



# ANDORRA PEDIATRICS

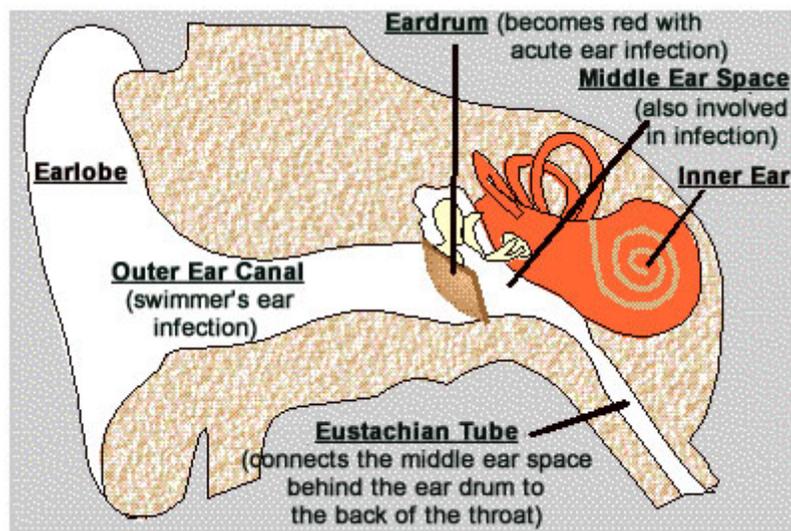
8945 Ridge Avenue  
Suite 3 - 4 - 5  
Philadelphia, PA 19128  
215-483-8558  
andorrapediatrics.com

## Middle Ear Fluid In Children

The ear has three parts—the outer ear, the middle ear, and the inner ear. The outer ear includes the part outside the head and the ear canal. The eardrum is a small circle of tissue about the size of a fingertip at the end of the ear canal. The middle ear is the space, usually filled with air, behind the eardrum. When a child has middle ear fluid, this is where it is found.

A small tube—the Eustachian tube—connects the middle ear to the back of the nose. Three tiny bones (the malleus, incus, and stapes) connect the eardrum through the middle ear to the inner ear. The inner ear is further inside the head and is important for hearing and balance.

In a healthy ear, sound waves travel through the ear canal and make the eardrum move back and forth. This makes the three bones in the middle ear move. The movement of these bones sends sound waves across the middle ear to the inner ear. The inner ear sends the sound messages to the brain. But if the middle ear has fluid in it, then the eardrum and the bones cannot move well. This could cause your child to have trouble hearing.



If the middle ear has fluid in it, then the eardrum and the bones cannot move well. This could cause your child to have trouble hearing.

### What Is Middle Ear Fluid?

If your child has middle ear fluid, it means that a watery or mucus-like fluid has collected behind the eardrum. Many children develop middle ear fluid with colds that resolves without treatment.

Middle ear fluid does not cause ear pain. Some children may not hear as well. This may cause your child to turn the TV volume up too loud, sit closer to the TV, or appear not to pay attention when someone is talking.

### What Causes Middle Ear Fluid?

Middle ear fluid commonly occurs in association with upper respiratory infections (common cold). It is common for children to have middle ear infections with middle ear fluid remaining after the infection is

treated. This is because the Eustachian tube (see diagram) becomes blocked with mucus during a cold and / or ear infection.

Antibiotics will treat the ear infection, but will not treat the fluid that remains trapped behind the eardrum. Clearing of this fluid can normally take up to 3 months.

### **Is There Any Harm Done By Waiting To See If The Fluid Will Clear?**

Persistent fluid may increase your child's chances of developing an ear infection, hearing loss and delay in speech development.

Middle ear fluid often clears up without any treatment. For many children, middle ear fluid can take up to 3 months to clear. However, fluid that remains trapped behind the eardrum longer than 3 months may become thickened like glue. In these cases, even if the Eustachian Tube did open up, this thickened fluid would not be able to drain out. For this reason, myringotomy tubes are recommended in children that have fluid persisting longer than 3 months.

### **How Can Middle Ear Fluid Be Prevented?**

Studies have shown that children who live with smokers and who spend time in group child care have more ear infections. Because some children who have middle ear infections will later develop middle ear fluid, the following suggestions may help:

- Keep your child away from cigarette and cigar smoke.
- When possible, keep your child away from other children who are sick.

### **How Does My Doctor Determine If There Is Fluid Present?**

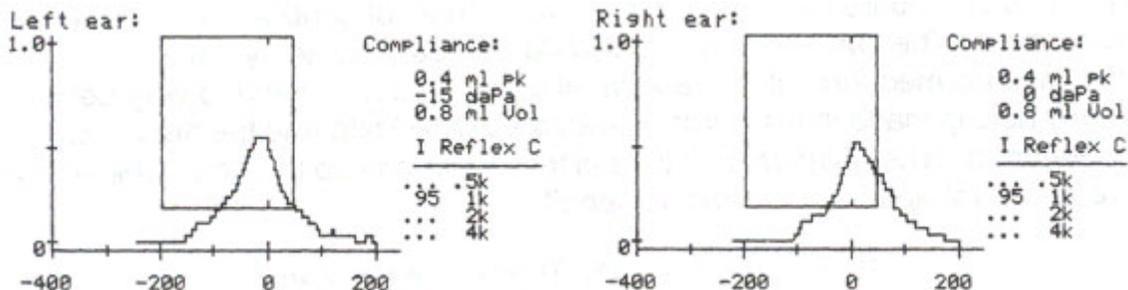
**Pneumatic Otoscopy:** This piece of equipment is used to look at the eardrum. The fluid in the middle ear space may sometimes be seen behind the eardrum. Even when the fluid cannot be seen, your doctor can test for fluid with this tool by blowing a puff of air onto the eardrum to see how well the eardrum moves. Under normal conditions, the eardrum is like a piece of saran wrap. If air is blown into the ear canal, the eardrum will move in and out. If there is fluid present behind the eardrum, this movement will be decreased. When there is a large amount of fluid present, there will be no movement of the eardrum.

**Tympanometry:** This test measures movement of the eardrum using sound waves. A small, soft probe is placed into the opening of the ear canal. Your child hears a low noise for a short time while the machine, called a tympanometer (in our office, the children call it the car machine), records how the eardrum moves. The test takes less than 15 seconds per ear and there is no pain involved. This sound wave is bounced off the eardrum and the eardrum movement is printed out on paper (see below). These printouts can be compared at each visit to help determine whether the amount of fluid is increasing or decreasing.

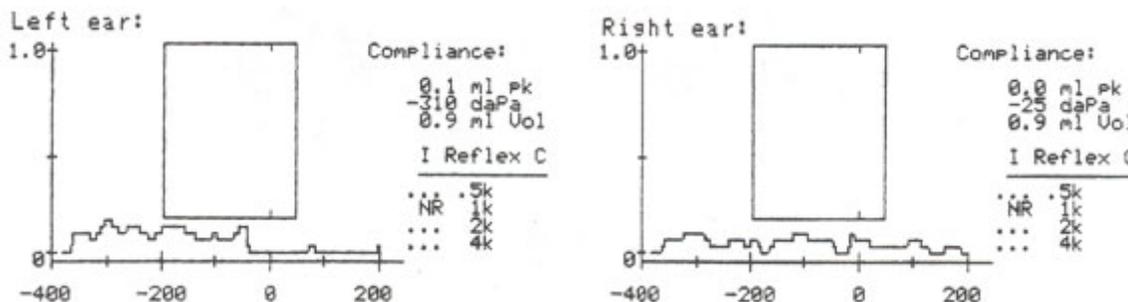
**Hearing Test (audiometry):** This tests your child's hearing using a machine called an audiometer. Hearing testing does not test for middle ear fluid. This testing will measure if the fluid is affecting your child's hearing and to what degree. This test requires your child to wear headphones and raise a hand when sounds are played into the headphones. The audiometer will record the sounds heard at different frequencies and print out the results. Your child's hearing is normal if most of the sounds at 20 db or below can be heard.

### Examples Of Tympanograms In Normal And Abnormal Ears

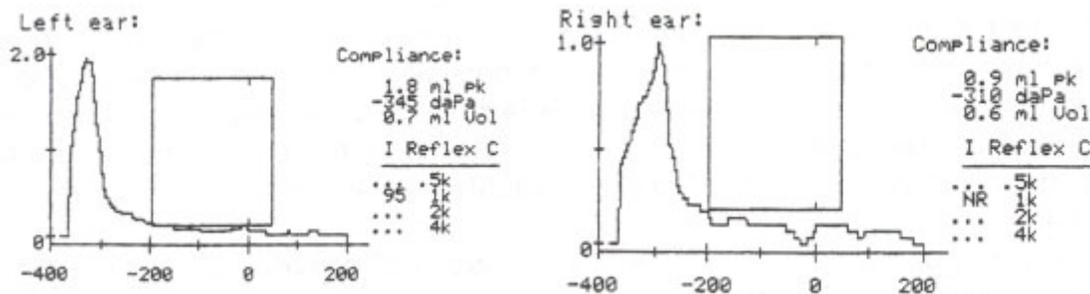
A normal tympanogram below shows the peak within the box, indicating normal movement of the eardrum. The peak is centered over zero, indicating equal pressure on both sides of the eardrum.



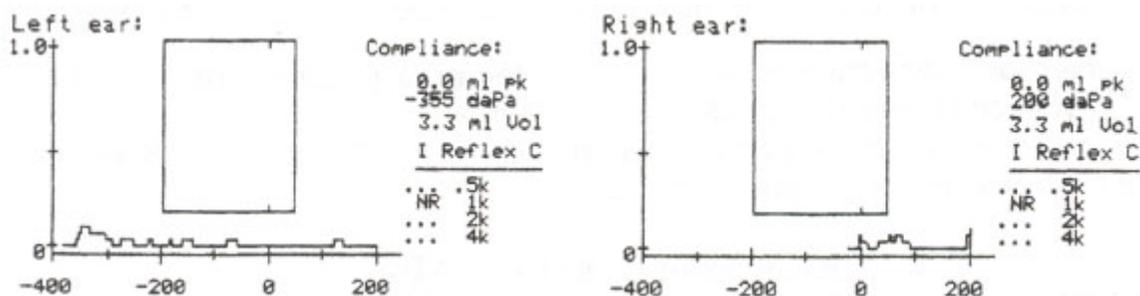
In contrast, the tympanogram below shows a greatly diminished peak indicating decreased movement of the eardrum. The peak is shifted to the left, indicating negative pressure in the middle ear. These findings are consistent with fluid behind the eardrum.



The tympanogram below is an example of a child with Eustachian tube blockage. In Eustachian tube blockage, the eardrum is pulled inward because of negative pressure still present behind the eardrum (curve below is shifted to the left of the box). However, the eardrum will still move outward, indicating there is minimal fluid present behind the eardrum. Your child's hearing is not affected and this usually resolves without treatment.



The tympanogram below indicates that the myringotomy tubes are in place. When the probe is placed into your child's ear, it can measure the volume of the outer ear canal (space from the probe to the eardrum). This volume is usually less than 1.0 ml. If there is a myringotomy tube in the eardrum, then the machine measures the volume from the outer ear canal through the eardrum and into the middle ear space. This volume is usually greater than 1.0 ml. As can be seen below, the volume in each ear is 3.3 ml. The shape of the curve has no significance when there are tubes in the eardrum.

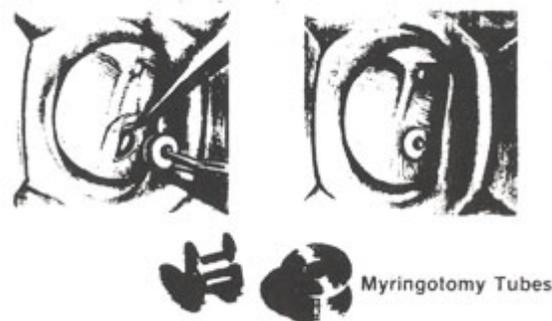


## What Are Myringotomy Tubes?

Myringotomy tubes are very small hollow tubes that are surgically placed through your child's eardrum. The tubes function to lessen the buildup of fluid behind the eardrum.

The procedure is performed in an outpatient hospital short stay unit by an Ear, Nose, and Throat specialist (ENT). This procedure requires less than 10 minutes of general anesthesia. If the procedure is performed in the early morning, your child is usually home by lunch.

The operation is performed through the ear canal using a microscope and very delicate surgical instruments. A tiny hole is made in the eardrum with a surgical knife and the fluid is suctioned out from behind the eardrum. The myringotomy tube is then inserted into the hole, where it is held in place by its flared ends (shaped like a small dumbbell).



Insertion of Myringotomy Tube in the Eardrum

## How Do I Know If My Child Needs Myringotomy Tubes?

Certain children are more prone to ear infections and/or fluid collections behind their eardrums. Antibiotics are used to treat these infections.

Fluid behind the eardrum increases your child's chances of developing more ear infections. An ear infection involves the middle ear structures and the eustachian tube. After an ear infection has been treated, we know that a certain amount of time is necessary for the eustachian tubes to also heal and open up. If your child has had several ear infections in a row and has fluid present after each infection, the eustachian tubes never get the time necessary to heal and open up. Antibiotics (Amoxicillin or Gantrisin) may be used to help prevent further ear infections and thereby allow time for the fluid to clear.

These antibiotics do not treat the fluid. Their purpose is to prevent further ear infections and persistent eustachian tube blockage. When these antibiotics fail, then myringotomy tubes are recommended.

There are three indications for tube placement:

- In a child who has recurrent ear infections despite being treated preventatively with an antibiotic (Amoxicillin or Gantrisin).
- In a child who has thick fluid behind the eardrum for greater than 3 months.
- In a child with persistent fluid behind the eardrum and a speech or hearing problem.

During an ear infection, many children will have some temporary hearing loss. Once the ear infection improves, your child's hearing should return to normal.

Speech delay may occur in children with persistent fluid behind the eardrum. Speech delay does not usually occur after only one or two ear infections.

## **What Do Myringotomy Tubes Do?**

Myringotomy tubes function to provide a temporary opening which passes through the eardrum. This opening acts like a Eustachian tube and allows air to move in and out of your child's middle ear space, thus preventing fluid buildup and subsequent ear infections.

As long as the tubes remain open, The ventilation that the tubes provide (into the middle ear space behind the eardrum) should prevent the fluid collection from reoccurring as long .

Once the fluid has been drained from the middle ear space and the tubes have been inserted, your child's hearing will improve. Your child's ear may continue to drain fluid for several days after the surgery.

The tubes also make it less likely that the ear will become infected. However, it is still possible for your child to develop an ear infection during a cold. In these cases, the tubes will allow drainage of any infected fluid and decrease the pain of an ear infection. These ear infections still require treatment with oral antibiotics and antibiotic ear drops.

## **Is General Anesthesia Safe For My Child?**

Pediatric anesthesia is extremely safe when performed by experienced professionals. The surgery does require using general anesthesia given by a mask. This is necessary because most children cannot hold still long enough to allow safe placement of the tubes. After the operation, children do not remember what occurred right before they went to sleep. The whole procedure takes less than 10 minutes.

## **Do The Tubes In My Child's Eardrum Cause Any Hearing Loss?**

No. The tubes will actually improve hearing by draining fluid. The function of the eardrum is not affected because the size of the opening in the eardrum is so small compared to the overall size of the eardrum.

For proper hearing, the eardrum must be able to vibrate in response to sound. When a tube is placed in the eardrum, this vibration is not affected.

## **How Do The Tubes Come Out?**

The tubes remain in the eardrum from 4 months to 2 years. The tubes will be pushed out of the eardrum as the eardrum grows. When this occurs, the tube is designed to fall outward into the ear canal. Once in the ear canal, it does not cause any harm, and will either fall out of the ear canal on its own or can be washed out in the office. The hole in the eardrum will usually heal within 48 hours.

## **Can My Child Go Swimming With Myringotomy Tubes?**

Yes. Water precautions are recommended to prevent water from flowing into the middle ear space through the tube, causing infection and drainage. However, it requires significant pressure to force water through these tiny tubes. To reach the necessary pressure, a child's head has to be at least one foot under water for an extended period of time. Since most children who have tubes placed are younger and will not be swimming underwater, the risk of infection from water entering the tubes is minimal.

The following are general guidelines for water protection in children with tubes:

- Children swimming in a chlorinated pool near the surface do not need to wear ear protection (even if they put their faces under water).
- Normal bathing or showering does not require ear protection. Water splashed into the ear will cause no harm. A shower spray should not be directed into the ear canal. Avoid getting soapy bath water into the ears. If this is a problem, ear molds will be helpful. Special ear molds can be made which will protect your child's ears and prevent water from getting into the tubes.
- Children swimming in lakes or oceans should wear ear protection as the chance for contaminated water causing infection is greater.
- Children with recurrent ear drainage after water exposure should wear ear protection. It is necessary for your child to be evaluated by the Ear, Nose, and Throat specialist if ear drainage is persistent.

### **Can My Child Travel By Airplane?**

Yes. Under normal conditions, the pressure one experiences in the ears is caused by the inability of the ear to equalize pressure between the level in the airplane cabin and the level behind the eardrum. With tubes in place, your child should have no discomfort during takeoff and landing because this pressure is able to equalize instantly.

This information should not be used as substitute for the medical care and advice of your child's physician. Health related topics found on the Andorra Pediatrics web site should not be used for diagnosing purposes or be substituted for medical advice. As with any new or ongoing treatment, always consult your professional healthcare provider before making any changes in treatment or beginning any new treatment. If you have any questions or concerns, please call our office.