LET'S TALK ABOUT . . .

ACOUSTIC NEUROMA

Key points
- Acoustic neuroma is a rare benign (not cancerous) tumour.
- The tumour usually grows slowly.
- The most common first symptom is hearing loss on one side.
- Other symptoms include ringing in the ears, imbalance and dizziness.
- Treatment options are observation, surgical removal or radiation.

What is acoustic neuroma?
Acoustic neuroma is a benign (not cancerous) tumour of the vestibular nerve. It usually grows slowly. The vestibular nerve carries balance and hearing information between the inner ear and the brain. This means that as the tumour gets bigger, it can cause hearing loss and tinnitus on the affected side, dizziness, and balance problems.

Acoustic neuroma is also called vestibular schwannoma or neurilemmoma.

Acoustic neuroma affects about 1 person in 100,000 each year. It is most common in people aged 30 to 60, but it can happen at any age.

If an acoustic neuroma gets very large, it can interfere with the brainstem and the cerebellum. These parts of the brain help to control the body’s basic functions, including breathing, heartbeat, sleep, eating, and movement. This means that in rare cases, acoustic neuroma can be life-threatening if it is not treated.

What causes acoustic neuroma?
Acoustic neuroma happens when the cells that wrap around the vestibular nerve start to grow out of control. These cells are called Schwann cells. They produce a substance called myelin, which acts like insulation around an electric wire and helps the nerves to carry information around the body.

Scientists believe that Schwann cells start to grow out of control because of a change in the genetic code (a mutation) on chromosome 22. The affected gene controls the growth of Schwann cells.

In most cases, an acoustic neuroma happens randomly and there is a tumour only in one ear.

In some cases, though, acoustic neuroma happens as part of a syndrome called neurofibromatosis 2 (NF2). If someone has acoustic neuroma as part of NF2, they usually have tumours in both ears, not just one. NF2 makes tumours grow in the brain and on many different nerves, not just the vestibular nerve.
People with NF2 usually start to develop symptoms when they are teenagers or young adults. About half of people with NF2 inherit it from one of their parents. The other half seem to get it spontaneously, meaning that nobody else in their family has the condition.

Symptoms of acoustic neuroma

Acoustic neuroma usually includes the following symptoms:

- **Hearing loss** in one ear, or asymmetric hearing loss (more in one ear than the other), which can be either sudden or progressive in nature
- **Tinnitus** (ringing in the affected ear)
- Dizziness or vertigo
- Loss of coordination
- Loss of balance or trouble walking

Many of these symptoms can be caused by other conditions as well, so it may not be easy to diagnose acoustic neuroma, especially in the early stages. But asymmetric signs and symptoms (more on one side than the other) are often caused by an acoustic neuroma, so a healthcare professional will always want to rule out an acoustic neuroma when making a diagnosis.

As the tumour gets bigger, it can start to press on other nerves nearby, such as the facial nerve and the trigeminal nerve. This can cause various problems, including:

- Numbness, tingling, weakness, or paralysis of the face
- Double vision
- Trouble with swallowing or speaking

Diagnosis of acoustic neuroma

Acoustic neuroma is usually diagnosed by a specialist, such as a neurologist or an otolaryngologist (an ear, nose, and throat or ENT doctor).

Your doctor will ask about your symptoms and your medical history. Your doctor will also do a thorough physical and neurological exam, including an ear exam.

You will likely have the following diagnostic tests:

- Hearing and balance tests (audiogram, vestibular function tests and auditory brainstem responses)
- Imaging (MRI scan)

If someone has asymmetric hearing and balance symptoms (more on one side than the other), a healthcare professional will always order an imaging test to rule out an acoustic neuroma. An MRI scan is the gold standard for diagnosing an acoustic neuroma. It can find very small tumours that might not have been noticed without an MRI.

Treatment and management

Treatment for acoustic neuroma will depend on how large the tumour is, where it is, how fast it is growing, what symptoms it is causing, your age and health, and what you would prefer. Your doctor will discuss the risks and benefits of each treatment option with you.

If the acoustic neuroma happened because of NF2, you will need treatment from a team of health care professionals who have experience with NF2.

Observation

If the acoustic neuroma is small and is not causing symptoms, your doctor may suggest watching it for a while to see if it grows or causes symptoms (“watchful waiting” or the “wait and see” approach). This means you will have regular follow-up appointments and MRIs. If anything changes, your doctor may decide that treatment is needed.

Surgery

If the acoustic neuroma is small, it may be possible to remove it with surgery (an operation). If the surgery goes well, it can preserve hearing and improve other symptoms.

If the acoustic neuroma is larger, it may already have damaged the vestibular nerve and other nerves nearby. This means that surgery may be more difficult, or it may not help with the symptoms.

Surgery should be done by a neurosurgeon who specializes in removing acoustic neuromas. There are several different surgical options. Which
procedure is used will depend on various factors, including:

- how big the acoustic neuroma is
- what symptoms it is causing
- how much it is affecting your hearing
- how experienced your surgeon is with each procedure

Surgery for acoustic neuroma can sometimes make the symptoms worse, because it may damage the vestibular nerve and other nerves nearby. Compared with other treatment options, surgery is more likely to damage your hearing and vestibular function permanently.

Radiation treatment

Radiation treatment involves sending large doses of radiation to a small area of the body. The goal is to kill the tumour cells without damaging the healthy parts of the body nearby. Radiation treatment is often a good option for small, non-malignant tumours like acoustic neuromas. Compared with surgery, it may be a better option for preserving your hearing.

Your doctor may suggest radiation treatment if:

- you would prefer not to have surgery, or surgery is not a good option for you
- the acoustic neuroma is affecting your only hearing ear, or you have acoustic neuromas affecting both ears

There are two options for radiation treatment:

- stereotactic radiosurgery, which is a single, focused dose of radiation
- radiotherapy, which is multiple lower doses of radiation over several days

Vestibular rehabilitation and physiotherapy

Surgery for an acoustic neuroma can damage your vestibular nerves. This can cause balance problems and vertigo. Surgery can also damage the nerves that control the muscles in your face, including the facial nerve and the trigeminal nerve. This can cause weakness and trouble with movement. Vestibular rehabilitation and physiotherapy soon after surgery can help with these problems.

Vestibular rehabilitation is a type of exercise therapy. Its goal is to help your brain compensate for the loss of balance function on one side. With vestibular rehabilitation, your brain can relearn how to balance and how to respond to signals from the visual and vestibular systems. In many patients, this compensation happens naturally, so they do not need vestibular rehabilitation. Other patients, however, may continue to have symptoms, and therefore they may benefit from vestibular exercises. One study found that patients who followed a customized vestibular rehabilitation program after surgery for an acoustic neuroma did better on balance tests than patients who were only given general instructions. A vestibular therapist can help design an appropriate program for you.

Vestibular rehabilitation after surgery for acoustic neuroma may include:

- moving your head while you look at an object that is standing still
- exercises to help you balance better while you are standing or walking

It is very important to start exercises gradually and increase them slowly and steadily. If you try to do too much, too soon, your dizziness may get worse.

New treatments for acoustic neuroma

Recent research suggests that certain drugs may slow the growth of acoustic neuroma, including:

- bevacizumab (Avastin®, Mvasi®, Zirabev®), a cancer chemotherapy drug
- mifepristone (Mifegymiso®), used to treat Cushing’s syndrome and for medical termination of pregnancy

Right now, these treatments are not approved for treating acoustic neuroma. But your doctor may decide to prescribe one of them anyway (off-label use), or you may decide to join a clinical trial of one of these drugs.

What to expect in the future

If you have surgery or radiation treatment, you will need regular follow-up appointments, including MRI scans and hearing tests, to make sure that nothing has changed. It is very rare for an acoustic neuroma to come back after treatment.

Many people still have hearing loss, tinnitus,
dizziness, or other symptoms after treatment:

- One study found that 8 years after treatment for acoustic neuroma, 3 in 4 patients were deaf in the affected ear. People who already had some hearing loss before they were treated were more likely to lose their hearing completely.

- Another study found that eight years after treatment, about 1 in 2 patients still had some dizziness symptoms. People who had larger tumours or symptoms of dizziness, headache, or migraine before they were treated were more likely to have dizziness later on. **Vestibular rehabilitation can help** to reduce dizziness.

**More resources and sources**

View more acoustic resources as well as sources used for this handout: [https://bit.ly/2QnDO4A](https://bit.ly/2QnDO4A)

*Handout updated August 2019*