acute infection has passed, the effusion remains and becomes chronic, lasting for weeks, months, or even years. This condition makes one subject to frequent recurrences of the acute infection and may cause difficulty in hearing.

What Are The Symptoms Of Otitus Media?

In infants and toddlers look for:

* pulling or scratching at the ear, especially if accompanied by the following...

    1. hearing problems
    2. crying, irritability
    3. fever
    4. vomiting
    5. ear drainage

In young children, adolescents, and adults look for:

* earache
* feeling of fullness or pressure
* hearing problems
* dizziness, loss of balance
* nausea, vomiting

* ear drainage
* fever

Remember, without proper treatment, damage from an ear infection can cause chronic or permanent hearing loss.

What Will Happen At The Doctor's Office?

During an examination, the doctor will use an instrument called an otoscope to assess the ear's condition. With it, the doctor will perform an examination to check for redness in the ear and/or fluid behind the eardrum. With the gentle use of air pressure, the doctor can also see if the eardrum moves. If the eardrum doesn't move and/or is red, an ear infection is probably present.

Two other tests may be performed for more information.

An audiogram tests if hearing loss has occurred by presenting tones at various pitches.

A tympanogram measures the air pressure in the middle ear to see how well the eustachian tube is working and how well the eardrum can move.

The Importance Of Medication

The doctor may prescribe one or more medications. It is important that all the medication(s) be taken as directed and that any follow-up visits be kept. Often, antibiotics to fight the infection will make the earache go away rapidly, but the infection may need more time to clear up. So, be sure that the medication is taken for the full time your doctor has indicated. Other medications that your doctor may prescribe include an antihistamine (for allergies), a decongestant (especially with a cold), or both.

Sometimes the doctor may recommend a medication to reduce fever and/or pain. Analgesic ear drops can ease the pain of an earache. Call your doctor if you have any questions about you or your child's medication or if symptoms do not clear.

What Other Treatment May Be Necessary?

Most of the time, otitis media clears up with proper medication and home treatment. In many cases, however, further treatment may be recommended by your physician. An operation, called a myringotomy may be recommended. This involves a small surgical incision (opening) into the eardrum to promote drainage of fluid and to relieve pain. The incision heals within a few days with practically no scarring or injury to the eardrum. In fact, the surgical opening can heal so fast that it often closes before the infection and the fluid are gone. A ventilation tube can be placed in the incision, preventing fluid accumulation and thus improving hearing.

The surgeon selects a ventilation tube for your child that will remain in place for as long as required for the middle ear infection to improve and for the eustachian tube to return to

normal. This may require several weeks or months. During this time, you must keep water out of the ears because it could start an infection. Otherwise, the tube causes no trouble, and you will probably notice a remarkable improvement in hearing and a decrease in the frequency of ear infections.

Otitis media may recur as a result of chronically infected adenoids and tonsils. If this becomes a problem, your doctor may recommend removal of one or both. This can be done at the same time as ventilation tubes are inserted.

Allergies may also require treatment.
So, Remember . . .

Otitis media is generally not serious if it is promptly and properly treated. With the help of your physician, you and/or your child can feel and hear better very soon.

Be sure to follow the treatment plan, and see your physician until he/she tells you that the condition is fully cured.

Ears and Altitude

ears and altitudeHave you ever wondered why your ears pop when you fly on an airplane? Or why, when they fail to pop, you get an earache? Have you ever wondered why the babies on an airplane fuss and cry so much during descent?

Ear problems are the most common medical complaint of airplane travelers, and while they are usually simple, minor annoyances, they occasionally result in temporary pain and hearing loss.

How Does Air Pressure Affect The Ear?

It is the middle ear that causes discomfort during air travel, because it is an air pocket inside the head that is vulnerable to changes in air pressure.

Normally, each time (or each second or third time) you swallow, your ears make a little click or popping sound. This occurs because a small bubble of air has entered your middle ear, up from the back of your nose. It passes through the Eustachian tube, a membrane-lined tube about the size of a pencil lead that connects the back of the nose with the middle ear. The air in the middle ear is constantly being absorbed by its membranous lining and resupplied through the Eustachian tube. In this manner, air pressure on both sides of the eardrum stays about equal. If and when the air pressure is not equal, the ear feels blocked.

Blocked Ears And Eustachian Tubes

172The Eustachian tube can be blocked, or obstructed, for a variety of reasons. When that occurs, the middle ear pressure cannot be equalized. The air already there is absorbed

and a vacuum occurs, sucking the eardrum inward and stretching it. Such an eardrum cannot vibrate naturally, so sounds are muffled or blocked, and the stretching can be painful. If the tube remains blocked, fluid (like blood serum) will seep into the area from the membranes in an attempt to overcome the vacuum. This is called "fluid in the ear," serous otitis, or aero-otitis.

The most common cause for a blocked Eustachian tube is the common cold. Sinus infections and nasal allergies (hay fever, etc.) are also causes. A stuffy nose leads to stuffy ears because the swollen membranes block the opening of the Eustachian tube.

Children are especially vulnerable to blockages because their Eustachian tubes are narrower than adults.

The Three Parts Of The Ear

* The outer ear: the part that you can see on the side of the head plus the ear canal leading down to the eardrum.
* The middle ear: the eardrum and ear bones (ossicles), plus the air spaces behind the eardrum and in the mastoid cavities (vulnerable to air pressure).
* The inner ear: the area that contains the nerve endings for the organs of hearing and balance (equilibrium).

How Can Air Travel Cause Ear Problems?

Air travel is sometimes associated with rapid changes in air pressure. To maintain comfort, the Eustachian tube must open frequently and wide enough to equalize the changes in pressure. This is especially true when the airplane is landing, going from low atmospheric pressure down closer to earth where the air pressure is higher.

Actually, any situation in which rapid altitude or pressure changes occur creates the problem. You may have experienced it when riding in elevators or when diving to the bottom of a swimming pool. Deep sea divers are taught how to equalize their ear pressures; so are pilots. You can learn the tricks too.

How To Unblock Your Ears

Swallowing activates the muscle that opens the Eustachian tube. You swallow more often when you chew gum or let mints melt in your mouth. These are good air travel practices, especially just before take-off and during descent. Yawning is even better. Avoid sleeping during descent, because you may not be swallowing often enough to keep up with the pressure changes. (The flight attendant will be happy to awaken you just before descent).

If yawning and swallowing are not effective, unblock your ears as follows:

* Step 1: Pinch your nostrils shut.
* Step 2: Take a mouthful of air.
* Step 3: Using your cheek and throat muscles, force the air into the back of your nose as if you were trying to blow your thumb and fingers off your nostrils.

When you hear a loud pop in your ears, you have succeeded. You may have to repeat this several times during descent.
Babies' Ears

Babies cannot intentionally pop their ears, but popping may occur if they are sucking on a bottle or pacifier. Feed your baby during the flight, and do not allow him or her to sleep during descent.

Precautions

* When inflating your ears, you should not use force. The proper technique involves only pressure created by your check and throat muscles.
* If you have a cold, a sinus infection, or an allergy attack, it is best to postpone an airplane trip.
* If you recently have undergone ear surgery, consult with your surgeon on how soon you may safely fly.

What About Decongestants And Nose Sprays?

Many experienced air travelers use a decongestant pill or nasal spray an hour or so before descent. This will shrink the membranes and help the ears pop more easily. Travelers with allergy problems should take their medication at the beginning of the flight for the same reason.

Decongestant tablets and sprays can be purchased without a prescription. However, they should be avoided by people with heart disease, high blood pressure, irregular heart rhythms, thyroid disease, or excessive nervousness. Such people should consult their physicians before using these medicines. Pregnant women should likewise consult their physicians first.
If Your Ears Will Not Unblock

Even after landing you can continue the pressure equalizing techniques, and you may find decongestants and nasal sprays to be helpful. (However, avoid making a habit of nasal sprays. After a few days, they may cause more congestion than they relieve). If your ears fail to open, or if pain persists, you will need to seek the help of a physician who has experience in the care of ear disorders. He/she may need to release the pressure or fluid with a small incision in the ear drum.

Earwax

Never put anything smaller than your elbow in your ear! Cotton swabs are for cleaning bellybuttons, not ears. You have probably heard these admonitions from relatives and doctors since childhood…read on to find out what they meant.

The Outer Ear And Canal
The outer ear is the funnel-like part of the ear you can see on the side of the head, plus the ear canal (the hole which leads down to the eardrum).

The ear canal is shaped somewhat like an hourglass-narrowing part way down. The skin of the outer part of the canal has special glands that produce earwax. This wax is supposed to trap dust and dirt particles to keep them from reaching the eardrum. Usually the wax accumulates a bit, dries out and then comes tumbling out of the ear, carrying dirt and dust with it. Or it may slowly migrate to the outside where it can be wiped off. The ear canal may be blocked by wax when attempts to clean the ear push wax deeper into the ear canal and cause a blockage. Wax blockage is one of the most common causes of hearing loss.

Should You Clean Your Ears?
Wax is not formed in the deep part of the ear canal near the eardrum, but only in the outer part of the canal. So when a patient has wax blocked up against the eardrum, it is often because he has been probing his ear with such things as cotton-tipped applicators, bobby pins, or twisted napkin corners. These objects only push the wax in deeper. Also, the skin of the ear canal and the eardrum is very thin and fragile and is easily injured.

Earwax is healthy in normal amounts and serves to coat the skin of the ear canal where it acts as a temporary water repellent. The absence of earwax may result in dry, itchy ears.

Most of the time the ear canals are self-cleaning; that is, there is a slow and orderly migration of ear canal skin from the eardrum to the ear opening. Old earwax is constantly being transported from the ear canal to the ear opening where it usually dries, flakes, and falls out.

Under ideal circumstances, you should never have to clean your ear canals. However, we all know that this isn't always so. If you want to clean your ears, you can wash the external ear with a cloth over a finger, but do not insert anything into the ear canal.

What Are the Symptoms of Wax Buildup?

* partial hearing loss, may be progressive
* tinnitus, noises in the ear
* earache
* fullness in the ear or a sensation the ear is plugged

Self Treatment For Earwax

Most cases of earwax blockage respond to home treatments used to soften wax if there is no hole in the eardrum. Patients can try placing a few drops of mineral oil, baby oil, glycerin, or commercial ear wax removal drops, such as Debrox®, Mack's® Wax AwayTM, Murine®, or Physicians' ChoiceTM in the ear. These remedies are not as strong as the prescription wax softeners but are effective for many patients. Rarely, people have allergic reactions to commercial preparations. Detergent drops such as hydrogen peroxide or carbamide peroxide may also aid in the removal of wax. Patients should know that rinsing the ear canal with hydrogen peroxide (H2O2) results in oxygen bubbling off and water being left behind-wet, warm ear canals make good incubators for growth of bacteria. Flushing the ear canal with rubbing alcohol displaces the water and dries the canal skin. If alcohol causes severe pain, it suggests the presence of an eardrum perforation.

When Should I See My Doctor?
If you are uncertain whether you have a hole (perforation or puncture) in your eardrum, consult your physician prior to trying any over-the-counter remedies. Putting eardrops or other products in your ear in the presence of an eardrum perforation may cause an infection. Certainly, washing water through such a hole could start an infection. In the event that the home treatments discussed in this article are not satisfactory, or if wax has accumulated so much that it blocks the ear canal (and hearing), your physician may prescribe eardrops designed to soften wax, or he may wash or vacuum it out. Occasionally, an otolaryngologist (ENT specialist) may need to remove the wax using microscopic visualization.

Other Possible Causes of Hearing Loss

* perforated eardrum
* middle ear infection (otitis media)
* external ear infection (otitis externa)
* acoustic trauma

Meniere's Disease

What Is Meniere's Disease?

Ménière’s disease, also called idiopathicendolymphatic hydrops, is a disorder of the inner ear. Although the cause is unknown, it probably results from an abnormality in the fluids of the inner ear. Ménière’s disease is one of the most common causes of dizziness originating in the inner ear. In most cases only one ear is involved, but both ears may be affected in about 15 percent of patients. Ménière’s disease typically starts between the ages of 20 and 50 years. Men and women are affected in equal numbers.

What Are The Symptoms?

The symptoms of Ménière’s disease are episodic rotational vertigo (attacks of a spinning sensation), hearing loss, tinnitus (a roaring, buzzing, or ringing sound in the ear), and a

sensation of fullness in the affected ear. Tinnitus and fullness of the ear in Ménière's disease may come and go with changes in hearing, occur during or just before attacks, or be constant. There may also be an intermittent hearing loss early in the disease, especially in the low pitches, but a fixed hearing loss involving tones of all pitches commonly develops in time. Loud sounds may be uncomfortable and seem distorted in the affected ear. From all the Ménière's disease's symptoms, vertigo is usually the most troublesome. It is commonly produced by disorders of the inner ear, but may also occur in central nervous system disorders. Vertigo may last for 20 minutes to two hours or longer. During attacks, patients are usually unable to perform activities normal to their work or home life. Sleepiness may follow for several hours, and the off-balance sensation may last for days. The symptoms of Ménière's disease may be only a minor nuisance, or can become disabling, especially if the attacks of vertigo are severe, frequent, and occur without warning.

How Is A Diagnosis Made?

The physician will take a history of the frequency, duration, severity, and character of your attacks, the duration of hearing loss or whether it has been changing, and whether you have had tinnitus or fullness in either or both ears. You may be asked whether there is history of syphilis, mumps, or other serious infections in the past, inflammations of the eye, an autoimmune disorder or allergy, or ear surgery in the past. You may be asked questions about your general health, such as whether you have diabetes, high blood pressure, high blood cholesterol, thyroid, neurologic or emotional disorders. Tests may be ordered to look for these problems in certain cases. When the history has been completed, diagnostic tests will check your hearing and balance functions. They may include:

For Hearing

* An audiometric examination (hearing test) typically indicates a sensory type of hearing loss in the affected ear. Speech discrimination (the patient's ability to distinguish between words like "sit" and "fit") is often diminished in the affected ear.

For Balance

* An ENG (electronystagmograph) may be performed to evaluate balance function. In a darkened room, recording electrodes are placed near the eyes. Warm and cool water or air are gently introduced into each ear canal. Since the eyes and ears work in a coordination through the nervous system, measurement of eye movements can be used to test the balance system. In about 50 percent of patients, the balance function is reduced in the affected ear.
* Rotational testing or balance platform, may also be performed to evaluate the balance system.

Other Tests

* Electrocochleography (ECoG) may indicate increased inner ear fluid pressure in some cases of Ménière's disease.

* The auditory brain stem response (ABR), a computerized test of the hearing nerves and brain pathways, computed tomography (CT) or, magnetic resonance imaging (MRI) may be needed to rule out a tumor occurring on the hearing and balance nerve. Such tumors are rare, but they can cause symptoms similar to Ménière's disease.

Recommended Adult Lifestyle Changes To Reduce The Frequency Of Ménière's Disease Episodes

* Avoid alcohol, caffeine, excessive fatigue, smoking, and streess
* Eat properly
* Get plenty of sleep
* Remain physically active

Diagnosing And Treating Ménière's Disease

A low salt diet and a diuretic (water pill) may reduce the frequency of attacks of Ménière's disease in some patients. In order to receive the full benefit of the diuretic, it is important that you restrict your intake of salt and take the medication regularly as directed. Anti-vertigo medications, e.g., Antivert® (meclizine generic), or Valium® (diazepam generic), may provide temporary relief. Anti-nausea medication is sometimes prescribed. Anti-vertigo and anti-nausea medications may cause drowsiness. Avoid caffeine, smoking, and alcohol. Get regular sleep and eat properly. Remain physically active, but avoid excessive fatigue. Stress may aggravate the vertigo and tinnitus of Ménière's disease. Stress avoidance or counseling may be advised. If you have vertigo without warning, you should not drive, because failure to control the vehicle may be hazardous to yourself and others. Safety may require you to forego ladders, scaffolds, and swimming.

When Is Surgery Recommended?

If vertigo attacks are not controlled by
conservative measures and are disabling, one of the following surgical procedures might be recommended:

* Intratympanic treatment, also known as chemical labyrinthotomy, is an office procedure in which a medicine, such as gentamicin, is injected into the middle ear. Other medicines may be used. Gentamicin is an antibiotic that causes a partial loss of balance function in the treated ear, controlling vertigo in about three fourths of cases and usually preserving hearing. Apart from a period of disequilibrium that can occur as the patient adjusts to the new level of balance function, this treatment is usually very well tolerated.

It is also significantly simpler and less invasive than other surgical treatments.

* The endolymphatic shunt or decompression procedure is an ear operation that is usually preserves hearing. Attacks of vertigo are controlled in one-half to two-thirds of cases, but control is not permanent in all cases. Recovery time after this procedure is short compared to the other procedures.
* Selective vestibular neurectomy is a procedure in which the balance nerve is cut as it leaves the inner ear and goes to the brain. Vertigo attacks are permanently cured in a high percentage of cases, and hearing is preserved in most cases.
* Labryrinthectomy and eighth nerve section
  are procedures in which the balance and
  hearing mechanism in the inner ear are destroyed on one side. This is considered when the patient with Ménière's disease has poor hearing in the affected ear. Labryrinthectomy and eighth nerve section result in the highest rates for control of vertigo attacks.

Perforated Eardrum

A perforated eardrum is a hole or rupture in the eardrum, a thin membrane that separates the ear canal and the middle ear. The medical term for eardrum is tympanic membrane. The middle ear is connected to the nose by the eustachian tube, which equalizes pressure in the middle ear.

A perforated eardrum is often accompanied by decreased hearing and occasional discharge. Pain is usually not persistent.

Causes Of Eardrum Perforation

The causes of perforated eardrum are usually from trauma or infection. A perforated eardrum can occur:

* If the ear is struck squarely with an open hand
* With a skull fracture
* After a sudden explosion
* If an object (such as a bobby pin, Q-tip, or stick) is pushed too far into the ear canal.
*

As a result of hot slag (from welding) or acid entering the ear canal

Middle ear infections may cause pain, hearing loss, and spontaneous rupture (tear) of the ear-drum resulting in a perforation. In this circumstance, there maybe infected or bloody drainage from the ear. In medical terms, this is called otitis media with perforation.

On rare occasions a small hole may remain in the eardrum after a previously placed PE tube (pressure equalizing) either falls out or is removed by the physician.

Most eardrum perforations heal spontaneously within weeks after rupture, although some may take up to several months. During the healing process the ear must be protected from water and trauma. Those eardrum perforations which do not heal on their own may require surgery.

Effects On Hearing From Perforated Eardrum

Usually, the larger the perforation, the greater the loss of hearing. The location of the hole (perforation) in the eardrum also effects the degree of hearing loss. If severe trauma (e.g. skull fracture) disrupts the bones in the middle ear which transmit sound or causes injury to the inner ear structures, the loss of hearing maybe quite severe.

If the perforated eardrum is due to a sudden traumatic or explosive event, the loss of hearing can be great and ringing in the ear (tinnitus) may be severe. In this case the hearing usually returns partially, and the ringing diminishes in a few days. Chronic infection as a result of the perforation can cause major hearing loss.

Treatment Of The Perforated Eardrum

Before attempting any correction of the perforation, a hearing test should be performed. The benefits of closing a perforation include prevention of water entering the ear while showering, bathing, or swimming (which could cause ear infection), improved hearing, and diminished tinnitus. It also may prevent the development of cholesteatoma (skin cyst in the middle ear), which can cause chronic infection and destruction of ear structures.

If the perforation is very small, otolaryngologists may choose to observe the perforation over time to see if it will dose spontaneously. They also might try to patch a cooperative patient's ear-drum in the office. Working with a microscope, your doctor may touch the edges of the eardrum with a chemical to stimulate growth and then place a thin paper patch on the eardrum. Usually with closure of the tympanic membrane improvement in hearing is noted. Several applications of a patch (up to three or four) may be required before the perforation doses completely. if your physician feels that a paper patch will not provide prompt or adequate closure of the hole in the eardrum, or attempts with paper patching do not promote healing, surgery is considered.

There are a variety of surgical techniques, but all basically place tissue across the perforation allowing healing. The name of this procedure is called tympanoplasty. Surgery is typically quite successful in closing the perforation permanently, and improving hearing. It is usually done on an outpatient basis.

Your doctor will advise you regarding the proper management of a perforated eardrum.

Swimmer's Ear

WARNING: If you already have an ear infection, or if you have ever had a perforated or otherwise injured eardrum, or ear surgery, you should consult an ear, nose, and throat

specialist before you go swimming and before you use any type of ear drops. If you do not know if you have or ever had a perforated, punctured, ruptured, or otherwise injured eardrum, ask your ear doctor.

Causes Of Swimmer's Ear

Swimmer’s ear is an infection of the outer ear structures. It typically occurs in swimmers, but the since the cause of the infection is water trapped in the ear canal, bathing or showering may also cause this common infection.When water is trapped in the ear canal, bacteria that normally inhabit the skin and ear canal multiply, causing infection and irritation of the ear canal. If the infection progresses it may involve the outer ear.

Symptoms Of Swimmer's Ear

200The most common symptoms of swimmer’s ear are mild to moderate pain that is aggravated by tugging on the auricle and an itchy ear.Other symptoms may include any of the following:

* Sensation that the ear is blocked or full
* Drainage
* Fever
* Decreased hearing
* Intense pain that may radiate to the neck, face, or side of the head
* The outer ear may appear to be pushed forward or away from the skull
* Swollen lymph nodes

Treatment Of Swimmer's Ear

Treatment for the early stages of swimmer’s ear includes careful cleaning of the ear canal and eardrops that inhibit bacterial growth. Mild acid solutions such as boric or acetic acid are effective for early infections.

For more severe infections, if you do not have a perforated ear drum, ear cleaning may be helped by antibiotics. If the ear canal is swollen shut, a sponge or wick may be placed in

the ear canal so that the antibiotic drops will be effective. Pain medication may also be prescribed.

Follow-up appointments with your physician are very important to monitor progress of the infection, to repeat ear cleaning, and to replace the ear wick as needed. Your otolaryngologist has specialized equipment and expertise to effectively clean the ear canal and treat swimmer's ear.

Prevention Of Swimmer's Ear

A dry ear is unlikely to become infected, so it is important to keep the ears free of moisture after swimming or bathing. Removable earplugs, sometimes worn for hearing protection, can be used to keep moisture out of the ear canal. Q-tips should not be used for this purpose, because they may pack material deeper into the ear canal, remove protective earwax, and irritate the thin skin of the ear canal creating the perfect environment for infection.

The safest way to dry your ears is with a hair dryer. If you do not have a perforated eardrum, rubbing alcohol or a 50:50 mixture of alcohol and vinegar used as eardrops will evaporate excess water and keep your ears dry.

Before using any drops in the ear, it is important to verify that you do not have a perforated eardrum. Check with your otolaryngologist if you have ever had a perforated, punctured, or injured eardrum, or if you have had ear surgery.

People with itchy ears, flaky or scaly ears, or extensive earwax are more likely to develop swimmer's ear. If so, it may be helpful to have your ears cleaned periodically by an otolaryngologist.

Tinnitus

Is the Ringing in My Ears Normal?

Not at all. Tinnitus is the name for these head noises, and they are very common. Nearly 36 million Americans suffer from this discomfort. Tinnitus may come and go, or you 302may be aware of a continuous sound. It can vary in pitch from a low roar to a high squeal or whine, and you may hear it in one or both ears. When the ringing is constant, it can be annoying and distracting. More than seven million people are afflicted so severely that they cannot lead normal lives.

Can Other People Hear the Noise in My Ears?

Not usually, but sometimes they are able to hear a certain type of tinnitus. This is called "objective tinnitus," and it caused either by abnormalities in blood vessels around the outside of the ear or by muscle spasms, which may sound like clicks or crackling inside the middle ear.

What Causes Tinnitus?

Most tinnitus comes from damage to the microscopic endings of the hearing nerve in the inner ear. The health of these nerve endings is important for acute hearing, and injury to them brings on hearing loss and often tinnitus. If you are older, advancing age is generally accompanied by a certain amount of hearing nerve impairment and tinnitus. If you are younger, exposure to loud noise is probably the leading cause of tinnitus, and often damages hearing as well.

There are many causes for "subjective tinnitus," the noise only you can hear. Some causes are not serious (a small plug of wax in the ear canal might cause temporary tinnitus). Tinnitus can also be a symptom of stiffening of the middle ear bones (otosclerosis).

Tinnitus may also be caused by allergy, high or low blood pressure (blood circulation problems), a tumor, diabetes, thyroid problems, injury to the head or neck, and a variety of other causes including medications such as anti-inflammatories, antibiotics, sedatives, antidepressants, and aspirin. If you take aspirin and your ears ring, talk to your doctor about dosage in relation to your size.

Treatment will be quite different in each case of tinnitus. It is important to see an otolaryngologist to investigate the cause of your tinnitus so that the best treatment can be determined.

Tinnitus Treatment

In most cases, there is no specific treatment for ear and head noise. If your otolaryngologist finds a specific cause of your tinnitus, he or she may be able to eliminate the noise. But, this determination may require extensive testing including X-rays, balance tests, and laboratory work. However, most causes cannot be identified. Occasionally, medicine may help the noise. The medications used are varied, and several may be tried to see if they help.

The following list of DOs and DON'Ts can help lessen the severity of tinnitus:

* Avoid exposure to loud sounds and noises.
* Get your blood pressure checked. If it is high, get your doctor's help to control it.
* Decrease your intake of salt. Salt impairs blood circulation.
* Avoid stimulants such as coffee, tea, cola, and tobacco.
* Exercise daily to improve your circulation.
* Get adequate rest and avoid fatigue.
* Stop worrying about the noise. Recognize your head noise as an annoyance and learn to ignore it as much as possible.

Can You Help Me Cope With Tinnitus?

Concentration and relaxation exercises can help to control muscle groups and circulation throughout the body. The increased relaxation and circulation achieved by these exercises can reduce the intensity of tinnitus in some patients.

Masking. Tinnitus is usually more bothersome in quiet surroundings. A competing sound at a constant low level, such as a ticking clock or radio static (white noise), may mask the tinnitus and make it less noticeable. Products that generate white noise are also available through catalogs and specialty stores.

Hearing Aids. If you have a hearing loss, a hearing aid(s) may reduce head noise while your are wearing it and sometimes cause it to go away temporarily. It is important not to set the hearing aid at excessively loud levels, as this can worsen the tinnitus in some cases. However, a thorough trial before purchase of a hearing aid is advisable if your primary purpose is the relief of tinnitus.

Tinnitus maskers can be combined within hearing aids. They emit a competitive but pleasant sound that can distract you from head noise. Some people find that a tinnitus masker may even suppress the head noise for several hours after it is used, but this is not true for all users.

Summary

Prior to any treatment of tinnitus or head noise, it is important that you have a thorough examination and evaluation by your otolaryngologist. An essential part of your treatment will be your understanding of tinnitus and its causes.