

## Ear infections

The ear is made up of three parts. The outer ear includes the part you can see and the canal that leads to the eardrum. The middle ear is separated from the outer ear by the eardrum and contains tiny bones that amplify sound. The inner ear is where sounds are translated to electrical impulses and sent to the brain. Any of these three parts can become infected by bacteria, fungi or viruses, in either the ear canal, or the eustachian tube that connects the ear to the throat. Children are particularly prone to middle ear infections (otitis media). It is estimated that around four out of five children will experience a middle ear infection at least once.

### Symptoms

The symptoms of an ear infection depend on the type but may include:

- Earache
- Mild deafness or the sensation that sound is muffled
- Ear discharge
- Fever
- Headache
- Loss of appetite
- Itchiness of the outer ear
- Blisters on the outer ear or along the ear canal
- Noises in the ear, such as buzzing or humming
- Vertigo (loss of balance).

### The function of the eustachian tube

The ear is connected to the back of the nose via the eustachian tube. This tube equalises air pressure inside the ear to allow better hearing, and funnels secretions from the middle ear into the throat. The walls of the eustachian tube lie flat against each other to prevent the migration of bacteria or other germs into the ear from the nose and throat. Whenever we swallow, a minuscule muscle flexes and opens the tube, allowing air pressure equalisation and the drainage of secretions. If the eustachian tube is blocked, secretions and associated bacteria build up inside the middle ear. This can cause ear infections, mild deafness and an increased likelihood of a ruptured eardrum.

### A range of causes

Some of the many causes of ear infection and contributing risk factors include:

- Upper respiratory tract infections
- Sudden changes in air pressure, such as during airline travel
- Smaller than average eustachian tubes
- Cleft palate
- Young age, since babies and children are more prone to ear infections
- Swimming in polluted waters
- Failing to dry the outer ear properly after swimming or bathing
- Overzealous cleaning of the ears, which can scratch the delicate tissues.

### Different types of infection

Ear infections are diagnosed by physical examination and laboratory analysis of pus or discharge. In some cases, CT scans may also be taken. Types of ear infection include:

- Otitis externa
- Otitis media
- Serous otitis media
- Infectious myringitis
- Acute mastoiditis

- Vestibular neuronitis
- Herpes zoster of the ear.

### **Otitis externa**

Otitis externa is an infection or inflammation of the ear canal between the eardrum and the outer ear. This type of infection is also known as swimmer's ear. It can be triggered by exposure to dirty water or by mechanical damage due to overzealous cleaning. The infectious agent can be either fungal or bacterial. Treatment options include:

- Professional cleaning of the ear canal, although syringing the ear is usually avoided
- Antibiotic eardrops, if the infection is bacterial in origin
- Oral antibiotics
- Antifungal preparations, if the infection is fungal in origin
- Pain-killing drugs
- Keeping ears free of water.

### **Acute otitis media**

Otitis media is an infection of the middle ear, which can be either acute or chronic. Children are most commonly affected by acute otitis media because it is caused by colds and blocked eustachian tubes - both typical ailments of childhood. The infectious agent can be either viral or bacterial, with research suggesting that viruses are responsible for most cases. Sometimes the eardrum will burst, leading to pus in the ear canal, but usually the eardrum will heal up again by itself. Treatment options include:

- Pain-killing drugs
- Antibiotics, if the infection is bacterial in origin
- Eardrops, if there is pus in the ear canal.

### **Chronic otitis media**

Frequent bouts of acute otitis media or one lingering attack can lead to chronic otitis media. Without medical intervention, the chronic infection can burst the eardrum or damage the delicate structures within the middle ear. Other possible complications of untreated chronic otitis media include meningitis, infection of the balance organs within the ear (labyrinthitis), sensorineural deafness and paralysis of the face. Treatment options include:

- Thorough cleaning of the ear and use of topical antibiotic drops (with or without steroids)
- Aggressive treatment to kill the infection
- Surgical repair of the perforated eardrum
- Prevention strategies to reduce the risk of another infection.

### **Serous otitis media**

Serous otitis media is known as glue ear. Children aged between six months and two years of age are most vulnerable to this type of ear infection. Glue ear commonly develops after a middle ear infection, and is characterised by the build-up of fluid and pus within the middle ear. Treatment options include:

- Antibiotics
- If antibiotics fail, or if the child is plagued by repeated attacks of glue ear, surgery to insert small drainage tubes (grommets) may be needed.

### **Infectious myringitis**

Infectious myringitis is inflammation of the eardrum, caused by infection from either viruses or bacteria. The eardrum responds to the inflammation by forming small blisters. This can be quite painful. If fever is present, the infectious agent is almost certainly bacterial. Treatment options include:

- Antibiotics
- Pain-killing drugs
- Professional rupturing of the blisters.

### **Acute mastoiditis**

The bone that can be felt immediately behind the ear is called the mastoid. Acute mastoiditis is infection of this bone, caused by prior acute otitis media. The symptoms include reddened and swollen skin over the mastoid, fever, plenty of discharge from the ear and intense pain. This is a serious condition. Untreated, acute mastoiditis can lead to deafness, blood poisoning, meningitis and paralysis of the face. Treatment options include:

- Intravenous antibiotics
- Surgical drainage of the infected bone.

### **Vestibular neuronitis**

The inner ear contains the organ of balance, the labyrinth - three semi-circular canals filled with fluid. The canals are positioned at different angles. When the head moves, the rolling of the fluid tells the brain exactly how far, how fast and in what direction the head is moving. Information from these canals is passed to the brain via the vestibular nerve. Vestibular neuronitis is inflammation of the vestibular nerve, probably caused by viral infection. The main symptom is sudden and dramatic vertigo, which may be accompanied by nausea and vomiting. The eyes may also involuntarily flutter towards the affected side of the head. Treatment options for vestibular neuronitis include:

- Medications, including antihistamines
- Anti-nausea drugs.

### **Herpes zoster of the ear**

Sound is sent as electrical impulses to the brain via the cochlear nerve. Herpes zoster of the ear is an infection of this auditory nerve by the herpes zoster virus. Symptoms include ear pain, vertigo, and small blisters on the outer ear and ear canal and perhaps on the face and neck. The main nerve that services the facial muscles may also become infected, leading to swelling and partial paralysis. Treatment options include:

- Antiviral medications such as acyclovir
- Pain-killing drugs
- Surgery to relieve the pressure on the facial nerve, if required.

### **Where to get help**

- Your doctor
- Nurse on Call Tel. 1300 606 024 – for expert health information and advice (24 hours, 7 days)
- Ear, nose and throat specialist
- The Royal Victorian Eye and Ear Hospital Tel. (03) 9929 8666

### **Things to remember**

- The ear can become infected by bacteria, fungi or viruses in the ear canal, or the eustachian tube that connects the ear to the throat.
- Treatment depends on the type of infection, but can include antibiotics, antiviral drugs, painkillers and surgery.

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