

## Ear problems - otosclerosis

The middle ear is separated from the outer ear by the eardrum, and contains tiny bones that amplify sound waves. Otosclerosis is characterised by the abnormal formation of bone within the middle ear that stops these tiny bones from vibrating. This causes a conductive hearing loss, because the sound waves can't reach the inner ear. The sense of balance may also be impaired if the abnormal bone growth extends into the inner ear. Women aged between 15 and 30 years are most commonly affected by otosclerosis. The cause is unknown, but risk factors include family history and pregnancy. Treatment options include surgery or the use of hearing aids.

### Symptoms

Otosclerosis tends to target one ear at first, but both ears are eventually affected. The condition doesn't cause total deafness. The symptoms of otosclerosis include:

- Gradual but progressive loss of hearing
- Hearing may improve in noisy conditions
- Sensations of ringing in the ears (tinnitus)
- Dizziness.

### The structures of the ear

The middle ear contains tiny bones (malleus, incus and stapes) that pass sound waves to the inner ear. Sound waves are then changed into electrical impulses and sent to the brain via the cochlear nerve. The body's organ of balance, the labyrinth, is also located within the inner ear. The labyrinth is a series of fluid-filled canals set at different angles. When the head is moved, the fluid rolls against tiny hairs, which transmit information to the brain via the vestibular nerve. If the brain knows the position of the head, it can work out the position of the rest of the body. Otosclerosis most commonly affects the tiny bone known as the stapes. The functioning of the labyrinth will be impaired if the abnormal bone growth extends into the inner ear, causing dizziness and nausea.

### The cause is unknown

The cause of otosclerosis is a mystery, but researchers have uncovered a number of risk factors including:

- **Family history** - otosclerosis tends to run in families, which suggests a genetic susceptibility or hereditary component to the disorder.
- **Gender** - women are more likely to develop otosclerosis than men.
- **Pregnancy** - susceptible women may develop otosclerosis during pregnancy.
- **Race** - Caucasians (white people) tend to be most commonly affected.
- **Osteogenesis imperfecta** - this genetic disorder is characterised by abnormally brittle bones. People with osteogenesis imperfecta are at increased risk of developing otosclerosis.
- **Non-fluoridated water** - some evidence suggests that drinking non-fluoridated water may increase the risk of otosclerosis in susceptible people.
- **Unknown causes** - some people develop otosclerosis even though they don't have any of the known risk factors.

### Diagnosis methods

Otosclerosis is diagnosed using a number of tests including:

- **Hearing tests** - a person with otosclerosis typically has trouble hearing low frequency sounds.
- **CT scan** - to check for damage to the cochlear nerve and labyrinth.

### Treatment options

Treatment may not be needed until the degree of hearing loss is significant. Options may include:

- **Medications** - some studies have suggested that taking fluoride, calcium and vitamin D supplements may help to slow the progression of otosclerosis. However, this treatment needs further research before it can be confirmed.
- **Hearing aid** - to boost hearing.
- **Surgery** - the affected stapes is surgically removed and replaced with a prosthesis or artificial stapes (stapedectomy). A successful operation can correct conductive hearing loss of otosclerosis.

### **Self-care after surgery**

After surgery, it is important (particularly in the early postoperative phase) to protect the structures within the ear from infection, pressure and noise to reduce the risk of complications. Be guided by your surgeon, but general suggestions include:

- Avoid blowing your nose.
- Avoid cold temperatures.
- Reduce your risk of upper respiratory tract infections by avoiding sick people.
- Avoid changes in air pressure (air travel or scuba diving).
- Avoid loud noises.
- See your doctor promptly if you experience ear pain, dizziness or fever, as these symptoms could indicate an infection.

### **Where to get help**

- Your doctor
- Ear, nose and throat specialist
- The Royal Victorian Eye and Ear Hospital Tel. (03) 9929 8666

### **Things to remember**

- Otosclerosis is a form of bone overgrowth within the middle ear that causes progressive hearing loss.
- The sense of balance may also be impaired.
- The cause is unknown, but risk factors include family history, gender and pregnancy.
- Treatment options include surgery and hearing aids.

**This page has been produced in consultation with, and approved by:**

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