



EAR PROBLEMS

Ear Infections

Acute otitis media (AOM)

What causes acute otitis media?

Acute otitis media (AOM) is an acute inflammation of the middle ear that can be caused by a viral or bacterial infection. In some cases it may be a combination of both. About 25% of individuals with acute otitis media have no live bacteria that can be cultured from ear fluid suggesting that these infections are caused only by a virus.

How common is AOM?

AOM accounts for over 20 million office visits per year and for 18% of ambulatory care visits among preschool children. The peak incidence is 6 - 18 mo. of age. 19-62% of children have had 1 episode of OM by age 1 year. 50 - 84% children have at least one episode of AOM by age 3. Recurrent (3 or more episodes within 6 mo, or 4 or more episodes within 12 mo.) is common, affecting about 10 - 20% of children by 1 year of age. By 7 years of age, almost 40% of children have had 6 or more episodes of AOM. However, as children mature AOM becomes less common. Children with recurrent OM are likely to have 1.5 to 2.5 fewer episodes the next year.

What are the risk factors for AOM?

Group day care and smoking in the household are the risk factors with the strongest correlation to AOM. Other risk factors are related to anatomy of the ear, environmental and social factors, and immature or defective immunologic status. Among the most prominent of these are dysfunction of the Eustachian tube (tube

leading from the middle ear to the nose necessary for pressure equalization), age less than 3 years, environmental allergies, genetic predisposition, upper respiratory infections, and lack of breast feeding in the first 3 - 6 months.

What are the symptoms of AOM?

Ear pain and hearing loss are common symptoms. Young children may be fussy, and irritable. Fever may or may not be associated with an ear infection, but is common with upper respiratory infections that are common precursors of an ear infection. Sometimes a child may show minimal symptoms of an ear infection. Pulling on the ear alone is not a reliable sign of ear infection. Drainage from the ear with AOM only occurs if the infection has ruptured the eardrum, there is a pre-existing hole in the eardrum, or there were tubes placed in the ears.

An examination of the ears by your doctor is essential to determine if there is an ear infection.

How is AOM treated?

The common treatments for AOM are antibiotics and medications for pain and fever. It is important to know that about 60% of otherwise healthy children with AOM initially managed without antibiotics are symptom free in 24 hours; by 2 - 3 days, 80% are without residual symptoms. This means that many otherwise healthy children may not need antibiotics for a typical episode of AOM. They can be observed closely and given medications for pain and fever. Viruses for which antibiotics are not effective may cause some of these more typical ear infections.

What happens after an ear infection is treated?

Residual fluid in the middle ear after an episode of AOM is the rule. Normally the middle ear space is filled with air. The fluid is caused by the inflammatory reaction of the tissues to the infection in the middle ear. Over time the fluid is absorbed into the tissues or drains down the Eustachian tube. Absorption of fluid occurs through the small blood vessels and lymph canals that are found in the lining of the middle ear. Clinical studies show that 65% of children still have fluid at 2 weeks after the infection. 40% have fluid at 1 month and 25% still have fluid even after 3 months. It is easy to see that if a child has recurrent ear infections, fluid may not completely resolve before the next infection occurs. This causes persistent muffled hearing and even speech delay if the fluid persists long enough. Thus, there is a continuum between AOM and middle ear fluid, one associated with the other. However, fluid alone does not appear to predispose to infection, but in combination with other factors including an upper respiratory

infection, the ear may be more easily infected. In addition, antibiotic treatment for AOM does not reduce the incidence of or reduce the duration of middle ear fluid.

Are there treatments that prevent AOM?

The placement of tubes in the eardrum is an effective treatment for recurrent AOM and/or persistent middle ear fluid. Clinical studies show that tubes reduce the incidence of AOM by about 65%.

Xylitol gum or syrup appears to reduce incidence of AOM

Antibiotic prophylaxis (long-term use of low-dose antibiotics to prevent the occurrence of an ear infection) is very minimally effective and not recommended. Studies show 11 months of treatment is needed to prevent one infection.

What can parents and healthcare providers do to decrease the possibility of ear infections?

Parents and healthcare providers can control some factors that increase the risk of AOM as noted above. These include control smoking in the household, day care or day care environment, pacifier use, exposure to upper respiratory infections, breast feeding in the first 3 - 6 months. In addition the child can be treated for allergies, esophageal reflux, and receive immunizations for Strep pneumoniae bacteria (PCV7 vaccine), one of the leading bacterial causes of AOM, and the influenza vaccine if encouraged by your pediatrician.

The respiratory infections that lead to ear infections are often spread by touch or by fomites such as pacifiers. Frequent hand-washing and cleaning of toys are both helpful. Respiratory infections can also be spread through the air. Avoid staying in small rooms with sick people and poor air circulation. Good nutrition, plenty of sleep, and decreased stress all help to bolster immunity. Avoid having your child drink while lying flat on the back. Liquids and bacteria may flow into the Eustachian when lying on the back while feeding causing inflammation and bacterial infection.

What about alternative medicine?

There is very limited information on the effectiveness of alternative treatments such as chiropractic, homeopathic and herbal medicines.

How common are complications of AOM?

A serious complication resulting from AOM is rare. Mastoiditis is an infection of the bone surrounding the middle ear. It was relatively common prior to the use of antibiotics and the treatment was surgery to drain the infection or mastoid bone abscess. Mastoiditis can lead to other very serious complications including brain abscess and meningitis. The incidence of mastoiditis in the US is about 4 in 10,000 episodes of AOM. Complications are not increased by initial non-antibiotic therapy if children are followed up carefully. This is an important consideration when discussing the treatment of AOM. For example, the placement of tubes is known to cause perforation of the ear drum in 2 - 10% of cases. Persistent perforation that does not heal can be repaired effectively with surgery. However, this complication should be weighed against the .04% incidence of mastoiditis resulting from a single episode of AOM and the common side effects and rare serious side effects of antibiotics.

Ear Fluid

Otitis Media with Effusion (OME)

Introduction

Parents are often surprised to learn that their child has fluid in the middle ear. The fluid may be discovered during a visit for another purpose altogether. Even though fluid causes no obvious symptoms, the child's hearing is decreased while fluid remains in the ear. Moreover, OME often comes during the same time when children are trying to make sense of the language they hear around them.

Fluid in the middle ear, that often goes undetected for months at a time, is an important hidden problem.

What is OME?

When children are taken to the doctor because they seem like they have an ear infection, the visit is most often about AOM. This article is about OME.

Ear infections come in several varieties. Most people use the phrase ear infection to refer to an inflammation of the middle ear behind the eardrum.

Acute otitis media (AOM) refers to fluid in the middle ear accompanied by signs or symptoms of an ear infection such as pain, redness, or a bulging eardrum. Children with AOM act sick (especially at night).

Otitis media with effusion (OME) is the name for fluid in the middle ear without other symptoms. Children with OME act as if they feel well. Because it is often discovered on routine well-child checks, it is sometimes called silent otitis media.

Who gets OME?

Children get OME much more frequently than adults. Younger children are more likely to develop persistent (chronic) OME. It most commonly occurs from 6 and 24 months of age. Over 50% of children have experienced OME by the age of 1 year. Recurrent OME occurs in 30 - 40% of children and 5 - 10% of episodes last 12 months or longer

OME is common in someone who had a cold or other upper respiratory infection. In addition, OME commonly lasts for weeks or months after an episode of AOM. When an ear is rechecked after AOM, fluid is often still present after the symptoms have gone. Thus, there is a continuum between AOM and middle ear fluid, one associated with the other.

Children may be prone to OME for a variety of reasons. Some have Eustachian tubes that are less efficient, and some have reasons that the Eustachian tube is more likely to become inflamed or blocked such as allergies, acid reflux, environmental irritants like tobacco smoke, or large adenoids that block the nasal opening of the Eustachian tube. Allergies and environmental irritants are by far the most common predisposing factors.

In the Northern hemisphere, OME is most common during winter cold and ear infection season between December and March, even in areas with a mild climate. It is least common between July and September.

OME is also more common among children in day care, especially if a child is exposed to more than six other children.

What are the symptoms of OME?

Children with OME have fluid in the ear that causes hearing loss, but there are no other symptoms.

Is OME contagious?

OME itself is not contagious. Nevertheless, the upper respiratory infections that often set up OME can be quite contagious.

How long does OME last?

Each individual is different, but in general fluid resolves faster after an episode of AOM than fluid that is known to be present over 3 mos. or is of unknown duration. Documented OME of 3 months duration or longer resolves spontaneously in only 33% of children after 1 - 2 years. Residual OME after untreated AOM is 65% at 2 weeks, 40% at 1 month, and 25% at 3 months.

How is OME diagnosed?

A skilled observer can make the diagnosis by looking in the ears with an otoscope. It is important to confirm the presence of fluid in the ear. This may be accomplished while looking in the ear with an otoscope with an air-tight speculum and using a small rubber bulb to alternately create negative and positive pressure against the ear drum while observing ear drum movement. Fluid dampens ear drum movement. Alternatively, this may be accomplished with automatic devices such as a tympanogram or an acoustic reflectometer. A hearing testing is recommended when OME persists for 3 mos. or longer, or at any time that language delay, learning problems, or a significant hearing loss is suspected.

How is persistent OME treated?

Antibiotics, antihistamines, decongestants, and steroids have not been shown to be effective in treating OME.

In otherwise healthy children, persistent OME is usually treated first with environmental control measures (avoiding cigarette smoke, and reconsidering group day care) and allergy evaluation and treatment if necessary.

Children should be followed until the fluid resolves.

Tube placement is recommended for most otherwise healthy children if fluid is persistent longer than 6 months.

If there is any question about persistent hearing loss after tubes are placed, a hearing test is necessary. However, each child is unique with regard to health, circumstances and other factors that can affect long-term ear function and speech. Tubes may be indicated at an earlier time for children with other

conditions, such as repeated episodes of AOM, anatomic differences, immunity problems, or learning and language delays.

Adenoidectomy is helpful if a child has had tubes placed in the past and OME continues to be a problem

What can parents and healthcare providers do to decrease the possibility of ear infections and OME?

Parents and healthcare providers can control some factors that increase the risk of AOM as noted above. These include control smoking in the household, day care or day care environment, pacifier use, exposure to upper respiratory infections, breast feeding in the first 3 - 6 months. In addition the child can be treated for allergies, esophageal reflux, and receive immunizations for Strep pneumoniae bacteria (PCV7 vaccine), one of the leading bacterial causes of AOM, and the influenza vaccine if encouraged by your pediatrician.

The respiratory infections that lead to ear infections are often spread by touch or by fomites such as pacifiers. Frequent hand-washing and cleaning of toys are both helpful. Respiratory infections can also be spread through the air. Avoid staying in small rooms with sick people and poor air circulation. Good nutrition, plenty of sleep, and decreased stress all help to bolster immunity. Avoid having your child drink while lying flat on the back. Liquids and bacteria may flow into the Eustachian when lying on the back while feeding causing inflammation and bacterial infection.

There is excellent information on the web site of the American Academy of Otolaryngology.

<http://www.entnet.org/KidsENT/>

Prevention of Ear Infections

Parents can control some factors that increase the risk of otitis media

Control smoking in the household

Day care or day care environment (smaller groups and clean environment)

Pacifier use
Exposure to upper respiratory infections
Breast feeding in the first 3 - 6 months

Receive treatment for:

Allergies

Esophageal reflux

Immunizations for Strep pneumoniae bacteria (PCV7 vaccine) and influenza vaccine if encouraged by your pediatrician.

The respiratory infections that lead to ear infections are often spread by touch or by fomites such as pacifiers. Frequent hand-washing and cleaning of toys are both helpful. Respiratory infections can also be spread through the air. Avoid staying in small rooms with sick people and poor air circulation. Good nutrition, plenty of sleep, and decreased stress all help to bolster immunity. Avoid having your child drink while lying flat on the back. Liquids and bacteria may flow into the Eustachian when lying on the back while feeding causing inflammation and bacterial infection.

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Fact Sheet About Day Care and Ear, Nose, and Throat Problems

Who is in day care?

The 2000 census reported that of among the nation's 19.6 million preschoolers, grandparents took care of 21 percent, 17 percent were cared for by their father (while their mother was employed or in school); 12 percent were in day care centers; nine percent were cared for by other relatives; seven percent were cared for by a family day care provider in their home; and six percent received care in nursery schools or preschools. More than one-third of preschoolers (7.2 million) had no regular child-care arrangement and presumably were under maternal care. Day care establishments are defined as those primarily engaged in care of infants or children, or in providing pre-kindergarten education, where medical care and/or behavioral correction are not a primary function or major element. Some may or may not have substantial educational programs, and some may care for older children when they are not in school.

What are your child's risks of being exposed to a contagious illness at a day care center?

Medline, a service of the National Library of Medicine and the National Institutes of Health, reports that day care centers do pose some degree of an increased health risk for children, because of the exposure to other children who may be sick. When your child is in a day care center, the risk is greatest for viral upper respiratory infection (affecting the nose, throat, mouth, voice box) and the common cold, ear infections, and diarrhea. Some studies have tried to link asthma to day care. Other studies suggest that being exposed to all the germs in day care actually IMPROVES your child's immune system. Studies suggest that the average child will get eight to ten colds per year, lasting ten - 14 days each, and occurring primarily in the winter months. This means that if a child gets two colds from March to September, and eight colds from September to March, each lasting two weeks, the child will be sick more than over half of the winter. At the same time, children in a day care environment, exposed to the exchange of upper respiratory tract viruses every day, are expected to have three to ten episodes of otitis media annually. This is four times the incidence of children staying at home.

When should your child remain at home instead of day care or school?

Simply put, children become sick after being exposed to other sick children. Some guidelines to follow are:

- When your child has a temperature higher than 100 degrees, keep him/her at home. A fever is a sign of potentially contagious infection, even if the child feels fine. Schools often advise keeping the child at home until a fever-free period has existed for 24 hours.
- When other children in the day care facility have a known contagious infection, such as chicken pox, strep throat or conjunctivitis, keep your child at home. Children taking antibiotics should be kept at home until they have taken the medicine for one or two days.
- If your child is vomiting or has diarrhea, the young patient should not be around other children. Other signs of illness are an inability to take fluids, weakness or lethargy, sunken eyes, a depressed soft spot on top of infant's head, crying without tears, and dry mouth.

Can you prevent your child from becoming sick at a day care center?

The short answer is no. Exposure to other sick children will increase the likelihood that your child may catch the same illness, particularly with the common cold. The primary rule is to keep your own children at home if they are sick. However, you can:

- Teach your child to wash his or her hands before eating and after using the toilet. Infection is spread the most by children putting dirty toys and

hands in their mouths, so check your day care's hygiene cleaning practices.

- Have your child examined by a physician before enrollment in a day care center or school.

During the examination, the physician will:

Look for otitis (inflammation) in the ear. This is an indicator of future ear infections.

- Review with you any allergies your child may have. This will assist in determining if the diet offered at the day care center may be harmful to your child.
- Examine the child's tonsils for infection and size. Enlarged tonsils could indicate that your child may not be getting a healthy sleep at night, resulting in a tired condition during the day.
- Alert the day care center manager when your child is ill, and include the nature of the illness. Day care has become a necessity for millions of families. Monitoring the health of your own child is key to preventing unnecessary sickness. If a serious illness occurs, do not hesitate to have your child examined by a physician.

www.entnet.org/healthinformation/

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There is excellent information on the web site of the American Academy of Otolaryngology.

<http://www.entnet.org/KidsENT/>

Tubes for ear infections

Surgery Overview

Ear tubes are plastic and shaped like a hollow spool. A specialist (otolaryngologist) places the tubes through a small surgical opening made in the

eardrum (myringotomy or tympanostomy). The child is unconscious under general anesthesia for this surgery.

Tubes can be beneficial because they:

Allow air to enter the middle ear.

Allow fluid to flow out of the middle ear through the tube into the ear canal.

Clear fluid from the middle ear and restore hearing.

Prevent future buildup of fluid in the middle ear while they are in place.

Decrease the feeling of pressure in the ears, therefore decreasing pain.

What to Expect After Surgery

Tubes can be inserted in an outpatient surgery clinic. Children usually recover quickly and have little pain or other symptoms after surgery.

Follow-up visits to the doctor after a child has tubes inserted are very important. The doctor checks to see whether the tubes are working and whether the child's hearing has improved with the tubes.

While the tubes are in place, the individual needs to take extra precautions. Wearing earplugs while bathing or swimming may help keep water out of the ear canal. Swimming in a chlorinated pool is generally safe, because the water is relatively clean. However, water in lakes, ponds, rivers, and even the bathtub may contain bacteria, and the individual should take care not to immerse their heads. Talk to your doctor for more information.

Tubes normally remain in the ears for 6 to 24 months. They usually fall out on their own as the eardrum grows. If the tubes don't fall out on their own, surgery may be needed to remove them. After the tubes are out, the individual needs to be watched for ear infections and fluid behind the eardrum.

Why It Is Done

Placing tubes in the ears allows fluid to drain from the middle ear. Tubes may help prevent ear infections and prevent fluid from building up behind the eardrum. Surgery to insert tubes is used in the following cases:

If the individual has had fluid behind the eardrum in both ears for more than 3 months and has significant hearing loss in both ears, surgery to insert tubes is recommended.

If the individual has repeated ear infections, surgery to insert tubes is more controversial. Tubes may help prevent ear infections and prevent fluid buildup behind the eardrum in children who have recurrent ear infections.

How Well It Works

Myringotomy with ear tube insertion restores hearing and clears fluid from the middle ear. While the tubes are in place, they should prevent buildup of pressure and fluid in the middle ear. Tubes also should decrease the feeling of pressure in the ears and decrease pain.

Tubes may keep ear infections from recurring while the tubes are in place.

Risks

Minor complications occur in up to half of the children who have tubes inserted. Usual complications include:

A thickening of the tympanic membrane (eardrum) over time, due to increased blood flow to the tympanic membrane, which occurs in about half of the children. These changes in the eardrum may affect hearing in a very small number of children. This thickening can also occur with tube placement in children with recurrent inflammation of the middle ear space.

Discharge of pus (otorrhea) from the ear. This is common and can become a recurrent problem in some children.

Other possible complications:

The tube may become blocked, allowing recurrence of ear fluid and infections. The tube may slip out of place, possibly falling into the middle ear (rare). Tissue may form behind the eardrum (cholesteatoma). This is also rare.

What to Think About

Some children who have tubes inserted may need to have tubes reinserted within 5 years.

Tubes may scar the eardrum. Scarring may lead to minor hearing loss.

After tubes are inserted, the individual needs regular checkups to see that the tubes are functioning. In some cases the individual needs to be placed on ear drops or sometimes oral antibiotics for drainage that can occur with tubes in place

There is an excellent video about tubes on the web site of the American Academy of Otolaryngology.

<http://www.entnet.org/kidsent/movies.cfm>

Eustachian Tube Dysfunction

If you have ever had to pop your ears while flying in an airplane or driving in the mountains, you have had first-hand experience with your Eustachian tubes. If you have ever felt ear discomfort in these situations, you have experienced Eustachian tube dysfunction.

The Eustachian tube connects the middle ear with the back of the nose. The middle ear is an air-filled space, and the air pressure in this space under ideal circumstances is the same as the outside air pressure. When the outside air pressure changes rapidly, as it does while driving through the mountains, there is a difference in pressure between the outside air and the air in the middle ear. If this pressure difference is great enough, you will feel pressure, or even pain, in your ears. When people pop their ears they typically swallow, open and close their jaws, or plug their noses and try to blow open their ears. These actions tend to open the Eustachian tube, allowing the air pressure to equalize between the outside world and the middle ears.

Most of the time, the Eustachian tubes are not open; it takes active muscle movement to open them. Unfortunately, many things can inflame the tubes, causing the tissue lining the tube to swell. Under such circumstances it becomes difficult or impossible to actively open the tubes. This is very similar to the problem we have all experienced breathing through a congested nose: as the tissues lining the nasal cavity swell, it becomes progressively more difficult to pull air through the nose.

The Eustachian tubes open into the back of the nose. Many nasal problems may lead to inflammation of the Eustachian tube openings. Allergies, sinusitis, and the common cold primarily affect the nose and sinuses; because drainage from the nose passes by the Eustachian tube openings, these nasal/sinus problems can lead to Eustachian tube dysfunction.

The symptoms of Eustachian tube dysfunction are fullness and pain in the ears; if persistent, you may experience hearing loss, ringing in the ears, and dizziness or unsteadiness.

The treatment for this problem depends upon the root cause but is aimed at decreasing the swelling in the Eustachian Tube. The treatment will vary depending upon the root cause, but may involve antibiotics, nasal sprays, decongestants and/or antihistamines.

Particularly after a cold, the symptoms may last for several weeks and require continuing on the nasal spray or decongestant for 4 -6 weeks

Another treatment modality is the Valsalva maneuver, which essentially increases the pressure in the nasal cavity to try to open the Eustachian tube and equilibrate the pressure in the middle ear space. This is performed by clamping down on the nose and inflating air into the nasal cavity in a constant fashion.

Only occasionally is surgical treatment required. This involves making a small cut in the ear drum and placing a tiny plastic grommet tube into the cut. The hole in the grommet tube allows air to pass into the middle ear, thus functionally replacing the Eustachian tube. This procedure is performed using local anesthesia. The tube is called a ventilation tube, but it is also frequently referred to as a PE tube for pressure equalization. If your symptoms do not improve with the prescribed medications, please call to consider placement of a PE tube.

Outer Ear Infection (External Otitis)

What is external otitis?

External otitis is inflammation of the outer ear canal or the passageway leading to the ear drum. The inflammation often involves the eardrum, but does not penetrate through it into the middle ear. An acute external otitis is frequently caused by a bacterial infection. A chronic inflammation may also be present for many years that is caused by skin conditions, or an environment in the ear canal favorable to inflammation. This discussion largely pertains to acute external otitis.

A healthy ear canal is generally cool and dry. Ear wax or cerumen is also part of this healthy environment. A healthy ear canal has a slightly acidic environment of pH 6.1. Cerumen has a pH of 6.9 and also helps trap bacteria as well as displace moisture. External otitis occurs most often when a tropical environment exists in the ear canal. The heat and moisture are favorable for the growth of bacteria. In addition, an alkaline pH also enhances bacterial growth. Other factors that predispose to external otitis include injury (e.g. Q Tips, removal of wax, insertion of ear plugs, and use of hearing aids), dermatologic conditions (e.g. eczema, psoriasis), narrow ear canals, ear drainage from middle ear disease, and diabetes. A lack of adequate cerumen in the ear canal can predispose to developing external otitis. Blocking the ear canals for long periods of time with ear plugs or hearing aids builds up heat and moisture in the ear canal creating a tropical environment. In addition, an ear plug can cause minor scratches in the ear canal skin creating an entry point into the skin for bacteria. In the case of swimmer's ear, external otitis commonly associated with swimming (even showering or bathing), it is likely that excessive moisture in the ear canal reduces ear canal pH, overcomes the moisture displacing properties of cerumen, and forms an ideal environment for bacteria and even fungus to grow in the ear canal.

Commercial ear wax removal solutions commonly contain hydrogen peroxide because it effectively softens and removes cerumen. Peroxide also seems to be a common home treatment for ear wax removal. However, when peroxide bubbles, one of the oxygen components of peroxide (H_2O_2) is released and peroxide turns to H_2O or water. This creates a very moist environment in the ear canal as well as increasing pH and removing cerumen. Therefore, the too frequent use of peroxide in the ear canal will cause external otitis, especially in one prone to ear canal infection due to one or a combination of other predisposing factors.

There is another form of external otitis that is characterized by an ear canal that is dry and scaly with little or no cerumen. This type of chronic external otitis is often associated with allergies and eczema

What are the symptoms of external otitis?

Bacterial growth in acute external otitis causes inflammation of the skin lining of the ear canal. The first sign of inflammation is often itching. In the confined space of the ear canal, progressive swelling begins to cause increasing pain. Further inflammation causes weeping of fluid from inflamed tissues, breakdown of cerumen, and eventually hearing loss from swelling and moist pasty debris in the ear canal. When inflammation progresses further, the outside of the ear becomes red, swollen and tender. A cardinal sign of external otitis is pain on pulling the ear. This sign helps differentiate external otitis from other causes of ear pain.

Chronic external otitis usually causes persistent itching and sometimes chronic drainage.

What does the doctor see when examining the ear canal?

In very early stages, when itching is the only sign, the ear canal may be dry or even scaly with little sign of inflammation. As inflammation progresses, the ear canal most commonly becomes red and swollen. Commonly there is moist, pasty debris in the ear canal that often blocks the doctor's view of the ear drum. Sometimes even areas of fungal growth can be seen on the surface of the pasty debris or ear canal. In acute external otitis, swelling may be so severe the opening into the ear canal is barely visible. If external otitis has been present for a long period of time, chronic inflammatory tissue called granulation tissue can form. It is red, friable and bleeds easily.

How is external otitis treated?

Mild to moderate pain can be effectively treated with non steroidal anti-inflammatory medications such as ibuprofen (Motrin) and naproxen (Aleve). Sometimes stronger pain medication is required

Antibiotic ear drops are the mainstay of treatment for external otitis. But first, in order for ear drops to penetrate into the ear canal, debris must be cleaned from the canal. This can be done with gentle irrigation using hydrogen peroxide. The ENT doctor uses a microscope and gentle suction to remove debris effectively while carefully examining the ear canal. There are a variety of antibiotic ear drops that are available. Some are also eye drops that can be placed into the ear canal. There are some drops that are effective against fungus.

15 - 20 drops are required to fill an adult ear canal, therefore in order to adequately cover the surface of the ear canal while treating external otitis, 6 - 10 drops should be used with each application. Some drops are used 3 - 4 times each day and some are used 2 times each day. Let the drops fill the ear canal. Wait 3-5 minutes. Then let the ear drops drain out. Don't use cotton to plug the ear canal after applying the drops. Remember heat and moisture are your enemy. Use the ear drops for the prescribed period of time, usually 7 -10 days. If there is a chronic infection, drops may be prescribed for 4 weeks or longer.

It is important to place ear drops into the ear canal where they can do their job effectively. Placing ear drops in your ear canal is done by feel, so it is better to have another person place drops in your ear canal. Apply the drops when you are laying down. Drops should run along the side of the ear canal until it is filled. The amount required will vary depending on age and the size of the ear canal.

Gentle to a fro movement of the ear is often necessary to eliminate trapped air and to assure filling.

When ear canal swelling is severe enough to prevent penetration of drops into the ear canal, a small expandable wick is placed gently into the ear canal to soak up the drops and allow them to penetrate into the ear canal to do their work. A short course of oral prednisone, a powerful anti-inflammatory medication, can be used to dramatically reduce swelling thus reducing pain and allowing antibiotic drops to enter the ear canal.

Antibiotic ear drops apply an extremely high concentration of antibiotic to the skin of the ear canal - 1000 times higher than could be achieved using an oral antibiotic. For this reason, oral antibiotics are not commonly used to treat external otitis. They can be effective, however, when the infection has spread outside the boundaries to the ear canal.

How can external otitis be prevented?

Preventing external otitis requires creation of a healthy environment in the ear canal. That means cool and dry, with some cerumen and a slightly acidic environment. Steps to prevent external otitis include:

Gently rinse the ear using a bulb syringe with a half-and-half solution of white vinegar (an acidifying solution) and rubbing alcohol (a drying agent).

1. Mix 50% rubbing alcohol and 50% white vinegar. You can buy these ingredients at the grocery or drug store. The %age of solutions can vary depending on the effect you need. Alcohol is a drying agent and the acidity of the vinegar inhibits bacterial growth.
2. The mixed solution should be at room temperature. Too cold or hot can cause dizziness when irrigating the ear.
3. Use a bulb syringe or a syringe and catheter supplied by your doctor.
4. Fill the syringe and gently irrigate your ear canal.
5. Discuss the frequency of irrigation with your doctor. Usually once each day is sufficient.

Avoid getting any more water in your ear until the irritation clears up. Cotton coated with petroleum jelly can be used as an earplug. Do not use plastic earplugs.

If your ear is itchy, try nonprescription swimmer's eardrops, such as Star-Otic or Swim-Ear. Use them before and after swimming or getting your ears wet.

Apply mineral oil, baby oil, or olive oil, 2-5 drops in the ear canal once each day. In the case of excessive or dry, hard wax, the oil softens wax allowing it to fall out or be removed easier. If there is very little wax, and the ear canal is dry and itchy, the oil is a substitute for wax and is helpful in creating a more natural

environment in the ear canal. If the ear canal is too moist, oil may also be helpful in displacing moisture and reducing inflammation.

Also see Home Treatment Instructions below

What complications can occur with external otitis?

Occasionally, infection can spread outside to boundaries of the ear canal into surrounding tissue. Most commonly infection spreads to the outer ear visible from the outside as redness, swelling, and drainage. The spread of infection into the bone surrounding the ear canal can be dangerous. This problem is treated very aggressively with intravenous antibiotics and sometimes surgery to remove infected bone. This problem is more common in individuals with diabetes.

Ear Canal Problems (Swimmer's Ear): Home Treatment Instructions

You may be able to relieve your ear canal problem with these home instructions:

- Gently rinse the ear using a bulb syringe with a half-and-half solution of white vinegar and rubbing alcohol. Make sure the flushing solution is body temperature. Inserting cool or hot fluids in the ear may cause dizziness.
- Avoid getting any more water in your ear until the irritation clears up. Cotton coated with petroleum jelly can be used as an earplug. Do not use plastic earplugs.
- If your ear is itchy, try nonprescription swimmer's eardrops, such as Star-Otic or Swim-Ear. Use them before and after swimming or getting your ears wet.
- To ease ear pain, apply a warm washcloth or a heating pad set on low. There may be some drainage when the heat melts earwax.
- Do not use a heating pad when you are in bed. You may fall asleep and burn yourself.
- Do not use a heating pad on a child.
- Avoid use of ear candles.

To insert eardrops:

- First, warm the drops to body temperature by rolling the container in your hands or placing it in a cup of warm water for a few minutes. Inserting cold eardrops can cause pain and dizziness.

- Have the person lie down, ear facing up.
- Place 1 or 2 drops on the wall of the ear canal so air can escape and drops can get into the ear. Gently wiggling the outer ear will help.
- You may find it easier to insert eardrops in a small child's ear by holding the child on your lap with his or her legs around your waist and head down on your knees. If possible, remain in this position for 2 to 3 minutes.

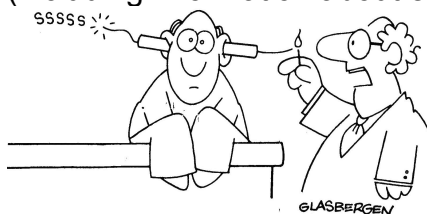
Symptoms to Watch For During Home Treat

If any of the following occur during home treatment you should consult your doctor

- Your ear pain and itching persist or get worse after 3 days of home treatment.
- The ear canal, the opening to the ear canal, the external ear, or the skin around the external ear becomes swollen, red, or very painful.
- You develop discharge from the ear that does not appear to be earwax.
- You develop discharge from the ear that is foul-smelling.
- Your ear symptoms are accompanied by a fever of or higher.
- You develop dizziness or unsteadiness.
- Your ear discomfort lasts for longer than 2 weeks.
- Your symptoms become more severe or frequent.

Earwax

(including information about ear candling)



Earwax (cerumen) is a protective substance that filters dust, keeps the ears clean, and prevents infection in the ear canal. Normally, earwax is soft and self-cleaning. Children have a lot of earwax. Generally there is less wax as they grow older.

Occasionally, earwax builds up, hardens, and causes some hearing loss or discomfort. Poking at the wax with cotton swabs, your fingers, or other objects may only further compact the wax against the eardrum. Professional help is needed to remove tightly packed earwax.

Earwax is eliminated from the ear naturally. In general, it is best to leave it alone. Most earwax problems that occur can be handled with home treatment. You should be concerned only if the earwax causes ringing, a full feeling in the ears, some hearing loss, pain, or dizziness.

Most cases of ear wax blockage respond to home treatments used to soften wax. These are safe and effective 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 in the ear canal. These remedies 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, there may be a perforation in the eardrum. This requires evaluation at your doctor's office.

The following information is from:

American Academy of Otolaryngology — Head and Neck Surgery
1650 Diagonal Road, Alexandria, VA 22314-2857
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www.entnet.org/healthinformation/

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 Away™, Murine®, or Physicians' Choice™ 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

The following is more detailed information about ear canal cleaning.
Information from: Clinical practice guideline: Cerumen impaction, Peter S. Roland, MD et al. Otolaryngology - Head and Neck Surgery, Volume 139, Issue 3, Supplement 2, Pages S1-S21 (September 2008)

There are a number of over-the-counter cerumen cleaning preparations on the market.

Topical preparations

Preparation	Active constituents
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Water-based: Acetic acid	Aqueous acetic acid
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Cerumenex	Triethanolamine polypeptide oleate condensate
Colace	Docusate sodium
Hydrogen peroxide	Hydrogen peroxide solution
Sodium bicarbonate	Sodium bicarbonate
Sterile saline solution	Water

Oil-based:

Almond oil	Almond oil
Arachis oil	Arachis oil
Earex	Arachis oil, almond oil, rectified camphor oil
Olive oil	Olive oil
Mineral oil/ Liquid petrolatum	Liquid petrolatum

Non-water-, non-oil-based:

Audax	Choline salicylate, glycerine
Debrox	Carbamide peroxide (urea-hydrogen peroxide)

The water-based and non-water, non-oil based products disintegrate cerumen and are called “cerumenolytics.” Oil-based products lubricate and soften cerumen.

Precautions:

Instilling cerumenolytic agents can result in discomfort, transient hearing loss, dizziness, and skin irritation, therefore, cerumenolytics should be avoided in patients with active infections of the ear canal. Many commercially available cerumenolytics contain possible irritants. Some individuals may have epidermal sensitivity to organic oils present in agents (i.e., almond oil). These agents should be applied for limited periods of time. For example, Cerumenex (10% triethanolamine polypeptide oleate) has a reported incidence of allergic skin inflammation of 1%. The risk of a local skin reaction in response to a cerumenolytic appears to be lowest with nonorganic solutions like saline.

Periodic irrigation of the ear canal is useful for some people. The main complications reported after irrigation are pain, injury to the skin of the ear canal with bleeding, and acute outer ear infection (acute external otitis).

Consideration should be given to re-acidifying the ear canal after irrigating with water or saline since the slightly acidic pH of the normal external auditory canal may be a significant factor in producing resistance to external otitis.

Hydrogen peroxide and solutions containing 50% white vinegar are reasonable alternatives to water and saline. Solutions containing alcohol should probably be avoided unless one can be certain that the tympanic membrane (ear drum) has

no perforation. Alcohol in the middle ear space is both painful and potentially ototoxic.

Ear Candling

Complementary medicine is becoming more popular in the United States and use of alternative therapies has increased. The most popular alternative practice for cerumen removal is ear candling, also known as “ear coning” or “thermo-auricular therapy.”

Ear candles are hollow tubes of fabric soaked with warm beeswax and subsequently hardened through cooling. The procedure of candling involves sticking such a candle into the ear, lighting the other end, and letting it burn for 15 minutes. Once the candle is extinguished, the near end in the ear is inspected. The individual is told that the waxy material at the end of the cone is cerumen from the ear, and has been drawn out through a “chimney effect” or capillary forces produced by the burning candle.

In addition to cerumen removal, ear candling is sometimes recommended for common conditions such as headaches, rhinosinusitis, colds, and tinnitus.

Adequate research on the effect of ear candling is limited. However, a series of experiments have concluded that candling does not eliminate wax from the ear, but rather the material deposited at the end of the cone is from the candle itself, and not wax from the external auditory canal. Additionally, another researcher concluded that the burning of the candle does not produce negative pressure. Comparison of photographs from each subject's ear canals taken before and after the ear candling procedure revealed that no cerumen was removed from these ears. Reported complications of ear candling included burns of the outer ear, ear canal blockages, and tympanic membrane (ear drum) perforation.

In summary, a few studies have shown that although ear candling is heavily promoted, the mechanism of action is implausible. Furthermore, it has no observable positive effects and ear candling use may be associated with considerable risks. The Food and Drug Administration (FDA) concluded that there is no validated scientific evidence to support the efficacy of the ear candles and warns against their use.

Noise and Hearing Loss

Noise & Hearing Protection

One in 10 Americans has a hearing loss that affects his or her ability to understand normal speech. Excessive noise exposure is the most common cause of hearing loss.

Can Noise Really Hurt My Ears?

Yes, noise can be dangerous. If it is loud enough and lasts long enough, it can damage your hearing.

The damage caused by noise, called sensorineural hearing loss or nerve deafness, can be caused by several factors other than noise, but noise-induced hearing loss is different in one important way, it can be reduced or prevented altogether.

Can I Toughen Up My Ears?

No. If you think you have grown used to a loud noise, it probably has damaged your ears, and there is no treatment—no medicine, no surgery, not even a hearing aid—that completely restores your hearing once it is damaged by noise.

How Does the 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, a slamming door, a voice, etc.

When noise is too loud, it begins to kill the nerve endings in the inner ear. As the exposure time to loud noise increases, more and more nerve endings are destroyed. As the number of nerve endings decreases, so does your hearing. There is no way to restore life to dead nerve endings; the damage is permanent.

How Can I Tell If A Noise Is Dangerous?

People differ in their sensitivity to noise. As a general rule, noise may damage your hearing if you have to shout over background noise to make yourself heard, the noise hurts your ears, it makes your ears ring, or you have difficulty hearing for several hours after exposure to the noise.

Sound can be measured scientifically in two ways. Intensity, or loudness of sound, is measured in decibels. Pitch is measured in frequency of sound vibrations per second. A low pitch, such as a deep voice or a tuba, makes fewer vibrations per second than a high voice or violin.

What Does Frequency Of Sound Vibration Have To Do With Hearing Loss?

Frequency is measured in cycles per second, or Hertz (Hz). The higher the pitch of the sound, the higher the frequency.

Young children, who generally have the best hearing, can often distinguish sounds from about 20 Hz, such as the lowest note on a large pipe organ, to 20,000 Hz, such as the high shrill of a dog whistle that many people are unable to hear.

Human speech, which ranges from 300 to 4,000 Hz, sounds louder to most people than noises at very high or very low frequencies. When hearing impairment begins, the high frequencies are usually lost first, which is why people with hearing loss often have difficulty hearing the high pitched voices of women and children. Loss of high frequency hearing also can distort sound, so that speech is difficult to understand even though it can be heard. People with hearing loss often have difficulty detecting differences between certain words that sound alike, especially words that contain S, F, SH, CH, H, or soft C sounds, because the sound of these consonants is in a much higher frequency range than vowels and other consonants.

What About Decibels?

Intensity of sound is measured in decibels (dB). The scale runs from the faintest sound the human ear can detect, which is labeled 0 dB, to over 180 dB, the noise at a rocket pad during launch.

Decibels are measured logarithmically. This means that as decibel intensity increases by units of 10, each increase is 10 times the lower figure. Thus, 20

decibels is 10 times the intensity of 10 decibels, and 30 decibels is 100 times as intense as 10 decibels.

Approx. Decibel Level

Example

0 Faintest sound heard by human ear.

30 Whisper, quiet library.

60 Normal conversation, sewing machine, typewriter.

90 Lawnmower, shop tools, truck traffic; 8 hours per day is the maximum exposure to protect 90% of people.

100 Chainsaw, pneumatic drill, snowmobile; 2 hours per day is the maximum exposure without protection.

115 Sandblasting, loud rock concert, auto horn; 15 minutes per day is the maximum exposure without protection.

140 Gun muzzle blast, jet engine; noise causes pain and even brief exposure injures unprotected ears. Maximum allowed noise with hearing protectors.

How High Can the Decibels Go Without Affecting My Hearing?

Many experts agree that continual exposure to more than 85 decibels is dangerous.

Does The Length Of Time I Hear A Noise Have Anything To Do With The Danger To My Hearing?

It certainly does. The longer you are exposed to a loud noise, the more damaging it may be. Also, the closer you are to the source of intense noise, the more damaging it is.

Every gunshot produces a noise that could damage the ears of anyone in close hearing range. Large bore guns and artillery are the worse because they are the loudest. But even cap guns and firecrackers can damage your hearing if the explosion is close to your ear. Anyone who uses firearms without some form of ear protection risks hearing loss.

Recent studies show an alarming increase in hearing loss in youngsters. Evidence suggests that loud rock music along with increased use of portable radios with earphones may be responsible for this phenomenon.

Can Noise Affect More Than My Hearing?

A ringing in the ears, called tinnitus, commonly occurs after noise exposure, and it often becomes permanent. Some people react to loud noise with anxiety and irritability, an increase in pulse rate and blood pressure, or an increase in stomach acid. Very loud noise can reduce efficiency in performing difficult tasks by diverting attention from the job.

Who Should Wear Hearing Protectors?

If you must work in an excessively noisy environment, you should wear protectors. You should also wear them when using power tools, noisy yard equipment, or firearms, or riding a motorcycle or snowmobile.

What Are The Laws For On-The-Job Exposure?

- Habitual exposure to noise above 85 dB will cause a gradual hearing loss in a significant number of individuals, and louder noises will accelerate this damage.
- For unprotected ears, the allowed exposure time decreases by one-half for each 5 dB increase in the average noise level. For instance, exposure is limited to 8 hours at 90 dB, 4 hours at 95 dB, and 2 hours at 100 dB.
- The highest permissible noise exposure for the unprotected ear is 115 dB for 15 minutes/day. Any noise above 140 dB is not permitted.

The Occupational Safety and Health Administration, in its Hearing Conservation Amendment of 1983, requires hearing conservation programs in noisy work places. This includes a yearly hearing test for the approximately five million workers exposed to an average of 85 dB or more of noise during an 8-hour work day.

Ideally, noisy machinery and work places should be engineered to be more quiet or the worker's time in the noise should be reduced; however, the cost of these actions is often prohibitive. As an alternative, individual hearing protectors are required when noise averages more than 90 dB during an 8-hour day.

When noise measurements indicate that hearing protectors are needed, the employer must offer at least one type of earplug and one type of earmuff without cost to employees. If the yearly hearing tests reveal hearing loss of 10 dB or

more in higher pitches in either ear, the worker must be informed and must wear hearing protectors when noise averages more than 85 dB for an 8-hour day.

Larger losses of hearing and/or the possibility of ear disease should result in referral to an ear, nose and throat physician (otolaryngologist).

What Are Hearing Protectors? How Effective Are They?

Hearing protection devices decrease the intensity of sound that reaches the eardrum. They come in two forms: earplugs and earmuffs.

Earplugs are small inserts that fit into the outer ear canal. They must be snugly sealed so the entire circumference of the ear canal is blocked. An improperly fitted, dirty or worn-out plug may not seal and can irritate the ear canal. They are available in a variety of shapes and sizes to fit individual ear canals and can be custom made. For people who have trouble keeping them in their ears, they can be fitted to a headband.

Earmuffs fit over the entire outer ear to form an air seal so the entire circumference of the ear canal is blocked, and they are held in place by an adjustable band. Earmuffs will not seal around eyeglasses or long hair, and the adjustable headband tension must be sufficient to hold earmuffs firmly around the ear.

Properly fitted earplugs or muffs reduce noise 15 to 30 dB. The better earplugs and muffs are approximately equal in sound reductions, although earplugs are better for low frequency noise and earmuffs for high frequency noise.

Simultaneous use of earplugs and muffs usually adds 10 to 15dB more protection than either used alone. Combined use should be considered when noise exceeds 105 dB.

Why Can't I just Stuff My Ears With Cotton?

Ordinary cotton balls or tissue paper wads stuffed into the ear canals are very poor protectors; they reduce noise only by approximately 7 dB.

What Are The Common Problems Of Hearing Protectors?

Studies have shown that one-half of the workers wearing hearing protectors receive one-half or less of the noise reduction potential of their protectors because these devices are not worn continuously while in noise or because they do not fit properly.

A hearing protector that gives an average of 30 dB of noise reduction if worn continuously during an 8-hour work day becomes equivalent to only 9 dB of

protection if taken off for one hour in the noise. This is because decibels are measured on a logarithmic scale, and there is a 10-fold increase in noise energy for each 10 dB increase.

During the hour with unprotected ears, the worker is exposed to 1,000 times more sound energy than if earplugs or muffs had been worn.

In addition, noise exposure is cumulative. So the noise at home or at play must be counted in the total exposure during any one day. A maximum allowable while on-the-job followed by exposure to a noisy lawnmower or loud music will definitely exceed the safe daily limit.

Even if earplugs and/or muffs are worn continuously while in noise, they do little good if there is an incomplete air seal between the hearing protector and the skin.

When using hearing protectors, you will hear your own voice as louder and deeper. This is a useful sign that the hearing protectors are properly positioned.

Can I Hear Other People And Machine Problems If I Wear Hearing Protectors?

Just as sunglasses help vision in very bright light, so do hearing protectors enhance speech understanding in very noisy places. Even in a quiet setting, a normal-hearing person wearing hearing protectors should be able to understand a regular conversation.

Hearing protectors do slightly reduce the ability of those with damaged hearing or poor comprehension of language to understand normal conversation. However, it is essential that persons with impaired hearing wear earplugs or muffs to prevent further inner ear damage.

It has been argued that hearing protectors might REDUCE a worker's ability to hear the noises that signify an improperly functioning machine. However, most workers readily adjust to the quieter sounds and can still detect such problems.

What If My Hearing Is Already Damaged? How Can I Tell?

Hearing loss usually develops over a period of several years. Since it is painless and gradual, you might not notice it. What you might notice is a ringing or other sound in your ear (called tinnitus), which could be the result of long-term exposure to noise that has damaged the hearing nerve. Or, you may have trouble understanding what people say; they may seem to be mumbling, especially when you are in a noisy place such as in a crowd or at a party. This could be the beginning of high-frequency hearing loss; a hearing test will detect it.

If you have any of these symptoms, you may have nothing more serious than impacted wax or an ear infection, which might be simply corrected. However, it might be hearing loss from noise. In any case, take no chances with noise—the hearing loss it causes is permanent. If you suspect a hearing loss, consult a physician with special training in ear care and hearing disorders (called an otolaryngologist or otologist). This doctor can diagnose your hearing problem and recommend the best way to manage it.

www.entnet.org/healthinformation/
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Sudden Hearing Loss

Description

Sudden Sensorineural Hearing Loss (SSHL), or sudden deafness, is a rapid loss of hearing. SSHL can happen to a person all at once or over a period of up to 3 days. It should be considered a medical emergency. A person who experiences SSHL should visit a doctor immediately. It occurs in 5-20 per 100,000 people per year.

A doctor can determine whether a person has experienced SSHL by conducting a normal hearing test. If a loss of at least 30 decibels in three connected frequencies is discovered, it is diagnosed as SSHL. A decibel is a measure of sound. A decibel level of 30 is half as loud as a normal conversation. A frequency is another way of measuring sound. Frequencies measure sound waves and help to determine what makes one sound different from another sound.

Hearing loss affects only one ear in 9 out of 10 people who experience SSHL. Many people notice it when they wake up in the morning. Others first notice it when they try to use the deafened ear, such as when they make a phone call. Still others notice a loud, alarming pop just before their hearing disappears. People with SSHL often experience dizziness and fullness or ringing (tinnitus) in the affected ear.

Some patients recover completely without medical intervention, often within the first 3 days. This is called a spontaneous recovery. Others get better slowly over a 1 or 2 week period. Spontaneous recovery eventually occurs in 30-50% in up to 3 months. Although a good to excellent recovery is likely, 15 percent of those with SSHL experience a hearing loss that gets worse over time.

Approximately 4,000 new cases of SSHL occur each year in the United States. It can affect anyone, but for unknown reasons it happens most often to people between the ages of 30 and 60.

Causes/Diagnosis

Though there are more than 100 possible causes of sudden deafness, it is rare for a specific cause to be precisely identified. Only 10 to 15 percent of patients with SSHL know what caused their loss. Normally, diagnosis is based on the patient's medical history. Possible causes include the following:

- Infectious diseases (viral and bacterial)
- Trauma, such as a head injury.
- Abnormal tissue growth in the inner ear.
- Immunologic diseases such as lupus.
- Toxic causes, such as snake bites.
- Ototoxic drugs (drugs that harm the ear).
- Circulatory problems.
- Neurologic causes such as multiple sclerosis.
- Relation to disorders such as Ménière's disease.

Treatment

People who experience SSHL should see a physician immediately. Doctors believe that finding medical help fast increases the chances for recovery. Several treatments are used for SSHL, but researchers are not yet certain which is the best for any one cause. If a specific cause is identified, a doctor may prescribe treatment for that problem. Or, a doctor may advise a patient to stop taking any medicine that can irritate or damage the ear.

The most common therapy for SSHL, especially in cases with an unknown cause, is treatment with steroids. Steroids are used to treat many different disorders and usually work to reduce inflammation, decrease swelling, and help the body fight illness. Steroid treatment helps some SSHL patients who also have conditions that affect the immune system, which is the body's defense against disease. Steroids are given orally. They can also be given by applying steroid drops to a membrane covering over the inner ear. The steroid is then absorbed into the inner ear where the problem lies.

Another common method that may help some patients is a diet low in salt. Researchers believe that this method aids people with SSHL who also have Ménière's disease, a hearing and balance disorder.

Research

Two factors that help hearing function properly are good air and blood flow inside the ear. Many researchers now think that SSHL happens when important parts of the inner ear do not receive enough oxygen. A common treatment for this possible cause is called carbogen inhalation. Carbogen is a mixture of oxygen and carbon dioxide that seems to help air and blood flow better inside the ear. Like steroid therapy, carbogen inhalation does not help every patient, but some SSHL patients taking carbogen have recovered over a period of time.

Additional Resources

American Academy of Otolaryngology — Head and Neck Surgery
1650 Diagonal Road, Alexandria, VA 22314-2857
Phone: 1-703-836-4444
Voice: (703) 836-4444, 8:30 a.m. - 5 p.m., Eastern time
TTY: (703) 519-1585
Fax: (703) 683-5100
E-mail: webmaster@entnet.org
Internet: www.entnet.org

Self Help for Hard of Hearing People, Inc. (SHHH)
7910 Woodmont Avenue, Suite 1200
Bethesda, MD, 20814
Voice: (301) 657-2248
TTY: (301) 657-2249
Fax: (301) 913-9413
E-mail: info@hearingloss.org
Internet: www.hearingloss.org

Alexander Graham Bell Association for the Deaf and Hard of Hearing (AG Bell)
3417 Volta Place, NW
Washington, DC, 20007-2778
Voice: (202) 337-5220
Toll-free Voice: (866) 337-5220
TTY: (202) 337-5221
Fax: (202) 337-8314
E-mail: info@agbell.org

Internet: www.agbell.org

Association of Late-Deafened Adults (ALDA)

1131 Lake Street, #204

Oak Park, IL, 60301

Toll-free Voice: (877) 907-1738

TTY: (708) 358-0135

Fax: (877) 907-1738

E-mail: info@alda.org

Internet: www.alda.org

CHID database search

CHID is a database produced by health-related agencies of the Federal Government. This database provides titles, abstracts, and availability information for health information and health education resources. The value of this database is that it lists a wealth of health promotion and education materials and program descriptions that are not indexed elsewhere. Search the database using sudden deafness to view citations to journal articles, educational materials, and books on this topic.

PubMed database search

PubMed is a database developed by the National Library of Medicine in conjunction with publishers of biomedical literature as a search tool for accessing literature citations and linking to full-text journals at web sites of participating publishers. Search the database using sudden deafness for medical journal articles.

NIH Pub. No. 00-4757

February 2000

Updated March 2003

Tinnitus (Ringing in the Ears)

What is tinnitus?

You may notice an occasional ringing or other sound in your ears. This is called tinnitus. The tinnitus usually doesn't last longer than a few minutes. However, in some cases it is persistent.

Tinnitus, also known as ringing in the ears or head noise, occurs when a person hears sounds in their head when there aren't any external noises. The sounds vary, and can range from a low roaring sound to a high-pitched scream. While some people describe the noise as a ringing or buzzing sensation, others hear crickets, wind blowing, seashell sounds or musical notes.

What causes tinnitus?

Tinnitus is most often a symptom of an inner ear problem. Irritation or damage to the inner ear or the hearing nerve can cause tinnitus. The most common causes are excessive exposure to loud noise, such as industrial machinery, aircraft engines, and loud music. Tinnitus may also begin after an inner ear injury from a single loud noise, such as a gunshot or a firecracker.

Interestingly, about 65% of normal hearing individuals have tinnitus if they are placed in a sound proof room where there is no background noise. This suggests that everyday ambient environmental noise commonly cancels tinnitus in many individuals.

There are other causes of tinnitus:

Physical injury

The components of the inner ear are delicate, so head trauma of any kind may cause damage. Changes in pressure, especially during air travel or scuba diving, may also cause tinnitus.

Irritation or disease to the ear, hearing nerve, or hearing pathway

Any disease or irritation that harms the external, middle, or inner ear can cause tinnitus. This includes conditions such as ear infections, excessive fluid build-up in the inner ear (Meniere's Disease), and growths in the ear. Even other brain tumors and increased spinal fluid pressure can cause tinnitus.

Occasionally more general medical problem such as diabetes, thyroid or high blood pressure can cause or aggravate tinnitus.

Muscle spasm

A spasm of the muscles that connect the eardrum to the middle ear can cause sounds in the ear. These muscles normally contract in response to a loud sound to help protect the inner ear from injury. The common temporal mandibular joint

problems can be associated with tinnitus. Rarely, they move in a rhythmic contraction, producing a clicking or popping sound.

Changes in blood flow

There are two large blood vessels in close proximity to the middle and inner ear. The blood flowing through these vessels produces a pulsating sound, like blood flow from the heart. Other variations of blood flow and blood vessel tumors can cause this kind of tinnitus.

Side effects of medications and stimulants

Many medications are known to cause or worsen tinnitus. The most common medications are high dose aspirin (usually over 3000mg or about 10 tablets per day) and nonsteroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen (Motrin®, Indocin®). Stimulants, such as caffeine and nicotine, may also worsen the tinnitus.

Despite these known causes of tinnitus, the cause is most commonly unknown.

Is there a treatment for tinnitus?

In most cases, there isn't a medical or surgical treatment that will completely eliminate tinnitus. However, most tinnitus will disappear or become less bothersome with time. This happens when the irritation causing the tinnitus goes away, or the brain begins to ignore the sound from the inner ear.

What can I do for relief of my symptoms?

It can take anywhere from a few days to a year for symptoms to improve. During this time, there are things you can do that may help.

Masking techniques

Tinnitus is usually more noticeable in a quiet setting. When in a quiet room, turn the radio on to a low volume to distract your ears from the head noise.

If falling asleep is difficult, set a clock radio to play at a very low volume for a few minutes after you get in bed.

Stress reduction

Coping with tinnitus is more difficult when you are under emotional stress.

To help with stress, try relaxation techniques (such as yoga or meditation), get plenty of sleep, and try to get at least 30 minutes of physical activity every day.

Avoid further injury to your ears

Protecting your ears against loud noises may prevent worsening of tinnitus. Use protective earplugs and earmuffs when you are exposed to loud noises.

Avoid certain medications

Avoid aspirin and NSAIDs, as these medications can cause or worsen tinnitus. Instead, take aspirin substitutes, such as acetaminophen (Tylenol®).

Does tinnitus cause hearing loss?

Tinnitus does not cause hearing loss. However, it may or may not come with a hearing loss or impairment. Talk to your health care provider if you have any questions.

More Home Treatment

The following tips may help you reduce symptoms of tinnitus.

- Cut back on or eliminate alcohol and beverages containing caffeine.
- Stop smoking and stop using smokeless tobacco products. Nicotine use makes tinnitus worse by reducing blood flow to the structures of the ear.
- Exercise regularly. Exercise improves blood flow to the structures of the ear.
- If you think earwax may be the cause of tinnitus, see the topic Earwax in Related Information for home treatment tips.

While waiting to see if tinnitus goes away, or if your health professional has advised you that your tinnitus will be present for a long time, try these methods to cope with the constant noise:

- Limit or avoid exposure to the noises you suspect are causing your tinnitus. If you cannot avoid loud noises, wear protective earplugs or earmuffs.
- Try to ignore the sound by directing your attention to other things.
- Practice relaxation techniques, such as biofeedback, meditation, or yoga. Stress and fatigue seem to make tinnitus worse.
- Quiet rooms can cause tinnitus to seem more distracting. Background noise may reduce the amount of noise you hear. Play music or white noise when you are trying to fall asleep or any time you find yourself in a quiet place. You may consider buying a machine that makes soothing sounds (such as ocean waves).

Symptoms to Watch for During Home Treatment

Use the Check Your Symptoms section to evaluate your symptoms if any of the following occur during home treatment.

- Symptoms develop that are related to nerve damage, such as loss of coordination or numbness or weakness on one side of the face or one side of the body.
- Other symptoms develop, such as significant hearing loss, vertigo, loss of balance, nausea or vomiting.
- Tinnitus localizes to one ear.
- Hearing loss becomes worse within 24 hours after an ear injury, or tinnitus or hearing loss does not improve within 1 week of an ear injury.
- Tinnitus continues for 2 weeks despite the use of home treatment.
- Your symptoms become more severe or more frequent.

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Other possible treatments:

What can be done for tinnitus?

More than 15 years ago, investigators suggested that the anti-anxiety medication Xanax (alprazolam) could improve life for people with disabling tinnitus. It is not known if this medication actually affected the sound, or if it just helped them cope with it better. It has not been widely adopted as a treatment. The initial study suggested that as many as 75% of patients improved. Other similar studies suggest only about a 20 - 30% improvement.

Antidepressants such as nortriptyline (Pamelor) and amitriptyline (Elavil) are sometimes effective. It is not known how these medications work for tinnitus, but studies show that about 80% of individuals with severe tinnitus also have depression.

Antihistamines are useful in patients who have environmental allergies, but not in those without allergies

There are a number of alternative medications and vitamins that claim to reduce tinnitus. These include melatonin, ginko, St John's Wart, lipoflavonoids, and vitamins.

A new study suggests that a natural compound called melatonin might be helpful. This hormone is produced by the brain and is important for establishing the sleep cycle. Researchers at Washington University found that patients taking 3 mg of melatonin one to two hours before bedtime both slept better and suffered less

from their tinnitus (Otolaryngology - Head & Neck Surgery, February 2006). An earlier melatonin study had found similar benefit (Laryngoscope, March 1998).

One reader wrote that he found zinc citrate or zinc methionine supplements helpful. Research supported his observation that 50 mg of zinc daily may reduce tinnitus severity (Otology and Neurotology, January 2003).

Arches Natural Products, Inc offers a proprietary herbal and mineral product called Arches Tinnitus Relief Formula for the reduction of tinnitus. There is no published medical evidence that this product is effective. The product can be found on the Internet

A medication prescribed to protect the stomach from ulcers may also provide benefit for tinnitus sufferers. One small, controlled trial of Cytotec (misoprostol) found that it worked twice as well as placebo to relieve tinnitus loudness (Otolaryngology - Head & Neck Surgery, May 2004). Cytotec can cause diarrhea, abdominal pain, nausea and flatulence. It can also cause premature labor or miscarriage, so pregnant women must avoid it.

Alternative medical therapy treatments such as acupuncture, hypnosis and massage therapy may be helpful in some cases.

There are several audiologic and behavioral modification techniques have been consistently helpful in many cases.

Some audiologist are recommending an Ipod to listen to any music for 20 minutes, twice each day while relaxing. The goal is to focus on something other than tinnitus while feeling relaxed. After individuals are convinced that it is possible to focus on something other than tinnitus, rapid progress is often made. This treatment attempts to retrain how your brain responds to tinnitus. The treatment is not covered by insurance.

Some audiologists are also fitting some individuals with certain types of hearing aids programmed to provide a little mid frequency gain. This seems to help with tinnitus in individuals who normally wear hearing aids.

Tinnitus Retraining Therapy is a technique used by some audiologist that uses a combination of low level, broad-band noise and counseling to achieve the habituation of tinnitus so that is the patient is no longer aware of their tinnitus, except when they focus their attention on it, and even then tinnitus is not annoying or bothersome. This treatment attempts to retrain how your brain responds to tinnitus. The treatment is not covered by insurance

Although a cure for tinnitus remains elusive, these measures might help some.

Tinnitus Resources

Information:

American Tinnitus Association
PO Box 5
Portland, OR 97207-0005
503-248-9985
fax: 503-248-0024

There is a wealth of information about tinnitus on the web site for the American Tinnitus Association: www.ata.org

Sources for Treatment options:

David Illich, AuD, FAAA
Christine Anderson, AuD
Professional Hearing Associates, Inc
1045 E Valley Pkwy
Escondido CA 92025
760-489-6901
dillich@hotmail.com

Airplane Travel and Ears

Ears and Altitude

Have 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

The 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 cheek 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.

www.entnet.org/healthinformation/

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