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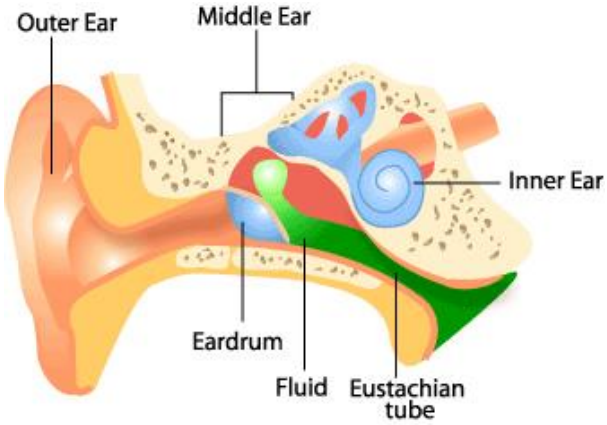
HEARING AND HEARING LOSS
A guide for Mr Watson's patients

During your consultation with Mr Watson, the contents of this pamphlet will be discussed. Reading this pamphlet in your own time will allow you to further understand your condition. If, after reading this pamphlet (also obtainable from Mr Watson's website), you do not understand, please make another appointment with Mr Watson so your questions may be further discussed.

Anatomy of Ear

The ear itself is divided into three parts:



Outer Ear

The outer ear comprises the ear lobe that leads into an ear canal. This is a dead end canal with the end being the eardrum. The eardrum is semi-transparent like Gladwrap. Wax is made within the ear canal and eventually falls out of the ear canal. Wax acts as a cleaning agent to the ear canal trapping dirt and debris. Cotton buds should never be used in the ears. Ear canals are self cleaning and cotton buds will simply push wax into the ear canal and it will be retained within the canal. The wax therefore becomes dirty in the depth of the ear canal.

Middle Ear

The middle ear is a bony space (room) behind the eardrum. This room has its own air vent which leads to the back of the nose (eustachian tube). This air vent opens and closes with changes in altitude and pressure. This air vent often does not function as well in children as it does in adults. Usually by the approximate age of ten it has improved to normal functioning. The middle ear also contains three small ear bones (Ossicles) and together with the eardrum act as an amplifier of sound presented to the ear.

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Inner Ear

The inner ear has two components, one the cochlear for hearing and secondly the semi-circular canals for balance control.

There are three small bones within the middle ear, the space behind the eardrum. These three bones are all connected together by small joints and act as the amplifier of sounds presented to the ear. The first of the three bones, the malleus, is attached to the eardrum. The last of the three bones, the stapes, make attachment to the inner ear lying on a thin tissue membrane called the footplate. Below the footplate is a reservoir of fluid within the inner ear.

We hear by sound waves passing through the ear canal and causing very slight movement of the eardrum. This in turn moves the ear bones. This acts as an amplifier to the sound. With the movement of the third bone, (the stapes), it pushes down on the thin membrane, beneath which lies a reservoir of fluid.

As the membrane is depressed, this sets up a wave motion stimulating small receptors or hair cells in the inner ear, sending impulses to the brain. The brain codes this information and interprets it as sounds. This is the way we normally hear.

Types of Hearing Loss

1 Conductive
2 Sensory neural hearing loss
3 Mixed hearing loss

1 Conductive Hearing Loss

Examples of conductive hearing loss can be best described by the anatomy of the ear. These will be described in terms of (a) the external ear, (b) the eardrum, (C) the middle ear and the inner ear.

a Ear Canal

Examples of conductive hearing loss of the outer ear canal:

- **Atresia of pinna of ear or ear canal:**

  This is a congenital maldevelopment of the ear where either the pinna or the pinna and the ear canal will not develop properly.

- **Stenosis of ear canal:**

  This is where the ear canal is smaller than would be expected. This occurs in certain situations such as Downs Syndrome. Exostosis is where the bone grows inward blocking the canal (see website for information).

- **Foreign body in external ear canal:**

  For example, a bead lodged within the ear canal. This particularly occurs in children.

- **Wax impaction:**

  Wax impacts within the ear canal and can cause a hearing loss. In general however, the ear canal is self- cleaning and therefore as long as the ear is not tampered with, with cotton buds and suchlike, then all usually is OK. There is a condition called Keratosis Obturans of which excessive skin is produced within the ear canal and causes blockage. If you feel the need to scratch your ear canals, then avoid doing so. Instilling some olive oil to the ear canal soothes the itch. Scratching the ear canals or using cotton buds to try to clean the ear canals usually introduces infection. This is called an otitis externa. It also occurs when dirty water, particularly from spas are introduced to the ear canal. People where they are exostosis (see website), water can be retained within the ear canals. As a result, infection occurs. If you are susceptible to ear infections of the outer ear canal, particularly with swimming or showers, then the best option is to instil some olive oil to the ear canal prior to swimming. This coats the ear canal and therefore water proofs it. As a test for yourself, put some olive oil on your hands and try to wash it off with water alone, it is almost impossible without using soap to break up the water proofing of the olive oil.

Tumours of External Ear Canal – these may be benign (non cancer) or cancer

b Ear Drum

- **Myringitis:**

  This is a thickening of the eardrum due to infection.

- **Perforation of the ear drum (hole in ear):**

  See handout on Myringoplasty.

c Middle Ear

- **Middle ear effusion (glue ear):**

  See handout on Bilateral Grommets.
  This is fluid within the middle ear space.

- **Eustachian tube dysfunction:**

  This is negative pressure within the middle ear.

- **Otosclerosis:**

  See handout on website.

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- **Ossicular disarticulation:**

  This is where there has been a dislocation of the Ossicles within the middle ear. This is usually due to trauma such as a hit to the ear.

- **Cholesteatoma**

  A Cholesteatoma is where skin of the eardrum occurs within the middle ear. This may be congenital, however often it is acquired. The acquired form occurs with stretching of the eardrum and the formation of a pocket within the drum. This is very much like a pocket in a pair of pants. With time, the pocket deepens and extends further into the middle ear. The skin that lines the pocket contains enzymes. These enzymes dissolve bone so that eventually the small ear bones (Ossicles) of the middle ear dissolve away. This produces a conductive hearing loss and this generally requires an operation that is called a Tympanoplasty or modified radical Mastoidectomy (see handout on Myringoplasty Middle Ear Operation).

  Cholesteatomas often present with a chronic discharge from the ear. Typically the discharge is thin, watery and smelly. Often there is very little ear pain because the condition is so chronic (long term). Cholesteatoma is to be suspected if a discharge does not clear with ear cleaning by the surgeon and application of topical antibiotic drops.

  A CT scan of the ear bones helps with the diagnosis and the planning of treatment. As mentioned, the treatment is generally that of operation. Without surgical treatment of a cholesteatoma, there may be significant problems that occur.

  As well as the hearing loss, there may be extension into the Labyrinth that causes dizziness and vertigo. There can also be dissolving of bone over the facial nerve as it runs within the middle ear. This results in a paralysis of the face on the side of the ear cholesteatoma. There can also be a dissolving of the bone between the middle ear and the brain. This can result in a CSF leak, Meningitis and brain complications.

- **Tumours**

  Tumours of the middle ear can occur. These are numerous. A Glomus tumour is a network of blood vessels. Fortunately tumours of the middle ear are rare.

2 Sensoury Neural Hearing Loss

Sensory neural hearing loss means a deaf to nerve cells. Nerve cells in this current age do not regenerate or repair themselves so this hearing loss is permanent and cannot be fixed by way of operation (exception cochlear implantation). Hearing aids generally used by people with sensory neural hearing loss.

Causes:

- **Noise induced hearing loss:**

  Work induced or socially induced hearing loss such as loud noise at nightclubs or loud music cause this.

- **Trauma:**

  An injury to the head or ear or head and neck may cause hearing loss.

- **Medications (Ototoxicity):**

  Certain drugs and medications may cause deafness.

- **Hereditary:**

  This means a family history of hearing loss. Therefore if grandparents and parents have hearing loss it is possible that further offspring also have hearing loss.

- **Congenital at risk criteria for hearing loss:**

  Infant hearing loss is associated with certain high risk groups.

  1 Bacterial Meningitis.
  2 Congenital perinatal infections (TORCH)
    - Toxoplasmosis
    - Other, e.g. Syphilis
    - Rubella
    - Cytomegalovirus
    - Herpes
  3 Positive family history of congenital hearing loss.
  4 Concomitant head and neck anomalies.
  5 Birth weight less than 1500g.
  6 Hyperbilirubinemia (baby yellow colour at birth).
  7 Initial Apgar < 4 at birth
  8 Prolonged NICU stay (5 to 10% of post-NICU infants have a measurable hearing loss).

- **Meniere's Syndrome:**

  See handout on website.
  Meniere's Syndrome is a condition where there is hearing loss, tinnitus (noise in ears), vertigo (spinning sensation), fullness in the ear.

- **Presbycusis:**

  This is hearing loss of ageing. As we age, our hearing deteriorates. This usually is in the higher frequency range.

- **Sudden sensory neural hearing loss:**

  Sudden sensory neural hearing loss usually occurs in one ear at a frequency of 10 per 100,000 persons. It is thought most likely to of a viral origin, possibly the Herpes virus. Early treatment with steroids and Acyclovir within the first three days has been shown to provide the best prognosis for either a return to normal hearing or some improvement in hearing. 10% of acoustic neuroma present with sensory neural hearing loss, (not necessarily however sudden hearing loss).

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- **Acoustic neuroma:**

  An acoustic neuroma is a benign (not cancer) tumour, arising from the sheath of the hearing nerve. The hearing nerve passes through a bony canal into the brain from the inner ear. It is here that the tumour usually grows. Although it is benign and slow growing, if is grows to a large size, it may eventually cause severe problems. This may cause numerous neurological problems with ultimate death. It usually occurs between the ages of 30-40 years, slightly more common in women. 10% of acoustic neuromas present with hearing loss in the affected ear. Also patients may present with tinnitus (noise in ear), see handout on website, or balance disturbance.

- **Otosclerosis:**

  See handout on website.

- **Diabetes**

- **Multiple Sclerosis**

- **Other various medical conditions**

Please read this entire document carefully and if there is anything which is not understood, then Mr Watson would like you to reschedule another appointment with him to discuss your concerns or questions.

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