

Hearing problems after a brain injury

A brain injury can damage both mechanical and neurological processes and result in a variety of hearing difficulties.

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How hearing can be damaged

The mechanical process of hearing is carried out by the ear itself, which has three sections, the outer, middle, and inner ears.

The outer ear, consisting of the lobe and ear canal, protects the more fragile parts inside.

The middle ear begins with the eardrum – sound makes this thin membrane vibrate. The vibration is transferred via three small bones to the inner ear.

The inner ear has a tube called the cochlea, which is wound tightly like a snail shell. From here the neurological process begins – the vibration is turned into electrical impulses and sent to various parts of the brain for processing.

The trauma involved in a traumatic brain injury (TBI) most commonly affects the mechanical process. An eardrum may rupture, any of the small bones could break or there could be bleeding or bruising of the middle ear.

Sometimes damage to the parietal or temporal lobes can disrupt the neurological process. Thankfully, many hearing difficulties are not permanent and can be reduced or eliminated with treatment.

Diagnosis of hearing problems

Accurate diagnosis and treatment are essential. The first step is to see a doctor for a referral to an audiologist or an ear, nose and throat specialist if needed. Some

audiologists run specialist clinics to help manage particular conditions with specialist hearing aids or therapeutic noise generators.

Tinnitus

Tinnitus is experienced as noises which are commonly like a buzzing, hissing or ringing in the ears. It is usually caused by damage to the mechanical process of hearing. It can worsen with exposure to:

- loud noises
- excessive stress
- caffeine
- alcohol
- nicotine
- some illicit drugs and medications
- quinine found in tonic water

Some audiologists run clinics to help manage tinnitus. Other treatments include tinnitus retraining therapy, cognitive behavioural therapy, and taught coping strategies.

Hearing aids can be adapted with a soft noise generator. This long-term exposure to gentle sound can desensitise the ears very effectively. This 'white noise' contains every frequency audible to humans, and can be likened to the sound of distant surf or wind.

Hyperacusis (sensitivity)

Trauma to the inner ear can cause certain noises or pitches to become extremely loud or soft. This causes many problems in situations such as dining out, walking, washing the dishes, using a vacuum cleaner or listening to music. Often the problem is not diagnosed as the person has trouble convincing others that the problem exists. An audiology test will often show that hearing is 'normal', but it is the sensitivity or inability to handle rapid changes in volume that is the issue. There is no cure for hyperacusis but there are many effective strategies to manage this condition, including:

- ear plugs and ear muffs can help in some situations
- activities such as dining out or shopping should be scheduled for quieter off-peak times
- nicotine and caffeine are stimulants and should be avoided
- it is helpful to maintain good health through diet, sleep and exercise
- specially programmed hearing aids can be used to desensitise ears through long-term exposure to gentle sound.

Meniere's syndrome

This syndrome is caused by excessive pressure in the chambers of the inner ear. This causes nerve-filled membranes to stretch, which can cause hearing loss, ringing, vertigo, imbalance and a sensation of pressure in the ear.

It is incurable, but treatment can ease the symptoms. This may include medication such as diuretics or steroids, electrical stimulation or simply limiting movement. There are various surgical procedures that may decrease the pressure in the ear or remove/deaden the nerves responsible.

Auditory agnosia

This rare condition involves problems with recognizing nonverbal sounds, but still being able to speak normally. It usually involves injury to the temporal-parietal parts of the brain and often resolves itself over time.

Practical tips for any hearing problems

There are practical steps a person can take to lessen many hearing problems. Many of these steps will help with other aspects of a TBI and other brain disorders. These include:

- avoid noisy, stressful environments where possible
- talk with trusted friends and professionals about the problem
- exercise regularly
- listen to gentle music to cover constant noise caused by tinnitus
- sleep well
- eat well and reduce salt if you have fluid pressure in the ear
- stop using drugs such as coffee, cigarettes and alcohol.