Disclaimer

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

Otitis media is an inflammatory condition of the middle ear space, the part of the ear between the outer and inner ear. The condition can occur at any age; however, it is a very common condition with children.

In order to learn more about Otitis Media 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)
The Middle Ear

(Refer fig. 4)

The Inner Ear

(Refer fig. 5)

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 outer most (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?

Otitis media is an inflammatory condition of the middle ear space, the part of the ear between the outer and inner ear. It may also involve the mastoid air cell system (a honeycomb-like bony structure present in the back portion of the ear) owing to its direct linkage to the middle ear.

Otitis media is an extremely common illness. 70% of children have at least one episode. Peak incidence is in the first two years of life and is thought to be linked to day care entry. The second peak occurs at 5 yrs of age and may be related to school attendance.

Otitis Media can be classified as:

- **Acute**: When the duration of the disease lasts from 0 to 3 weeks.
- **Sub acute**: When the duration is for 3 to 12 weeks.
- **Chronic**: When the duration is greater than 12 weeks.

Symptoms

There are different stages of Otitis Media and symptoms will vary depending on the stage as follows:

- **Stage of Hyperemia**
- **Stage of Exudation**
- **Stage of Suppuration**
- **Stage of Resolution**

**Stage of Hyperemia**

This stage is characterized by earache, ear fullness and fever. The eardrum appears red on examination.

**Stage of Exudation**

In this stage, there is an increased pain and fever accompanied by hearing loss. In infants, vomiting, convulsions and irritability may accompany it. The eardrum appears red, swollen and bulged. There may be associated pain on the bony area behind the ear.

**Stage of Suppuration**

In this stage, there is discharge from the ear. Initially the discharge may be blood stained; later it becomes mucoid (mucus like) and then pus like. The fever and hearing impairment worsens. There may be a small hole in the eardrum.

**Stage of Resolution**

The resolution stage is a return of tissues to normalcy.
Causes

The cause of Otitis Media can be viral or bacterial infections. Below is a list of specific infections that can lead to a diagnosis of Otitis Media.

Viruses including:
  - Respiratory syncytial virus (RSV)
  - Influenza A & B
  - Rhinoviruses

Bacteria including:
  - S. Pneumoniae
  - Beta haemolytic streptococcus
  - H.Influenzae and M.catarrhalis are responsible for Acute Otitis media
  - Pseudomonas aeruginosa, Staph aureus, Streptococcus, K Pneumonia, H Influenza, Peptostreptococcus and Bacteroids are responsible for Chronic Otitis media.

Risk Factors

- Otitis media is high in lower socioeconomic groups due to overcrowded living conditions.
- Maternal smoking and day care attendance increase the risk of Otitis Media.

Other Risk Factors include:
  - Eustachian tube dysfunction
  - Nasal Allergies
  - Adenoids and other masses in the Nasopharynx
  - Gastroesophageal reflux (GERD)
  - Immune deficiency
  - Scarlet fever, measles, pneumonia, influenza and some other systemic febrile conditions increase the risk of developing Otitis Media.

Complications of Otitis Media

Complications can occur from untreated Otitis Media and can be very serious. It is important that you seek treatment early for symptoms of Otitis Media to prevent the following complications from occurring:
Extracranial Complications

- Facial nerve palsy
- Deafness
- Labyrinthine complications (balance impairment)
- Abscess in the neck or behind the ear

Intracranial Complications

- Meningitis
- Raised intracranial pressure
- Intracranial abscess

Incomplete treatment can also lead to Otitis media with effusion, sometimes referred to as Glue Ear because a thick, glue-like fluid collects behind the eardrum and can impair hearing.
Diagnosis

Diagnosing Otitis Media is done at your physician’s office and includes:

- Medical History
- Examination of the ear with otoscope

(Refer fig. 13)

Conservative Treatment Options

Conservative treatment measures include:

- Treat contributing factors such as upper respiratory tract infections and nasal allergies
- Appropriate oral antibiotics are prescribed according to the sensitivity of the antibiotic to the infecting organism
- Regular cleaning of the ear discharge
- Keeping the ear dry with ear plugs while bathing and avoiding swimming

Surgical Treatment Options

Depending on the severity of Otitis Media, the stage of the condition and the patient’s response to conservative treatment, your physician may recommend a surgical procedure.

Myringotomy: This is a procedure where a small incision is made on the eardrum to release the pus from the middle ear. This procedure is indicated in the early stage before perforation of eardrum has occurred.

(Refer fig. 14 to 22)
Adenoidectomy: This surgery removes the adenoids at the back of the throat if they are enlarged and interfering with the function of the Eustachian tube.

Myringoplasty/Tympanoplasty: Tissue is taken either from the back of the ear or from the small cartilaginous lobe of skin in front the ear called the tragus. The tissues are thinned and dried. An absorbable gelatin sponge is placed in the canal under the drum to allow for support of the graft. The graft is then inserted underneath the remaining drum remnant and the drum remnant is folded back onto the perforation to provide closure.

Very thin silastic sheeting is generally placed against the top of the graft to prevent it from sliding out of the ear, when the patient blows his nose or sneezes. A small amount of Gelfoam is also placed on the outside of the silastic to hold it into position in a so-called sandwich type layer (drawing).

(Refer fig. 14 to 22)
Mastoidectomy: This surgery involves removal of infected portions or all of the mastoid bone, located behind the ear, thereby clearing the disease from the mastoid air cell system.

(Refer fig. 14 to 22)
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.

Specific complications of Ear surgery can include:

- Residual deafness
- Ear discharge and cavity problems especially after Mastoidectomy
- Injury to facial nerve
- Loss of taste on the side of surgery
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 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.

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: ____________

Patient's Name: ____________

Physician's Signature: ____________

Patient's Signature: ____________

Date: ____________

Date: ____________

Middle Ear Infections - Otitis Media
Multimedia Health Education

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