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### FLUID IN THE MIDDLE EAR (SEROUS OTITIS MEDIA)

Serous otitis media, better known as middle ear fluid, is the most common condition causing hearing loss in children. Normally, the space behind the eardrum containing the hearing bones is filled with air. This allows normal transmission of sound. This space can become filled with fluid during colds or upper respiratory infections. Once the cold clears, the fluid will generally drain out of the ear through a tube that connects the middle ear to the nose: the eustachian tube. The eustachian tube does not drain well in children. Fluid that has accumulated in the middle ear space often remains blocked.

The fluid slows sound transmission and hearing is diminished. Parents may notice that their child has the sound on the television turned up too loud; they might notice their child often asking, "What?" in response to a question. In many children, there may be no noticeable complaints. This is especially true when a child is less than 2 years old. Fluid can be present for months in children, only to be detected by a routine visit to the pediatrician's office. Fluid often produces few symptoms, but can have significant consequences if not recognized.

Because children need hearing to learn speech, hearing loss from fluid in the middle ear can result in speech delay. Children begin to speak some words by 18 months. Children with fluid in both ears can show significant delay in their use of language. In addition, young children learn to pronounce words by hearing them spoken. When there is a hearing loss, even a mild one, the spoken words of parents and siblings are distorted to the child with fluid in the ears.

Since the words sound distorted to the child, pronunciation of these words by the child will also be distorted. The extreme case of this distortion is the deaf child whose speech is very difficult to understand because the child does not hear at all. If a child has fluid for many months during the formative years, there may be noticeable mispronunciation, which will require speech therapy. Identification of fluid in the middle ear is important, not only to prevent future speech problems, but to avoid permanent damage to the eardrum and the middle ear.

Most children will have at least one ear infection before the age of four. With treatment, the ear infections clear up promptly. A follow-up visit to the pediatrician or family doctor is essential, in order to be certain that the ear infection has cleared, and fluid no longer remains in the middle ear. Most primary care doctors recommend a revisit during the week after completing the antibiotic. Without the follow-up visit, fluid may still be present, even though the child has no complaints or symptoms. Therefore, it is essential that ear infections be rechecked after initial treatment.

Additional antibiotics may be prescribed, if fluid is still present at the follow-up visit. If fluid has not cleared over an eight to ten week period after an infection, referral to an ear, nose and throat specialist is advisable. A complete examination of the ear, nose and throat should be performed. Hearing tests should also be obtained to assess the degree of hearing loss from the fluid accumulation. Usually, the presence of fluid results in a "mild conductive hearing loss." This could be as much as 30% hearing loss overall. In very

young children (less than 2 years old), it may be very difficult to obtain accurate hearing tests, particularly for the individual ears. A general hearing level can usually be obtained, however. If the child is younger than 6 months old and does not seem to respond normally to environmental sounds, such as the doorbell, telephone ringing, or calling, a brainstem evoked response audiometry hearing test may be advisable to rule out a more severe hearing loss.

Other tests should be taken in addition to the hearing tests: impedance tympanometry, better known as a tympanogram, should be obtained to measure the movement of the eardrum when pressure is applied to it. When fluid is present in the middle ear, the motion of the eardrum will be markedly restricted. Sounds that would easily transmit are reduced in strength. As a comparison, when you strike a crystal glass gently with a spoon, you will hear a nice ring. If the glass is filled with water, the ring sounds much duller. This is precisely what happens when the middle ear is filled with fluid.

After the specialist confirms that fluid is present behind both eardrums, further medical treatment is often advised. This may consist of additional antibiotics, decongestants, and in some cases, nasal sprays. If fluid has been present for over 12 weeks, surgical drainage of the fluid is often indicated. The decision to perform surgery should be based on the response to medical treatment, the degree of hearing loss and the appearance of the eardrum itself under the surgical microscope.

Surgery involves draining the fluid through a small incision in the eardrum, so that the fluid can be gently removed and a tube inserted. The procedure, medically termed, myringotomy and tube placement, or tympanostomy and tube placement, is performed on children under general anesthesia. Surgery is performed on an ambulatory or same day surgery basis. Within an hour or two after surgery, the child can be discharged home, with a follow up visit to the specialist in approximately two to three weeks.

Parents often ask why the fluid cannot be drained without inserting a tube. The need for the tube insertion is because the eardrum incision generally heals very rapidly (within a few days), which is not long enough for the swollen membranes in the middle ear to return to normal. As soon as the eardrum heals, fluid will reaccumulate. Tubes were first introduced because of this very problem. There are many types of tubes, but all tubes serve the same function. They keep the eardrum open, allow air to enter the middle ear space, and permit fluid in the middle ear to drain. Most tubes will gradually be rejected by the ear and work their way out of the eardrum. As they come out, the eardrum seals behind the tube. Tubes will last six months to two years in the eardrum before they come out. Occasionally, the eardrum does not heal completely when the tube comes out. The majority of children treated with tubes do not require further surgery. They may have ear infections in the future, but most will clear up with medical treatment. Some children are very prone to ear infections and have a tendency to accumulate fluid after each infection. Children tend to outgrow this cycle by age 7 or 8. In an ear, nose and throat specialty practice, this group comprises 10 to 15% of all children who have required tubes.

Another set of tubes can be required, if there is a recurrence of fluid. The specialist may recommend tubes with flanged arms. When these are opened behind the eardrum, they function much like a "butterfly bolt." These "T tubes" are most often made of a non-reactive material called silastic. This type of tube rarely clogs with blood or secretions and is held back within the eardrum by arms that are spread behind the drum. When inserted, T tubes can generally remain in the ear for prolonged periods of time. They are not commonly rejected. In some children, they can be removed in the office without anesthesia.

In addition to the insertion of a longer lasting tube, a careful search for underlying causes of Eustachian tube function should be sought, particularly in a child who has recurrent infections and requires a second set of tubes.