Ear Infections and Grommets

The Normal Ear

The normal ear consists of three parts: the external ear, middle ear and inner ear. The external ear is divided into the ear canal and the external ear (pinna) which is attached to the side of the head. The middle ear consists of the tympanic membrane (ear drum), the middle ear space which is usually filled with air, and three small bones which are housed within this space. They are known as malleus, incus and stapes (hammer, anvil and stirrup bones).

The middle ear is connected to the back of the nose which is known as the nasopharynx through a small tube which is known as the Eustachian tube. In the deeper aspect of the middle ear, there is inner ear which consists of the hearing organ which is known as the cochlear, the balance organ which is the vestibule and the nerves transmitting the hearing and the balance to the brain are also housed within this bone. The sound waves are transmitted through the ear canal onto the drum where it vibrates and the vibration is transmitted through the bones into the inner ear where the fluid in the inner ear moves what is called the hair cells which are sensory organs which converts the pulses to electrical energy so it can be transmitted along the hearing nerves to the brain.

Normal tympanic membrane

What is Otitis Media?

The normal middle ear is usually filled with air. When the air is replaced with fluid the condition is usually known as otitis media with effusion. This is very common in children especially up to the age of six years. The peak incidence is around two years. Most children have at least one episode of otitis media with effusion during the first year of life.

Acute otitis media means there is acute inflammation of the middle ear and tympanic membrane. In this condition the eardrum will be red and often bulging. There may be some fluid present in the middle ear, and the child often complains of pain and may be irritable and may have high fevers. This often requires analgesics and antibiotics. Following acute otitis media the fluid may remain in the middle ear often for a number of weeks. The fluid usually drains through the Eustachian tubes, and if there is any impediment through this drainage, the fluid may persist. When this occurs it is known as otitis media with effusion and often called “glue ear”.

Middle ear effusion (glue ear)

Glue ear refers to the term as the type of fluid in the middle ear when it is ‘gluey’ in consistency. The type of fluid in the middle ear can vary from simple fluid which may be yellow or straw coloured or clear fluid or thick gluey secretions which often mean the fluid has been there for a considerable amount of time (easily three months or more).
**What causes Otitis media?**

Otitis media is common in young children and there are a number of predisposing factors. These include:

- Upper respiratory tract infection, especially caused by viral infection which are often worse in autumn &
  winter.
- Eustachian tube malfunction. This does not allow the fluid to drain following infection. In cleft palate,
  cranio-facial syndromes and in very young children the Eustachian tube is impaired, hence the
  predisposition for otitis media.
- Allergies especially to inhaled allergens. Mild and other food allergens.
- Some racial groups.
- Family history of otitis media.
- Exposure to cigarette smoke (passive smoking).
- Attendance at Daycare or preschool.
- Children in the household attending primary school or Daycare.

**Symptoms caused by Otitis media**

- Otalgia (ear pain)
- Ear discharge
- Fever
- Restlessness
- Night time waking

Most of the infections can be treated with analgesics and antibiotics. Occasionally some children require drainage
of the fluid to give them symptomatic relief. In contrast the middle ear effusion (glue ear) without acute infection
does not cause fever or acute pain but does cause hearing loss, blocked sensation in the ear, speech language
development delay, problems with learning at school, intermittent discharge, balance disturbance and scarring on
the tympanic membrane and ossicles.

**How is Otitis Media diagnosed?**

Most acute Otitis media or Otitis media with effusion can be diagnosed by simply observing the eardrum. This will
require an otoscope or microscope. The best way to diagnose is to remove any wax or debris in the ear canal
and observe the eardrums with a microscope or with a pneumatic otoscopy. Tympanometry is another way of
diagnosing middle ear fluid where one could assess the movement of the tympanic membrane to various
pressures. Flat Tympanometry suggests the drum has fluid behind it and it does not vibrate as one should. In all
the children hearing can be assessed by what is known as “pure tone audiometry” where their hearing level can
be assessed. In younger children this assessment is slightly difficult but a technique such as Oto-acoustic
emissions, or ABR testing is now useful for detecting hearing loss.

**What treatments are available?**

For acute otitis media with effusion antibiotics with pain relief should resolve the symptoms within seven days. If
symptoms persist then one should consider changing the antibiotics or seeing an Ear, Nose and Throat surgeon
for drainage of fluid which often helps these infections. For persistent or recurrent acute otitis media with effusion,
options include prophylactic antibiotics or insertion of ventilation tubes (grommets).

Middle ear effusion when persists more three month period requires attention especially if it is causing hearing
loss, changes on the tympanic membrane which may be irreversible such as scarring, speech and language
developmental delay.
Options for treatment:

- Prolonged course of antibiotics for a period of 4-6 weeks along with decongestants.
- Eustachian tube exercises for all children especially with Otovent nasal tubes.
- Control other medical conditions including allergies.
- In most instances ventilation tubes (grommets) are necessary as other options have already been tried and failed.

These are a small plastic tube which is in the shape of small cotton reels. They are very small and are placed on the drum under a general anaesthetic, with a small incision on the tympanic membrane. One flange sits in the middle ear, the other on the external surface of the tympanic membrane. This helps to equalise the pressure, drain the fluid and restores the tympanic membrane to be in its normal position. There are various shapes and sizes of ventilation tubes (grommets) and depending of its size, they will last for a variable period of time. Usually they last anywhere between 9 and 18 months.

The surgery for insertion of grommets is performed under general anaesthetic, with mask anaesthesia, and takes about ten minutes. It is a day procedure where the child is in hospital for approximately four hours. Post operatively the child usually requires Paracetamol and often some ear drops to keep the hole of the grommet patent for a few days.

Middle ear effusion (glue ear)

Ear drum with ventilation tube (Grommet)

What are the Risks of Grommets?

Grommets are usually a straight forward procedure and the general anaesthetic when performed in hospital has minimal risks. Post operatively the main problems include post-operative discharge which means there may be fluid coming out through the grommet after inserting the grommet. If there is middle ear fluid for which the grommet has been inserted, (although most of the fluid is drained at the time of surgery) over the next few days you can expect some fluid to come through the grommet (which is what the grommet is supposed to do.) For this reason you need to use topical Sofradex drops which helps to keep the grommet hole patent.

In terms of swimming it appears no protection is necessary but care should be taken when children dive deep down in the pool over ten feet, swimming in local creeks or hot pools. Precaution is necessary when washing hair with shampoo as the alkaline pH of shampoo water seems to increase the risk of discharge from the grommets. Ear plugs can be used for hair washing but not essential. Grommets usually fall at its own accord - sometimes have to be removed if it's there for more than three years.
Ear drum perforation risk is about 2% following insertion of grommets and if this does occur, the perforation usually acts like a grommet for a period of time and if it does not heal, when the child is about eight years of age this could be repaired through a simple operation.

Retained grommet : The grommets not falling out in 12-18 months' time can occur in 5 % of the children and may need surgical removal to prevent persistent tympanic membrane perforation.

There is often some scarring on the tympanic membrane which is called tympanosclerosis which occurs following insertion of grommets, and this does not usually cause any hearing loss. This is simply a white patch on the drum which is visible on examination which does not have any long term effects.

Discharge after grommets (10%) is common especially after a cold or swimming - you should use topical ear drops like Sofradex to control this infection rather than oral antibiotics. Occasionally this discharge needs suction or dry mopping prior to using topical antibiotic drops.

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