
Middle Ear Surgery

Does Your Ear Still Bother You?

Maybe you noticed some hearing loss or fluid in your ear and went to your doctor. He or she found a problem with your middle ear. This is a part of the ear you can't see. Your doctor may have prescribed medications, but your ear still bothers you. Don't worry. Middle ear surgery may improve your hearing and ease other symptoms.

Common Problems and Symptoms

Your middle ear may have been injured or infected recently. Over time, certain growths or bone disease can also harm the middle ear. Any of these problems may cause the following symptoms:

- Hearing loss in one or both ears
- Fluid, often smelly, draining from the ear
- Pain, pressure, or discomfort in the ear
- Ringing in the ear
- Dizziness when you move your head

Learning About the Middle Ear

The middle ear is an air-filled chamber that lies behind the eardrum. Together, the eardrum and middle ear pass sound to the inner ear. When the ear is healthy, air pressure remains balanced in the middle ear. Disease, illness, or injury can affect how well the middle ear works.

How you Hear- The three parts of the ear all help you hear. The outer ear funnels sound to the ear drum. This makes the eardrum vibrate. The three tiny bones in the middle ear (the malleus, incus, and stapes) pass the vibrations to the inner ear. There, the vibrations become electrical signals. These signals travel along the auditory (hearing) nerve to the brain.

- The **mastoid bone** surrounds the middle ear
- The **external ear** collects sound waves
- The **ear canal** carries sound waves to the eardrum
- The **eardrum** vibrates from sound waves, setting the middle ear bones in motion
- The **middle ear bones (ossicles)** vibrate, transmitting sound waves to the inner ear
- The **eustachian tube** helps control air pressure in the middle ear
- The **cochlea** picks up sound waves and produces nerve signals
- The **auditory nerve** carries sound signals to the brain

- The **vestibular nerve** carries balance signals to the brain
- The **facial nerve** controls muscles in the face
- The **semicircular canals** help maintain balance

Middle Ear Problems and Hearing Loss

Left untreated, middle ear problems often lead to lifelong hearing loss. There are two types of hearing loss: conductive and sensorineural. One or both kinds can occur. Injury, infection, certain growths, or bone disease can cause your symptoms. A burst eardrum or a chronic (long lasting) ear infection may be painful and decrease hearing. A growth or bone disease may damage the middle ear bones and affect hearing.

Conductive Hearing Loss- Sound waves may be disrupted before they reach the inner ear. If this happens, conductive hearing loss may occur. The ear canal can be blocked by wax, infection, a tumor, or a foreign object. The eardrum can be injured or infected. Abnormal bone growth, infection, or tumors in the middle ear can block sound waves.

Sensorineural Hearing Loss- Middle ear problems may spread to the inner ear, leading to sensorineural hearing loss. Also called nerve deafness, this hearing loss often occurs in both ears. Sound waves may be poorly processed in the inner ear. Or nerve signals may not reach the brain. Aging, loud noise, toxins, or an inherited condition can cause nerve deafness. It may also develop in an infected ear.

Your Treatment Plan

Your treatment options depend on your middle ear problem. If you do choose surgery, you may need more than one procedure.

Your Options- There may be more than one way to treat your middle ear problem. You and your doctor may discuss any of the following:

- Medications to control symptoms
- A hearing aid to improve hearing
- Surgery to relieve symptoms. This may be combined with medications or a hearing aid.

If Surgery is Right for You- Depending on your age, health, and lifestyle, surgery may be the best treatment. It may be done in stages, months, to a year apart. Types of surgery include:

- **Tympanoplasty** to repair a damaged eardrum
- **Mastoidectomy** to remove infected bone
- **Ossicular chain reconstruction** to repair some or all middle ear bones
- **Stapes surgery** to repair the stapes bone

Tympanoplasty

Tympanoplasty can repair a damaged eardrum, stop infection, and improve hearing. During surgery, you will be given general anesthesia. Or you will have local anesthesia with sedation.

Tympanoplasty takes about 1 to 3 hours. It may be done along with a mastoidectomy or an ossicular chain reconstruction.

Infection and Injury- Your eardrum may become damaged by chronic ear infections. Certain injuries to the ear can also tear the eardrum. An eardrum with a tear or a hole in it may keep you from hearing well. It may also cause ear pain.

Repairing the Eardrum- The eardrum can be reached through the ear canal. Or your surgeon may make an incision behind the ear. Both approaches may be used. Then the eardrum is repaired with a graft. A graft is a small piece of material, often your own tissue. It covers the tear or hole in your eardrum. The graft is secured with a spongy substance. This substance dissolves as the graft heals.

Mastoidectomy

Mastoidectomy can remove infected bone and growths from the middle ear. But it may not improve your hearing in the affected ear. During surgery, you will receive general anesthesia. Mastoidectomy may take 1 ½ to 3 hours. It may be done along with a tympanoplasty or an ossicular chain reconstruction.

Infection and Growths- The mastoid bone contains cells that hold air (called air cells). Problems occur when an ear infection spreads to the air cells. Skin cells may also build up in an infected ear. These skin cells can form a growth (called cholesteatoma). This growth can destroy nearby bone. If not treated, mastoid bone problems may cause deafness, facial nerve damage, dizziness, brain infection, or even death.

Removing Mastoid Bone- To reach the mastoid bone, your surgeon makes an incision behind the ear. Or he or she goes through the ear canal. Both approaches may be used. Infected bone and any growths are removed. Then the incision is closed with stitches. There are many types of mastoidectomy. Each type is based on the amount of infected bone. Depending on how much bone is removed, some hearing may be lost.

Ossicular Chain Reconstruction

Ossicular chain reconstruction (also called middle ear bone surgery) can improve conductive hearing. It can be done to replace a damaged malleus or incus bone. In some cases, all three middle ear bones are replaced. During surgery, you will be given local anesthesia with sedation. Or you may receive general anesthesia. Middle ear bone surgery takes about 1 to 3 hours. It is often done along with a tympanoplasty or a mastoidectomy.

Damaged Malleus or Incus Bones- Injury or infection can damage the malleus or incus bones. Your surgeon reaches these bones by going through the ear canal or making an incision behind the ear. Then an incision is made around the eardrum. The eardrum is held to one side. All or part of the damaged bone is removed.

Replacing One or Both Bones- The damaged malleus or incus bone—or both—may be replaced with a manmade part. This part is called a prosthesis. Or your surgeon may use a donor middle ear bone. Your surgeon attaches the prosthesis or the donor bone where needed. Then the eardrum is put back in place.

Damaged Malleus, Incus, and Stapes Bones- All three middle ear bones may be damaged. Your surgeon reaches the bones by going through the ear canal or making an incision behind the ear. Then an incision is made around the eardrum. The eardrum is held to one side. All or part of the damaged bones are removed.

Replacing All Three Bones- All three bones may be replaced with a manmade part. This part is called prosthesis. Your surgeon places one end of the prosthesis against the eardrum. The other end may touch the stapes bone or be laid against a tissue graft. Then the eardrum is put back in place.

Stapes Surgery

Stapes surgery can improve conductive hearing. This surgery is done to replace all or part of a damaged stapes bone. You will be given general anesthesia or local anesthesia with sedation during surgery. The surgery takes about 1 to 3 hours. Unlike ossicular chain reconstruction, stapes surgery is rarely combined with other middle ear surgeries.

A Diseased Stapes Bone- The stapes bone may become damaged by otosclerosis. This is an inherited middle ear disease. The disease creates spongy bone tissue. The tissue grows and hardens around the footplate (the part of the stapes that touches the cochlea). As a result, the footplate becomes fixed in place and cannot vibrate. It cannot transmit sound waves, and hearing loss may occur.

Removing Bone- The first step of stapes surgery is removing the crura. This is the part of the stapes that touches the footplate. Your surgeon reaches the crura by going through the ear canal. An incision is made around the eardrum. The eardrum is held to one side. Then the crura is removed.

Preparing Bone- The second step is preparing the diseased footplate for bone replacement. This will let sound vibrations reach the inner ear again. Your surgeon may make a hole in the footplate with a laser or drill. This is called a stapedotomy. Or all of the footplate may be removed and replaced. This is called a stapedectomy.

Replacing Bone- The third step is replacing the crura. A manmade part (called a prosthesis) is attached to the incus bone. The prosthesis transmits sound waves to the inner ear. There are many types of prosthesis. They are most often made of metal, plastic, or your own tissue. But some may use more than one of these materials.