G CHEE
EAR NOSE THROAT SINUS & DIZZINESS CENTRE
www.gcheeent.com

#12-06 Mount Elizabeth Medical Centre
3 Mount Elizabeth
Singapore 228510
Tel: 6737 7227 Fax: 6737 2150
Email: gchee@gcheeent.com

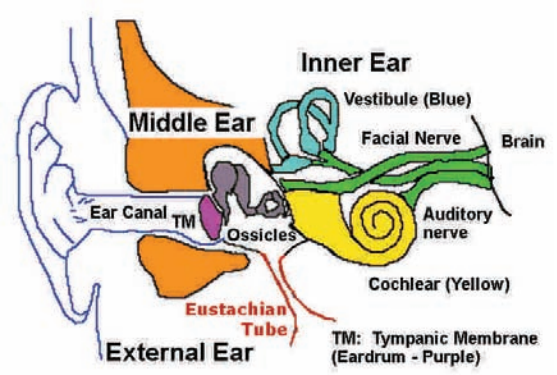
How the Ear Works - Things You Need to Know

Introduction

Our ears are vital in communication with the outside world. Yet, they are taken for granted until problems arise. Problems can arise from the pinna, external ear, middle ear or inner ear compartments.

How our Ears Work

The ear is designed to maximize physical energy in the form of sound waves entering the external ear and converting this to electrical impulses to the brain that will then perceive sound. The pinna is cup-shaped and funnels sound into the external ear. The sound wave hits the eardrum (TM) which vibrates and starts the middle ear bones (ossicles) in motion. The arrangement of the ossicles is such that the energy from the external ear is amplified 1.5 times when transferred to the inner ear.



The inner ear is filled with fluid in which the hearing cells are situated. When the ossicles vibrate, it results in movement of the inner ear fluid which in turn stimulate the hearing hair cells. Stimulation of the inner ear hair cells generate an electrical impulse to the brain via the hearing nerve. In simple terms, this is how we hear. Any disruption of this mechanism will result in hearing loss.

Common Causes of Hearing Loss

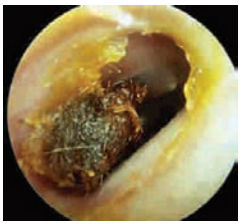
Pinna Problems

1. Keloids - Keloids are excessive scar tissue that form as a result of trauma, and infection. The most common cause is ear piercing. Hearing loss is usually not a symptom. Surgery is usually required to excise the excessive scar tissue.

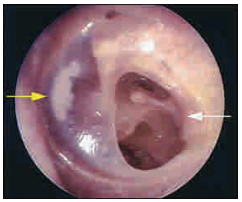
External Ear Problems

1. Earwax - one of the more common causes of hearing loss is buildup of earwax in the external ear canal. Caucasians in general, have sticky, wet wax while Orientals have dry flaky wax. Buildup of wax causes blockage, pain and deafness. Earwax can be removed with flushing (commonly known as syringing) or with suction.

2. Infection - Bacteria and Fungi are common causes of infection. Trauma from digging is a common reason for infection. This is especially so when digging is coupled with water from swimming or showering. Treatment involves clearing the infection with suction and application of an appropriate eardrop.



Middle Ear Problems



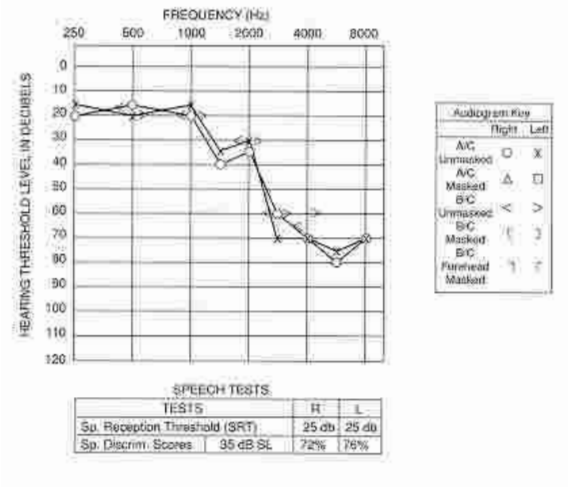
1. Perforated Eardrum - Most perforated eardrums heal spontaneously soon after damage. Causes of the perforation include infection and trauma. Surgery is usually required to mend chronic perforations that do not heal spontaneously.

2. Infection - also known as Otitis Media. Seen more commonly in children, these infections are painful and are associated with fever. Treatment with antibiotics is usually required.

3. Ossicular Chain Damage - Middle ear bones or ossicles connect the eardrum to the inner ear. Hearing loss can result if the bones are damaged and the chain is disrupted or if the chain is fixed and immobile (as in Otosclerosis). Surgery is required to repair the damage.

Inner Ear Problems

1. Degeneration (Presbycusis) - the most common cause of hearing loss from the inner ear is natural, age-related degeneration or presbycusis. Both ears are equally affected and the high frequencies are usually more severely affected. Hearing aids are recommended when quality of life is affected.



2. Noise-induced Deafness (NID) - excessive exposure to noise at work or as a result of social habits (eg. MPs players, playing in a band) can lead to hearing loss that affects both ears. Tinnitus (or ringing in the ears) is a common associated problem.

3. Labyrinthitis (Inner ear infection) - due mainly to viruses such as the herpes or influezae virus. Affects one ear and is sudden in onset. May be accompanied by dizziness. Hearing can be recovered if treatment (high dose oral steroids and antivirals) is instituted within one week of onset of symptoms, preferably within two days.

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Allergic Rhinitis - What We Can Do about the Sensitive Nose

Caring for your Ears - What Not to Do

Some people just have excessive wax that build up and block the ear canals on a regular basis. The best, safest and most effective method in cleaning the ears is using suction or forceps under direct vision (with magnification would be better). Syringing is commonly employed by family physicians and can be effective if done properly. The following are some of the methods that are ineffective and sometimes hazardous;

1. Ear Digging - cleaning the outer ear canal with cotton buds or a metal cup digger is a common habit for many people. Unfortunately, not only does this not achieve its goal but many times, wax is pushed further in and impacted by the cleaning process. Our outer ear canals are equipped with a self-cleaning mechanism that bring debris, dirt and wax from the innermost part of the canal to the outermost part where it falls out the canal. Ear digging disrupts this process.

2. Instilling wax softeners - some instill waxsol, olive oil in the mistaken belief that the wax will 'dissolve'. All this does is to soften wax in preparing for actual removal by suction or syringing. Sometimes, instilling such drops causes more hearing loss and blockage.

3. Ear Candling - the principle of ear candling is based on the creation of convention currents by the lighted candle that will eventually 'suck' wax out. Ear candling has been conclusively proven not to work. The air currents created are not strong enough to remove wax from the ear canals. The 'wax' removed from the ear after candling is actually wax from the candle!

4. Cleansing Eardrops - this includes hydrogen peroxide, salicylic acid etc. Usually ineffective in cleaning the ear canals. Some can cause an allergic or irritative reaction and result in infection.

Conclusion

The best thing to do for the ears is not to do anything! There is a famous saying that goes:

"Nothing smaller than your elbow should go into your ears."

Prepared by

Dr Gerard Chee
Consultant, Ear Nose Throat Surgeon