Disclaimer

This movie is an educational resource only and should not be used to manage your health. All decisions about the management of otitis media with effusion must be made in conjunction with your Physician or a licensed healthcare provider.
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INTRODUCTION

Otitis media with effusion or OME is a condition causing inflammation and fluid accumulation behind the ear drum in the middle ear. The middle ear is normally filled with air and facilitates hearing by carrying sound waves from the ear drum to the inner ear structures. When the middle ear is filled with fluid hearing can become muffled and contribute to hearing and speech problems in children.

Children who have chronic otitis media with effusion may be candidates for ear tube surgery. Ear tubes, also referred to as tympanostomy tubes, are small open ended tubes inserted into an incision in the eardrum to ventilate the middle ear with air and drain middle ear fluid. Ear Tube surgery is referred to as Myringotomy with tympanostomy tube insertion and is one of the most commonly performed surgeries in the world.
Introduction

In order to learn more about Otitis media with effusion and ear tube surgery, it is important to understand the normal anatomy of the ear.

Normal Ear Anatomy

The ear constitutes an important component of the sensory system. The main function of the ear is to maintain balance and convert sound into electrical impulses after amplifying them. These electrical impulses are then transmitted into the brain.

(Refer fig. 1 & 2)

For descriptive purpose the ear is divided into:

- The External Ear
- The Middle Ear
- The Inner Ear

The External Ear

(Refer fig. 3)
Normal Ear Anatomy - External Ear

The external ear consists of Pinna or auricle and the external auditory canal.

Pinna
This is the part of the ear that projects from the side of the head. It helps in collecting sound and directing the traveling sound waves into the external auditory canal. It consists of elastic cartilage that is covered by skin.

(Refer fig. 6)

External Auditory Canal
The external auditory canal measures about 2.5 cms and extends from Pinna to Tympanic membrane. Its outer part is cartilaginous while the inner part is bony. At its medial end (inner) is the eardrum or Tympanic membrane. It is lined by skin. The skin is rich in sebaceous and ceruminous glands (sweat glands). The products of these glands mix to form wax.

(Refer fig. 7)
Normal Ear Anatomy - Middle Ear

The middle ear resembles a matchbox with a vertical diameter of 15mm and transverse diameter of 4mm. It consists of the tympanic membrane or ear drum and middle ear bones or ossicles. The middle ear communicates with the nasopharynx (area behind the nose) through the Eustachian tube.

(Refer fig. 8)

Tympanic membrane

The tympanic membrane is a transparent disc situated between the external ear and the middle ear. The eardrum has a diameter of approximately 8 to 9mm. It has an outer skin layer and an inner mucous layer.

(Refer fig. 9)

Middle Ear Ossicles (Bones):

These consist of a chain of three movable bones: malleus, incus and stapes.

Malleus

This is the largest of the three ossicles measuring about 8mm in length. The malleus resembles a hammer and is the outermost (lateral) ossicle.

It is firmly fixed to the eardrum at one end while the other end articulates with the incus.

(Refer fig. 10)
Incus
The incus is present between the malleus and stapes. It is shaped like an anvil.

(Refer fig. 11)

Stapes
The stapes is the smallest of the three ossicles resembling a stirrup. It is attached to the incus at one end and its other end i.e. the footplate articulates with the inner ear via the oval window.

(Refer fig. 12)

Eustachian Tube
The Eustachian tube opens into the middle ear and continues to the back of the throat. It functions to maintain equal pressure in the ear and assists with draining any mucus in the middle ear to the throat to be swallowed.

In children, the Eustachian tube is shorter, narrower and less vertical than in adults making it harder to drain mucus from the ear. This is one reason why children are more susceptible to ear infections.

(Refer fig. 13)
Normal Ear Anatomy - Inner Ear

The inner ear lies in the temporal bone. It consists of three Semicircular canals (anteriorly), Cochlea (posteriorly) and the Vestibule (middle).

All the inner ear structures have an outer bony shell inside which the membranous end organs (receptors & nerve endings) of hearing and balance are suspended. Two fluids surround this membranous end organ.

The fluid inside the membranous end organ is called Endolymph and the fluid outside the end organ, between the bony shell and the end organ, is called Perilymph. These fluids protect the membranous end organ and help in its normal functioning.

Semicircular Canals

These are three semi-circled tubes set at right angles to each other. The canals are named horizontal, anterior vertical & posterior vertical. The membranous end organ here contains the organ of balance or equilibrium.

(Refer fig. 11)

Cochlea

This is a snail like structure inside which is suspended the organ of hearing. It is coiled for two and half turns.

The Auditory nerve arises from these membranous end organs which carries impulses into the brain.

(Refer fig. 12)
What is Otitis Media with Effusion?

Otitis media with effusion (OME) occurs when mucus builds up in the middle ear due to a poorly functioning Eustachian tube. Normally, the Eustachian tube keeps the middle ear full of air enabling sound waves to be passed from the ear drum to the bony ossicles. When the tube becomes blocked and doesn’t function properly, the middle ear accumulates mucus.

This fluid buildup can interfere with the normal vibration of the ear drum from sound waves, making sounds muffled and difficult to hear. The fluid that accumulates in the middle ear can be very thick and sticky which is why otitis media with effusion is sometimes referred to as “glue ear”.

Otitis Media with effusion develops without pain or other classic symptoms of an ear infection. It may occur after a bacterial or viral middle ear infection has resolved or without any initial ear infection at all.

Symptoms of Otitis Media with Effusion

Children with otitis media with effusion do not exhibit classic earache symptoms. They do not have pain or tenderness to the ear or fever. Often, the condition is diagnosed by the doctor at a routine well child visit.

Behavior that you may notice in your child can include the following:

- Problems hearing such as not responding when called or not following directions.
- Speech problems such as mispronouncing words or delayed speech
- Behavioral problems: children may be labeled as inattentive or difficult at school when actually they are having trouble hearing instructions from their teacher.
- Complaints of muffled hearing
- Using a loud voice when speaking
- Turning up the volume on the television

Risk Factors for Otitis Media with Effusion

OME occurs most frequently in children under two but can occur at any age. Risk Factors that may predispose your child to OME can include:

- Enlarged adenoids blocking the Eustachian tube preventing drainage of fluid from the middle ear
- Exposure to second hand smoke causing irritation and swelling of the Eustachian tube.
• Allergies leading to inflammation of the Eustachian tube
• Drinking from a baby bottle while lying flat. This enables the fluid from the bottle to enter the middle ear through the Eustachian tube and can cause infections and effusion.
• Conditions such as cleft lip and palate and Down's syndrome can result in a smaller Eustachian tube.
• Early entry into group child care or group play with other children
• Bottle fed babies or babies that were not breastfed for at least 4 months are at higher risk of developing otitis media with effusion.
Diagnosis

An otolaryngologist is a physician that specializes in the treatment of ear, nose, and throat disorders. An Otolaryngologist is trained medically as well as surgically and may be referred to as an ENT surgeon. Your physician will perform the following to assess your child’s ear status.

- Medical history including past ear infections and response to treatment.
- Examination of the ear with an otoscope

Other tests your physician may order include:

Tympanometry Test: This test measures middle ear function and how well the ear drum moves. It can inform your doctor whether fluid is present in the middle ear.

Hearing Test: A test to measure how well you hear. Various hearing tests

Conservative Treatment Options:

Most cases of Otitis Media with effusion will clear up on their own in a few weeks or months. Your doctor will use a “wait and see” approach to assess if the OME resolves itself while also monitoring your child for hearing and speech problems over the next few months.

Conservative treatment options that may be recommended can include the following:

- Keep the child’s environment free of smoke
- Don’t give a baby a bottle while lying flat. Their head should always be elevated.
- Remove allergens from the child’s environment including pets and dust.
- Change air filters regularly to minimize dust
- Wash hands frequently
- Wash toys with antibacterial solution frequently

Steroids, decongestants, antihistamines and antibiotics have not been shown to be effective treatment for otitis media with effusion.

Indications for Ear Tube Surgery

When conservative treatment options and a “wait and see” approach do not resolve OME, your doctor may recommend ear tube surgery. This surgery is referred to as Myringotomy with tympanostomy tube placement.

Ear tubes or tympanostomy tubes are small open ended tubes made of plastic, metal, or both. In Europe, tubes are referred to as grommets. Sometimes ear tubes are called PE tubes or pressure equalization tubes as they mimic the function of the Eustachian tube to equalize pressure in the middle ear. Tympanostomy tubes are inserted into an incision made in the tympanic membrane or eardrum.
The tubes are used to ventilate the middle ear with air, drain fluid, and equalize pressure. The ends of the tube have a slight collar or lip that helps keep them in place in the eardrum. Most tubes fall out on their own in 6-12 months but occasionally need to be removed by a doctor. Tympanostomy tubes may help prevent fluid buildup and hearing loss as well as recurrent ear infections.

Your doctor may recommend Myringotomy with tympanostomy tube placement surgery if your child has some of the following conditions:

- **Chronic Otitis Media**: Recurrent middle ear infections that are unresponsive to antibiotic therapy
- **Chronic Effusion**: Fluid that remains for 4 months or longer behind the ear drum in the middle ear.
- **Bilateral Effusion**: Middle ear fluid in both ears.
- **Hearing Loss**: Hearing test is administered and demonstrates significant hearing loss.
- **Speech Delay**: Normal speech milestones are not obtained by the child as a result of effusion and the associated hearing loss.

**Surgery**

Myringotomy with tympanostomy tube insertion surgery is performed in a hospital operating room with the child under general anesthesia.

It is usually performed on both ears as day surgery enabling the patient to go home the same day but may require an overnight hospital stay depending on the particular circumstances. The patient will be asleep and unaware of the surgery.

(Refer fig. 13 to 20)
The surgeon performs the surgery through the ear canal with no outside incisions.

The ear canal is washed with sterile solution.

A small incision is made to the tympanic membrane (ear drum) through the ear canal.

Fluid from the middle ear begins to drain through the opening and is then suctioned out of the ear.

A tympanostomy tube is then placed in the incision connecting the middle ear with the outer ear enabling drainage of fluid and aeration of the middle ear.

(Refer fig. 13 to 20)
The ear canal is packed with cotton to control bleeding.

(Refer fig. 13 to 20)

Post Operative Guidelines

Common post-operative guidelines include:

- You should notice an improvement in your child’s hearing. It is important to keep follow up appointments every 3-6 months with your doctor to assess that the tubes are working properly.
- Children usually recover quickly and have little or no pain after surgery.
- You should be able to go home after a few hours if there are no complications following the surgery.
- Your child will feel sleepy and may be irritable the first 24 hours after surgery.
- Normal activities can usually be resumed the next day.
- Your doctor may prescribe ear drops to prevent fluid from blocking the tube.
- It is normal to see ear drainage for up to a week after surgery. Drainage can be most any color but should be reported if it continues longer than a week, has a foul odor, or is accompanied with fever.
- Most ear tubes fall out on their own in 6-12 months. Occasionally ear tubes fall out sooner and require another surgery to replace. Sometimes the doctor may have to surgically remove the tubes if they don’t fall out on their own.
- Discuss water precautions with your doctor. Ear plugs may be recommended for swimming and bathing to prevent infections.
Risks and Complications

As with any major surgery there are potential risks involved. The decision to proceed with the surgery is made because the advantages of surgery outweigh the potential disadvantages. It is important that you are informed of these risks before the surgery takes place.

Complications can be medical (general) or specific to ear surgery.

Medical complications include those of the anesthetic and your general well being. Almost any medical condition can occur so this list is not complete.

Complications include:

- Allergic reactions to medications
- Blood loss requiring transfusion with its low risk of disease transmission
- Heart attacks, strokes, kidney failure, pneumonia, bladder infections
- Complications from nerve blocks such as infection or nerve damage
- Serious medical problems can lead to ongoing health concerns, prolonged hospitalization, or rarely death.

Complications are rare after ear tube surgery, but unexpected events can follow any operation. Your surgeon feels that you should be aware of complications that may take place so that your decision to proceed with this operation is taken with all relevant information available to you.

Specific complications of myringotomy with tympanostomy tube insertion are rare but can include:

- Infection
- Cholesteatoma
- Permanent hole in the ear drum
- Thickening of the ear drum
- Blocked tubes

Infection

Report fever of 38.5 C or 101.0 F or higher or foul smelling ear drainage to your surgeon. Antibiotics will be prescribed to treat the infection.

Cholesteatoma

A rare but dangerous condition where a skin cyst forms in the middle ear and becomes infected invading the surrounding bone.
Permanent hole in the ear drum
Permanent hole in the ear drum causing hearing loss and increased risk of infections requiring further surgery to repair.

Thickening of the ear drum
Thickening of the ear drum with possible hearing loss

Blocked tubes
Tubes may become blocked allowing ear infections and fluid build up to recur.
Summary
A good knowledge of this procedure will make the stress of undertaking the procedure easier for you to bear. The decision to proceed with the surgery is made because the advantages of surgery outweigh the potential disadvantages. It is important that you are informed of these risks before the surgery.

Disclaimer
Although every effort is made to educate you on Otitis Media with Effusion and take control, there will be specific information that will not be discussed. Talk to your doctor or health care provider about any concerns you have about Otitis Media with Effusion.

You must not proceed until you are confident that you understand this procedure, particularly, the complications.
YOUR SURGERY DATE
READ YOUR BOOK AND MATERIAL
VIEW YOUR VIDEO / CD / DVD / WEBSITE
PRE - HABILITATION
ARRANGE FOR BLOOD
MEDICAL CHECK UP
ADVANCE MEDICAL DIRECTIVE
PRE - ADMISSION TESTING
FAMILY SUPPORT REVIEW

Physician's Name: ________________
Physician's Signature: __________
Date: __________

Patient's Name: ________________
Patient's Signature: __________
Date: __________