



Cochlear implant surgery

This leaflet explains about cochlear implants and what to expect when your child comes to Great Ormond Street Hospital (GOSH) to have one inserted.

How do we hear?

The ear consists of three parts, the outer ear, the middle ear and the inner ear. Sound enters the ear canal and causes the eardrum to vibrate. These vibrations then pass through the middle ear via the three small bones of hearing (ossicles) in to the inner ear. The cochlea of the inner ear converts the vibrations into nerve impulses which are carried to the brain. The brain then interprets these nerve impulses as sound.

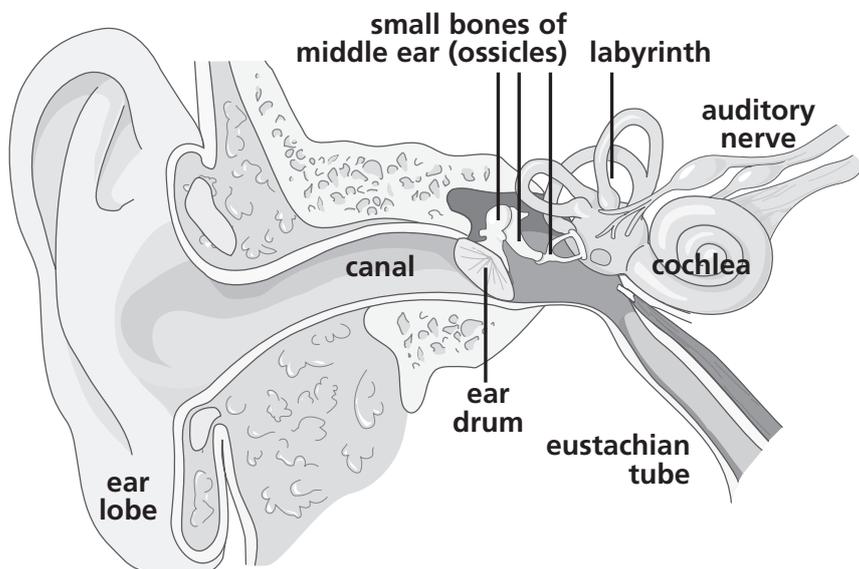


Figure 1: Internal anatomy of the ear

What is a cochlear implant?

A cochlear implant is an electronic system that stimulates the nerve of hearing in the cochlear. It can give a sensation of sound to profoundly deaf children who have been unable to hear even when using the most powerful hearing aids available.

The cochlear implant system is made up of several pieces of equipment which work together to provide the sensation of hearing. The microphone clips into the ear and picks up sound which is converted into an electrical signal in the speech processor. The speech processor is like a miniature computer which in children is worn behind the ear or at ear level. Signal passes from the speech processor through a wire to a coil held in place on the scalp by a magnet. Then the signal passes through the skin to the receiver package. The receiver converts the signal into a tiny electrical current that travels via an electrode implanted in the cochlear to stimulate the auditory nerve. The auditory nerve then carries the signal to the brain. When the brain decodes these signals, your child can have a sensation of hearing.

Figure 2: Internal (left) and external (right) parts of cochlear implant



What does the operation involve?

The operation takes several hours and is carried out when your child is deeply asleep under a general anaesthetic. Your child will need to have some hair shaved off for the operation but this will be done once he or she is asleep. The surgeon makes a cut behind the ear and drills through the bone, into the middle ear and into the cochlea. A 'bed' is made in the bone behind the ear to hold the receiver and internal magnet, which the surgeon will insert and then close the incision. The surgeon will use dissolvable stitches to do this. Once the cochlear implant has been inserted, audiologists will perform some initial testing while your child is still in the operating theatre. This testing confirms that the electrodes are working and can help them make an initial program for your child's implant.

Are there any risks?

Your child will need a general anaesthetic for this operation. Modern anaesthetics are very safe and your child's anaesthetist is a very experienced doctor who is trained to deal with any complications. Every operation carries some risk of infection and bleeding, but this is small. Your child will be given an antibiotic injection during their operation to reduce the risk of infection. Immediately after the procedure some children may feel sick and vomit. They may have a headache or sore throat. These side effects do not usually last long and are not severe. Your child may also feel dizzy after the operation due to the balance mechanisms of the ear being disturbed during surgery but this will get better. There is also a chance that your child could have ringing in the ears for a while after the operation. Again this is temporary and will improve in time.

There is a small risk that the operation may damage the facial nerve, which runs through the ear. This could result in facial palsy, which is a weakness down one side of the face. The nerve which takes taste sensations from the tongue to the brain is also very occasionally damaged, resulting in taste disturbances to part of the tongue after the operation. Facial nerve monitoring is used during the operation to reduce the chances of problems happening. This involves placing tiny needles in the face.

There is also a very small risk of a cerebrospinal fluid leak, which is where fluid surrounding the brain leaks out. This may resolve on its own or the child may need to have a drain or packing inserted in the ear under a general anaesthetic.

We aim to fully insert all the electrodes but there are some occasions where this is not technically possible. As long as some electrodes are inserted the cochlear implant may be used to give the sensation of hearing. Also there is a very small risk the device may fail.

What happens before the operation?

You will receive information about how to prepare your child for the operation in your admission letter. The doctors will explain the operation in more detail, discuss any worries you may have and ask you to give permission for the surgery by signing a consent form. Another doctor will also visit you to explain about the anaesthetic. If your child has any medical problems, particularly allergies, please tell the doctors about these. Please also bring in any medicines your child is currently taking.

What happens afterwards?

After the operation, your child will return to the ward to wake up fully from the anaesthetic. Your child will have a large pressure bandage around their head. Once your child feels comfortable and has had a drink they will be able to get up and play. Children generally spend one night in hospital following surgery. During the morning after the surgery your child will have the bandage removed followed by an x-ray to document the position of the electrode. Afterwards, he or she will usually be able to return home. After the operation you will be able to feel the cochlear implant under the skin, this will be more obvious in smaller children. We will send you your next outpatient appointment in the post, which will be in approximately two weeks, to check that your child is recovering well and has not developed any problems.

Going home

You will be given antibiotics for your child so please give your child the complete course according to the instructions on the bottle. You should give your child pain relief medicines such as paracetamol or ibuprofen according to the instructions on the bottle. There may be swelling around the area after the operation, which may take a few weeks to resolve. If your child has grommets you may be prescribed eardrops. You will be given written instructions on how to give them or you could watch our podcast available on our website at www.gosh.nhs.uk/medical-conditions/medicines-information/how-to-give-your-child-ear-drops-or-spray/video-podcast-how-to-give-your-child-ear-drops-or-spray

Your child may also experience some bloody discharge from the ear for several days. He or she needs to be off school for two weeks and avoid sports. You will need to take care during hair washing, bathing and showering to avoid water getting into the area. Swimming is not allowed until you have been seen in outpatients. Also you should take care to minimise any potential chance of a head injury.

What is the outlook for children with cochlear implants?

A cochlear implant will not cure your child's deafness but it should provide a useful sensation of hearing sound. However it takes a lot of time, patience and practice to use it as well as possible.

**If you have any questions, please call
Peter Pan Ward on 020 7829 8825**