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**SCENT**

SOUTH - COAST - EAR - NOSE - THROAT

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### THE EUSTACHIAN TUBE – FUNCTION AND DYSFUNCTION

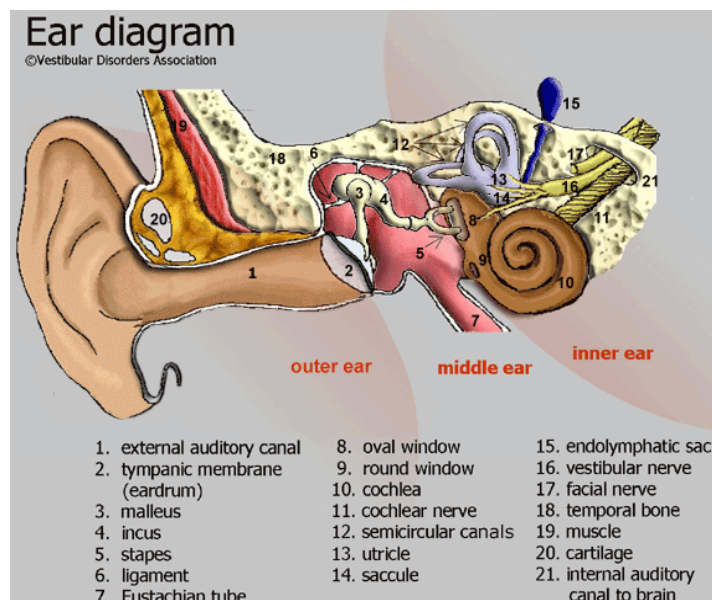
The eustachian tube is a narrow, one and a half inch long channel connecting the middle ear with the nasopharynx, the upper throat area just above the palate, in back of the nose.

The eustachian tube functions as a pressure equalizing valve for the middle ear which 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. In doing so 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 on 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 the fluid may be drawn from the mucous membrane of the middle ear creating a condition we call *serous otitis media* (fluid in the middle ear). This occurs frequently in children in connection with an upper respiratory infection and accounts for the hearing impairment associated with this condition.

Occasionally pain or middle ear fluid develops when landing in an aircraft. This is due to failure of the eustachian tube to properly equalize the middle ear air pressure and the condition is called *aerotitis*. It is temporary and often can be avoided by taking precautions (see following section).

On occasions just the opposite from blockage occurs: the tube remains open for prolonged periods. This is called *abnormal patency of the eustachian tube*. This condition is less common than serous otitis media and occurs primarily in adults. Because the tube is constantly open the patient may hear himself breathe and hears his voice reverberate. Fullness and a blocked feeling are not uncommon. Abnormal patency of the eustachian tube is annoying but does not produce hearing impairment.



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## **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 atmospheric pressure decreases, resulting in a relative increase in the middle ear air pressure. When the aircraft descends, just the opposite occurs: atmospheric pressure increases and there is a relative decrease in the middle ear pressure. Either situation may result in discomfort in the middle ear due to abnormal middle ear pressure if the eustachian tube is not functioning properly. Usually this discomfort is experienced upon aircraft descent.

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

1. Obtain from your druggist (a prescription is not necessary) the following items: Sudafed tablets; plastic squeeze bottle of ¼ percent Neo-Syneprine nasal spray.
2. Following the container directions, begin taking Sudafed tablets the day before your air flight. Continue the medication for 24 hours after the flight if you have experienced any ear difficulty.
3. Following the container directions, use the nasal spray 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.
4. 45 minutes before the aircraft is due to land again use the nasal spray every five minutes for 15 minutes. 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).
5. Remember that 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.
6. Do not take Sudafed or oral decongestants if you have blood pressure problems, heart problems or prostate problems.

## **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 blockage of the eustachian tube from an upper respiratory infection or an attack of nasal allergy. In the presence of bacteria this fluid may become 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. Fortunately 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 very 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.

## ACUTE SEROUS OTITIS MEDIA

Treatment of acute serous otitis media is medical, and is directed towards treatment of the upper respiratory infection or allergy attacks. This may include antibiotics, antihistaminics (anti-allergy drugs), decongestants (drugs to decrease mucous membrane swelling) and nasal sprays. Also the use of the "ear popper" in the office can be used to provide positive pressure to the eustachian tube and may open it up with relief of symptoms. This is a very simple non invasive treatment which is preformed while sitting in the examination chair.

## ACUTE SUPPURATIVE OTITIS MEDIA - TREATMENT

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 an abscessed ear or an infected ear. This 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 abscess, and the pain. In many cases antibiotic treatment will suffice. Should myringotomy be necessary the ear may drain pus and blood for up to a week. The drum membrane then heals and the hearing usually returns to normal within three to four weeks. Antibiotic treatment, with or without myringotomy, usually results in normal middle ear function within three to four weeks. During this healing period there are varying degrees of ear pressure, popping, clicking and fluctuation of hearing, occasionally with 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.

## CHRONIC SEROUS OTITIS MEDIA- TREATMENT

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 patients with a 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 the child's resistance to infection. A deficiency in some of the blood proteins may predispose to recurrent infections and prolonged colds. Periodic injections of gamma globulin may be indicated.

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

In connection with medical treatment we may recommend eustachian tube inflation, the blowing of air through the nose into the obstructed eustachian tube and middle ear to help relieve the congestion and reestablish middle ear ventilation. This is done by Valsalva maneuver or by Politzerization.

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 discharge.

*Politzerization* is accomplished by blowing air with a special syringe (middle ear inflator) into one nostril while blocking the other, and the same time swallowing. This forces the air into the Eustachian tube and middle ear. This likewise should not be performed when a cold is present.

### *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 ear drum membrane and middle ear bones. This involves myringotomy with insertion of a ventilation tube and, at times, adenoidectomy.

*Myringotomy* (an incision in the eardrum membrane) is performed to remove middle ear fluid. A hollow plastic 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 plastic tube usually remains in place for three to nine months during which time the eustachian tube blockage should subside. When the tube dislodges, the eardrum heals; the Eustachian tube then resumes its normal pressure equalizing function.

In rare cases the drum membrane does not heal following dislodgement of the tube. The perforation may be repaired at a later date if this occurs.

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

More often than not when the ventilation tube dislodges there is no further middle ear ventilation problem. Should serious otitis media recur, reinsertion of a tube may be necessary to insert a more permanent type of tube, the "mesh" ventilation tube. This tube is more difficult to insert but frequently will remain in place until removed. In children, removal may require an anesthetic. At times a permanent drum 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 or she 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.

### **THE ABNORMALLY PATENT EUSTACHIAN TUBE**

Abnormal patency of the eustachian tube is condition occurring primarily in adults, in which the Eustachian tube remains “open” for prolonged periods. It is also called a patulous eustachian tube. 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.

The exact cause of an abnormal patent eustachian tube is often difficult to determine. At times it develops following a loss in weight. It may develop during pregnancy, or while taking oral contraceptives or other hormones.

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 a ventilation tube (as otitis media) is often effective.