

Teaching Handout

For Pressure Equalization Tube Surgery

This patient education handout is intended to help patients and their families learn more about their medical conditions, the options available to them and the possible consequences of their decisions. This information is not intended to be used for diagnosis or treatment of any specific individual. Please consult with your physician regarding your particular circumstances.

About Your Ears:

The ear is much more than the flexible soft tissue that attaches to the side of your head. The ear is actually very complex. It is divided into 3 parts called the outer, middle, & inner ear. Each part performs an important function for the process of hearing.

The outer ear consists of an auricle and ear canal. The eardrum is a very thin membrane that separates the outer ear from the middle ear. The middle ear is an air filled chamber containing 3 small bones called ossicles. They connect the eardrum to the inner ear and are named individually the malleus (hammer), incus (anvil) and stapes (stirrup).

The air chamber in the middle ear connects the back of the nose to the eustachian tube. This tube serves as a pressure-equalizing valve and as a drain. In infants and young children, the eustachian tube is short and flat. By age 7, the Eustachian tube is larger and more upright which improves its ability to function.

Many problems within the middle ear space are related to the eustachian tube. Normally, the eustachian tube opens with swallowing and yawning. Obstruction, or blockage of the eustachian tube creates negative pressure and over time can pull the eardrum inward. If this occurs some clear fluid may be drawn from mucous membranes into the middle ear space causing a fluid buildup. This frequently occurs in children with upper respiratory infections or allergic symptoms. If bacteria or a virus enters the middle ear fluid through the eustachian tube an upper respiratory infection called acute otitis media may develop. This is often accompanied by symptoms of fever, ear pain, irritability and sometimes drainage. Children have a greater risk for ear infections if they are in daycare, bottle feed or are around passive cigarette smoking.

Causes of eustachian tube problems may include an immature eustachian tube, a cleft palate, infections, allergies or enlarged adenoids. The adenoids are tonsil-like tissues that are located in the back of the nose, next to the opening of the eustachian tube.

The last part of the ear is called the inner ear. It contains a structure called the cochlea that is shaped much like a snail's shell. This organ contains small hair cells bathed in fluid. When fluid in the cochlea is moved by sound waves, electrical signals are sent to the brain – resulting in hearing!

Normal hearing occurs when the sound waves pass through the ear canal, vibrating the eardrum. Hearing loss is measured in decibels. A loss of 30 decibels or more may indicate a need for PE tubes.

Otitis media usually causes some conductive hearing loss. Due to an increase in middle ear fluid and eardrum thickening, the sound vibrations that travel through the ossicles are reduced. This hearing loss usually goes away once the fluid is removed.

Hearing loss is measured in decibels. A loss of 30 decibels or more may indicate a need for PE tubes.

Potential reasons for a tube placement procedure include:

- A substantial hearing loss in patients with otitis media
- Poor response to antibiotics
- Otitis media with fluid for more than 3 months
- Recurrent episodes of acute otitis media
- Chronic retraction of the eardrum.
- Significant eustachian tube problems with flying or altitude changes

Benefits of the Procedure:

PE tube surgery involves the creation of a small hole in the eardrum called a myringotomy. The tympanostomy tube is gently placed through the myringotomy.

Otitis media is the second most common childhood infection, surpassed only by the common cold. Because the number of episodes of otitis media declines after surgery, the need for antibiotics is also reduced, and decreases the likelihood of developing antibiotic-resistant bacterial ear infections.

The most common type of hearing loss related to chronic otitis media with effusion (fluid) is a conductive hearing loss. After myringotomy with removal of fluid from the middle ear space, and PE tube placement, the conductive hearing loss is usually resolved.

PE tube placement also helps avoid other complications of chronic ear disease. These include permanent holes in the eardrum, scarring of the eardrum and bones, adhesive otitis media, bone deterioration, cholesteatoma (dead skin cells) deposits, development of eardrum retraction pockets, and hearing loss.

Because they help correct conductive hearing losses that occur with fluid behind the eardrum, PE tubes can also help improve speech development. Some aspects of development are especially vulnerable to the intermittent hearing losses caused by fluid behind the eardrum.

Your ENT surgeon will be happy to answer any additional questions you may have regarding the benefits of PE tubes.

Risks of the Procedure:

The procedure is not particularly painful. Most over the counter pain medicines relieve the discomfort associated with this procedure. However, there are some risks associated with any surgical procedure.

Standard surgical risks may include fever, infection, bleeding and allergic or adverse reactions to anesthesia medications.

Your anesthetist is a physician or a certified nurse practitioner fully licensed to administer anesthesia. Before surgery, you will have the opportunity to discuss the risks of anesthesia in detail. They will be able to tell you about the types of medicines that will be used, their durations and any possible side effects. Typically this procedure is very brief and requires a minimal amount of medication.

Fortunately complications associated with the placement of PE tubes are very low. The most common complication is recurrent or persistent drainage from the ear. This fluid may be clear or appear cloudy and may occur in up to 20% of patients. Often this is seen after an upper respiratory infection or seasonal allergies since fluid that was once trapped behind an intact eardrum is now free to drain out the ear.

The following complications are possible, but relatively rare:

- The PE tube may stay in longer than desired. Most tubes will fall out within a 2-year period. In some children the tubes do not fall out of the eardrum within the expected time and may require removal at a future date. On the other hand the tube may also fallout prematurely. This is can be managed by close observation over time.

- Some swollen tissue may develop around the edges of the tube. This may lead to infection, bleeding and drainage from the ear. The PE tube may need to be removed if it does not clear with treatment.
- The eardrum may become thinned and retract into the middle ear space. This can occur despite the normal function of the PE tube.
- A hole in the eardrum may persist after the PE tubes fall out. Usually the hole will heal spontaneously, however additional surgical treatment may be required.
- Heavy scarring, or calcification of the eardrum can occur. This is called myringosclerosis and normally does affect hearing.
- Skin from the outside of the eardrum may be introduced into the middle ear space causing debris from dead skin cells, called cholesteatoma, to develop. This can lead to trapping of skin within the middle ear. If this occurs additional surgery will be necessary.

It's extremely rare to develop a permanent hearing loss after the placement of PE Tubes. Many of these complications are also seen as a result of disease. If you have any questions, please write them down and discuss them with your surgeon or anesthetist.

Pre-Procedure Care:

Once your doctor has diagnosed the problem and recommended PE tubes, a preoperative evaluation is necessary.

The purpose of this evaluation is to help us learn more about you and your special needs. We will also provide you with detailed information regarding the procedure, ensure that necessary paperwork is completed, and answer any questions or concerns you might have.

Before your admission, take time to write down a list of any medications that are currently being used (this includes over the counter and prescription medications). Be sure to list the exact name, dosage and number of times a day each medicine is taken. Tell us if you or your child has ever had a reaction to a medicine, local anesthetic, tape or skin cleanser.

Do not eat or drink anything after midnight, the night before your surgery. If you are taking medication that has a morning dose - you should ask your doctor if he or she wants you to stop the medication the night before, or take the medication with a small sip of water at an earlier time.

Call your doctor if your child develops an acute illness or has an asthma attack within 3 days of the scheduled surgery. If your child is exposed to measles, mumps or chicken pox within 21 days of procedure, you should also notify your doctor. He or she may want to reschedule the procedure.

The PE Tube Procedure:

In children, PE tubes are usually placed in the operating room under general anesthesia by mask. Insertion of a breathing tube is usually not required. Most anesthetists do not routinely require placement of an I.V. fluid line for this procedure. Keep in mind, however, that if your child has any special medical problems, the anesthetist will take whatever measures are needed to ensure a safe anesthesia experience.

After your child is under a comfortable level of anesthesia, the eardrums are visualized using a special microscope. Any wax that is obstructing the view of the eardrum is carefully removed. Once the eardrum is clearly seen, it is carefully inspected for any other problems.

A small incision is then made in the front portion of the eardrum. This is called a myringotomy. A small suction device is used to remove any fluid that has collected in the middle ear space.

The incision is made in the front portion of the eardrum to avoid injury to the ossicles within the middle ear.

After the fluid has been removed from the middle ear space, a PE tube is carefully placed through the incision using small instruments. Remember, if infected fluid is present, your child will likely need further antibiotic treatment after surgery.

The type of PE tube used will vary depending on the clinical situation and your ENT surgeon's judgment. There are many types of PE tubes. Two major types of tubes include: short, generally grommet-shaped tubes, and long T-shaped tubes. Grommet-shaped tubes are used most often in pediatric procedures – especially if this is the first set of PE Tubes your child has placed.

Grommet-shaped tubes generally remain in place for 6 to 12 months; T-tubes may remain in place for several years.

If this is your second set of PE tubes, your physician may recommend removal of the adenoids at the same time. Discuss this possibility with your doctor.

After the PE tubes have been properly positioned in the eardrum, your child will be awakened by the anesthetist and transported to the recovery room.

Post-Procedure Care:

Once surgery is completed, a short stay in the recovery room is required. Depending on the facility, parents or spouses may be allowed in the recovery room. The nurses will monitor your child while the anesthesia wears off. Frequently during this time period children are disoriented, appear uncomfortable and may be very irritable. This usually lasts less than an hour.

The doctor may prescribe eardrops and/or oral antibiotics for a few days after surgery. If required, just follow the physician's instructions on using the medications.

The ENT surgeon may recommend water precautions for some patients. This may require the use of a cotton ball with petroleum jelly, earplugs or a swimmer's headband to prevent water from entering the ear canal. For those patients who are allowed to get their ears wet in a pool, they shouldn't dive too far below the surface of the water. The pressure from this activity may cause water to enter the middle ear.

The ENT surgeon will probably want to see you for a follow-up visit shortly after the surgery. This is to insure the eardrum has healed well and to check the PE tubes to make sure they are working properly. After leaving the hospital, please feel free to contact your physician if you have any concerns. The majority of patients do very well after PE tube surgery. Most resume their normal daily routines by the next day.

Even with PE tubes, you may still develop an ear infection. Often this is associated with irritability and ear drainage. However, as long as the PE tube is functioning, the infections should be less severe and less frequent. If you suspect an ear infection please give your physician a call. You may need a course of oral antibiotics and eardrops.

As the eardrum grows the tubes are gradually pushed out. The residual hole in the eardrum usually closes within a few days after the tube falls out. Infrequently, the ENT doctor might need to remove the PE tubes.

Your ENT surgeon will be happy to address additional questions or concerns about what to expect after surgery.

Thank you for taking the time to learn more about PE Tube surgery. We hope that what you have learned today will enable you to better communicate your questions and concerns.

Remember, YOU are the most important member of your health care team!