

Michigan Ear Institute

Eustachian  
Tube  
Problems



[www.michiganear.com](http://www.michiganear.com)

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## WELCOME

*Welcome to the Michigan Ear Institute, one of the nation's leading surgical groups specializing in hearing, balance and facial nerve disorders. The Michigan Ear Institute is committed to providing you with the highest quality diagnostic and surgical treatment possible.*

*Our highly experienced team of physicians, audiologists and clinical physiologists have established international reputations for their innovative diagnostic and surgical capabilities, and our modern, attractive facility has been designed with patient care and convenience as the foremost criteria.*

*It is our privilege to be able to provide care for your medical problems and we will strive to make your visit to the Michigan Ear Institute a positive and rewarding experience.*

## **MECHANISM OF HEARING**

The ear is divided into three parts: an external ear, a middle ear and an inner ear. Each part performs an important function in the process of hearing.

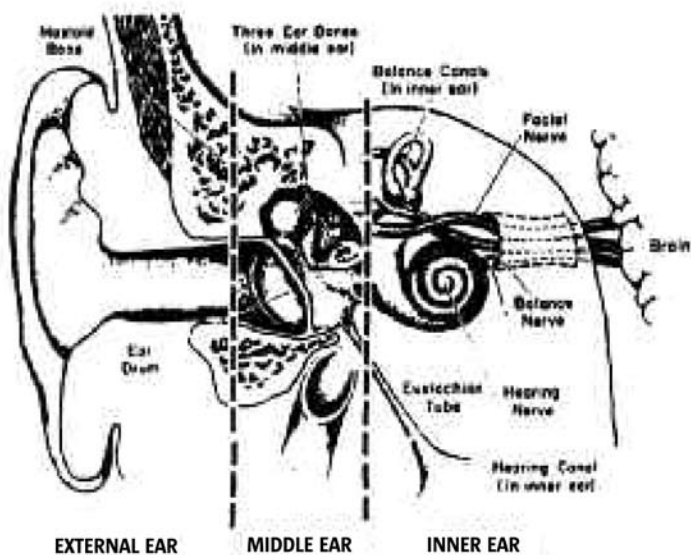
The external ear consists of an auricle and ear canal. These structures gather the sound and direct it toward the eardrum membrane.

The middle ear chamber lies between the external and inner ear. This air filled space is connected to the back of the throat by the Eustachian tube, which serves as a pressure equalizing valve. The middle ear contains three small ear bones (ossicles): the malleus (hammer), incus (anvil), and stapes (stirrup). These bones transmit sound vibrations to the inner ear. They act as a transformer, converting sound vibrations in the external ear canal into fluid waves in the inner ear. A disturbance of the Eustachian tube, eardrum or the bones may result in a conductive hearing loss. This type of impairment is usually correctable medically or surgically.

The inner ear chamber contains the hair cells bathed in fluid. Inner ear fluid waves stimulate the hair cells. The information generated in these cells is transmitted to the brain through the hearing nerve where it is interpreted. A disturbance in the inner ear fluids or nerve endings may result in a sensorineural (nerve) hearing impairment. This type of impairment is usually not correctable.

## **FUNCTION OF THE EUSTACHIAN TUBE**

The Eustachian tube is a narrow, one and a half inch long channel that connects the middle ear with the nasopharynx- the upper throat area just above the palate.



The Eustachian tube functions as a pressure-equalizing valve for the middle ear that is normally filled with air. When functioning properly, the Eustachian tube opens for a fraction of a second periodically (about once every three minutes) in response to swallowing or yawning. It allows air into the middle ear to replace air that has been absorbed by the middle ear lining (mucous membrane) or to equalize pressure changes occurring during altitude changes. Anything that interferes with this periodic opening and closing of the Eustachian tube may result in hearing impairment or other ear symptoms.

Obstruction or blockage of the Eustachian tube results in a negative middle ear pressure, with retraction (sucking in) of the eardrum membrane. In the adult, this is usually accompanied by some ear discomfort (a fullness or pressure feeling) and may result in a mild hearing impairment and head noise (tinnitus). There may be no symptoms in children.

If the obstruction is prolonged, fluid may be drawn from the mucous membrane of the middle ear creating a condition called serous otitis media (fluid in the middle ear).

This occurs frequently in children in connection with upper respiratory infections and accounts for the hearing impairment associated with this condition.

## **EUSTACHIAN TUBE PROBLEMS RELATED TO FLYING**

Individuals with a Eustachian tube problem may experience difficulty equalizing middle ear pressure when flying.

When an aircraft ascends, outside pressure decreases, resulting in outward pressure on the eardrum. When the aircraft descends, just the opposite occurs: atmospheric pressure increases and there is a relative decrease in the middle ear pressure and inward pressure on the eardrum. Either situation may result in discomfort in the ear due to abnormal middle ear pressure if the Eustachian tube is not functioning properly. This discomfort more likely to occur upon aircraft descent.

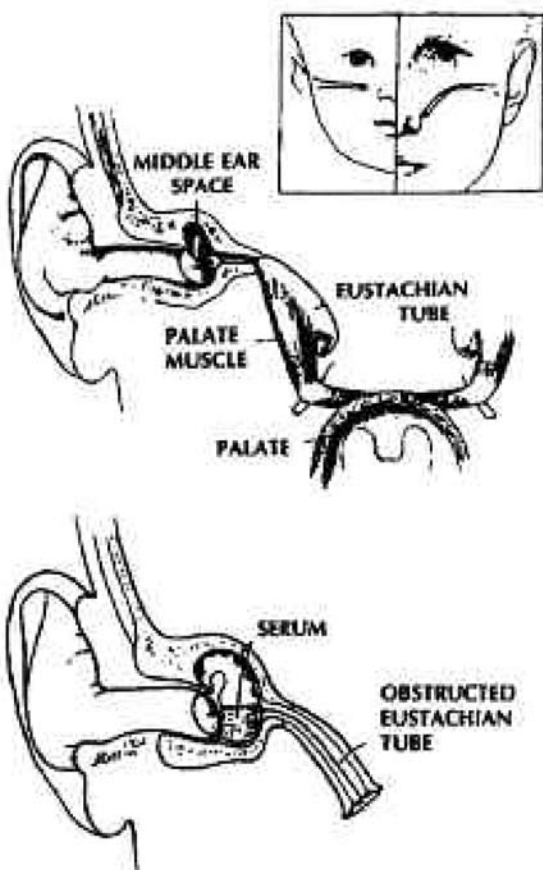
To avoid middle ear problems associated with flying, you should not fly if you have an upper respiratory problem such as a common cold, allergy attack, or sinus infection. Should you have such a problem, or should you have a chronic Eustachian tube problem and must fly, it may help to avoid ear difficulty by observing the following recommendations:

1. Begin taking an oral decongestant, such as Sudafed tablets, the day before your air flight. Continue the medication for twenty-four (24) hours after the flight if you have experienced any ear difficulty.

2. Following the container directions, begin the use of a nasal decongestant spray, such as Neosynephrine, shortly before boarding the aircraft. Should your ears “plug up” upon ascent, hold your nose and swallow. This will help suck excess air pressure out of the middle ear.
3. Thirty minutes before the aircraft is due to land again use the nasal spray. Chew gum to stimulate swallowing. Should your ears “plug up” despite this, hold your nose and blow forcibly to try to blow air up the Eustachian tube into the middle ear (Valsalva maneuver).
4. Drinking adequate amounts of fluid (ideally water) before and during the flight allow the lining of the Eustachian tube to function more efficiently.
5. Remember it is unwise to fly if you have an acute upper respiratory infection. Should flying be necessary under these circumstances DO NOT perform the Valsalva maneuver mentioned above.

None of these recommendations or precautions need be followed if you have middle ear ventilation tube in your eardrum membrane.



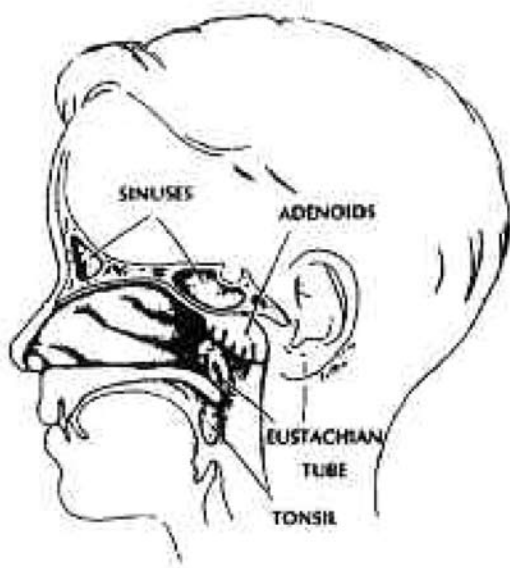


## SEROUS OTITIS MEDIA

Serous otitis media is the term we use to describe a collection of fluid in the middle ear. This may be acute or chronic.

Acute serous otitis media is usually the result of block- age of the Eustachian tube from an upper respiratory infection or an attack of nasal allergy. In the presence of bacteria, this fluid may be come infected leading to an acute suppurative otitis media (infected or abscessed middle ear). When infection does not develop, the fluid remains until the Eustachian tube again begins to function normally, at which time the fluid is absorbed or drains down the tube into the throat.

Chronic serous otitis media may result from long-standing Eustachian tube blockage, or from thickening of the fluids so that it cannot be absorbed or drained down the tube. This chronic condition is usually associated with hearing impairment. There may be recurrent ear pain, especially when the individual catches a cold. Serous otitis media may persist for many years without producing any permanent damage to the middle ear mechanism. The presence of fluid in the middle ear, however, makes it very susceptible to recurrent acute infections. These recurrent infections may result in middle ear damage.



## CAUSES OF SEROUS OTITIS MEDIA

Serous otitis media may result from any condition that interferes with the periodic opening and closing of the Eustachian tube. The causes may be congenital (present at birth), may be due to infection or allergy, or may be due to blockage of the tube by adenoids.

## **The Immature Eustachian Tube**

The size and shape of the Eustachian tube is different in children than in adults. This accounts for the fact that serous otitis media is more common in young children. Some children inherit small Eustachian tubes from their parents; this accounts in part for the familial tendency to middle ear infection. As the child matures, the Eustachian tube usually assumes a more adult shape.

## **Cleft Palate**

Serous otitis media is more common in the child with a cleft palate. This is due to the fact that the muscles that move the palate also open the Eustachian tube. These muscles are deficient or abnormal in the cleft palate child.

## **Infection**

The lining membrane (mucous membrane) of the middle ear and Eustachian tube is connected with, and is the same as, the membrane of the nose, sinuses, and throat. Infection of these areas results in mucous membrane swelling which in turn may result in Eustachian tube obstruction.

## **Allergy**

Allergic reactions in the nose and throat result in mucous membrane swelling, and this swelling may also affect the Eustachian tube. This reaction may be acute, as in a hay fever type reaction, or may be chronic, as in many varieties of "chronic sinusitis".

## **Adenoids**

The adenoids are located in the nasopharynx, in the area around and between the Eustachian tube openings. When enlarged, the adenoids may block the Eustachian tube opening.

## **TREATMENT OF ACUTE SEROUS OTITIS MEDIA**

Treatment of acute serous otitis media is usually medical, and is directed towards treatment of the upper respiratory infection or allergy attacks. This may include antibiotics, antihistamines (anti-allergy drugs), decongestants (drugs to decrease mucous membrane swelling) and nasal sprays.

## **TREATMENT OF ACUTE SUPPURATIVE OTITIS MEDIA**

In the presence of an upper respiratory infection, such as a cold, tonsillitis or sinusitis, fluid in the middle ear may become infected. This results in what is commonly called otitis media or an abscessed ear.

The infected fluid (pus) in the middle ear may cause severe pain. If examination reveals that there is considerable ear pressure, a myringotomy (incision of the eardrum membrane) may be necessary to relieve the pressure, drain the abscess and relieve the pain. In most cases, though, antibiotic treatment will suffice.

Should myringotomy be necessary, the ear may drain pus and blood for up to a week. The eardrum then heals and the hearing usually returns to normal within three to four weeks. During this healing period there can be varying degrees of ear pressure, popping, clicking and fluctuation of hearing, with occasional shooting pains in the ear.

Resolution of the acute infection occasionally leaves the patient with uninfected fluid in the middle ear. This is called chronic serous otitis media.

# TREATMENT OF CHRONIC SEROUS OTITIS MEDIA

Treatment of chronic serous otitis media may be either medical or surgical

## Medical Treatment

As the acute upper respiratory infection subsides it may leave the patient with chronic sinus infection. Pus from the sinuses and nose drains over the Eustachian tube opening in the nasopharynx resulting in persistent Eustachian tube blockage. Antibiotic treatment may be indicated.

General health factors are particularly important in regard to one's resistance to infection. A deficiency in some of the blood proteins may predispose an individual to recurrent infections and prolonged colds. Periodic injections of gamma globulin proteins may be indicated.

Allergy is often a major factor in the development or persistence of serous otitis media. Mild cases may be treated with antihistamine drugs. More persistent cases may require allergic evaluation and treatment, including injection treatment.

The Valsalva maneuver is accomplished by forcibly blowing air into the middle ear while holding the nose, often called "popping the ear". This should not be done, however, if there is a cold and nasal congestion.

Some patients suffer from gastro-esophageal acid reflux that allows the stomach acid to irritate the opening of the Eustachian tube resulting in inflammation of the tube. Medical treatment for this acid reflux may be initiated in order to control this condition.

## **Surgical Treatment**

The primary objective of surgical treatment of chronic serous otitis media is to reestablish ventilation of the middle ear, keeping the hearing at a normal level and preventing recurrent infection that might damage the eardrum membrane and middle ear bones. This involves myringotomy with insertion of a ventilation tube and occasionally adenoidectomy. In an occasional patient, there is a procedure to widen the Eustachian tube opening in the back of the nose.

### **Myringotomy**

Myringotomy (an incision in the eardrum membrane) is performed to remove middle ear fluid. A hollow plastic or metal tube (ventilation tube) is inserted to prevent the incision from healing and to insure middle ear ventilation. The ventilation tube temporarily takes the place of the Eustachian tube in equalizing middle ear pressure. This tube remains in place for variable lengths of time, depending on its design. When the tube dislodges, the eardrum heals and the Eustachian tube then again becomes necessary for middle ear aeration.

In adults, myringotomy and insertion of a ventilation tube is usually performed in the office under local anesthesia. In children, general anesthesia is required. The adenoids can be removed at the same time if enlarged.

More often than not, when the ventilation tube dislodges, there is no further middle ear ventilation problem. Should serous otitis media recur, reinsertion of a tube may be necessary. In some difficult cases, it is necessary to insert a more permanent type of tube. This tube is inserted via an operation and will remain in place until removed.

At times a permanent eardrum membrane perforation (hole in the eardrum) develops when the tube is dislodged or removed. If this perforation persists, it

can be repaired at a later date when the Eustachian tube blockage has subsided.

When a ventilation tube is in place, the patient may carry on normal activities, with the exception that he must not allow water to enter the ear canal. Your doctor will recommend an ear plug for use when showering, washing the hair or swimming.

## **EUSTACHIAN TUBE SURGERY**

Certain patients who are treated with various medications and myringotomy with tubes continue to suffer from Eustachian tube dysfunction. These patients may be candidates for a procedure to widen the opening of the Eustachian tube (called Eustachian tuboplasty). This procedure is done under general anesthesia in the operating room. Special scopes are used through the nose to visualize the opening of the Eustachian tube in the back of the nose. Instruments including a laser and shavers are used through the mouth. An incision is made near the opening of the Eustachian tube and deeper tissue is removed with the laser. This may allow wider and easier opening of the Eustachian tube and improve its function.

## **CHRONIC SEROUS MASTOIDITIS AND IDIOPATHIC HEMOTYMPANUM**

Chronic serous mastoiditis and idiopathic hemotympanum are uncommon conditions that have the same symptoms as chronic serous otitis media. They differ in that the middle ear fluid continues to form, either drainage out the ventilation tube or blocking it completely so that the tube dislodges shortly after surgery. This persistent fluid formation is due to changes in the mucous membrane of the middle ear and mastoid.

In both of the above conditions mastoid surgery may be necessary to control the problem and reestablish a normal middle ear mechanism.

## **PATULOU (ABNORMALLY PATENT EUSTACHIAN TUBE)**

Abnormal patency of the Eustachian tube is a condition occurring primarily in adults, in which the Eustachian tube remains “open” for prolonged periods. This abnormality may produce many distressing symptoms: ear fullness and blockage, a hollow feeling, hearing one’s own breathing, and voice reverberation. It does not produce hearing impairment. Other tests may be necessary to determine the cause of these symptoms.

The exact cause of an abnormal patent Eustachian tube is often difficult to determine. At times, it develops during pregnancy, or while taking oral contraceptives or other hormones. Weight loss or radiation therapy may be causes as well.

Treatment of this harmless condition is often difficult. A number of different medications are at times successful in alleviating the symptoms. Myringotomy and insertion of ventilation tube (as described under the surgical treatment of serous otitis media) can be effective.

Surgical correction of abnormally patent Eustachian tube can be preformed and has been developed at the Michigan Ear Institute. Certain materials may be injected into the opening of the Eustachian tube in order to close the tube. Cartilage may also be placed into a pocket in the Eustachian tube, which will also close it. Success varies in patients with this procedure and symptoms can continue despite intervention.



## **PALATAL MYOCLONUS**

Palatal myoclonus is a rare condition in which muscles of the palate (back of the mouth) twitch rhythmically many times a minute. The cause of this muscle spasm is unknown.

A person may experience a rhythmic clicking or snapping sound in the ear as the Eustachian tube opens and closes. Sedatives or tranquilizers often are effective in controlling the symptoms. No treatment is needed in many cases.

Occasionally, the snapping sound in the ear is caused by simultaneous spasm of the two muscles attached to the middle ear bones. This also usually responds to medication. A small surgery to cut one or both of these muscles can be done to relieve the symptoms.





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Received by

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Patient Signature

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Date



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