# Meningitis and hearing loss

**Anna Duncan** outlines how meningitis can affect children's hearing and the increased risk following CI surgery

### What is meningitis?

- inflammation of the protective membranes surrounding the brain and spinal cord

### Who can get it?

- anyone can be affected by meningitis
- children under five are the highest risk group, followed by 15-19 year olds (Meningitis Now)

### How can meningitis affect hearing?

Deafness can be caused by bacterial meningitis. There are many different types of bacteria that can cause meningitis including meningococcal, pneumococcal and Hib. It is thought that over 30% of bacterial meningitis cases result in some degree of hearing loss. This can range from a mild loss to profound loss in one or both ears. Once well enough to be tested following the illness all patients should have their hearing tested. Meningitis can cause sensori-neural hearing loss as the infection can spread to the cochlea, damaging the hair cells. In addition, meningitis can cause inflammation of the auditory nerve. Another possible side effect is ossification which is where there is bony growth within the cochlea. This can develop over time following the illness.

### Cochlear implants and meningitis

There are two aspects when considering Cochlear Implants (CI) and meningitis:

- CI may be an appropriate intervention for severe/profound deafness occurring as a result of meningitis.
- There is an increase in the risk of meningitis as a result of undergoing CI surgery.

### CI following meningitis

If meningitis results in severe-profound hearing loss, cochlear implantation may be the best option as hearing aids may not be able to provide enough amplification to hear environmental and/or speech sounds. As mentioned above, there is a risk of ossification in the cochleae which means that CI centres must move fast when assessing patients following meningitis. Referrals should be made as soon as possible and patients will be fast tracked through the assessment process. Any fibrous/bony growth within the cochlea can make insertion of the electrode array difficult and in some cases impossible. A split electrode ▶

array may need to be used in order to stimulate as much of the cochlea as possible. Many CI candidates who have been deafened by meningitis hear well with their device, but the outcomes are much less certain than for other causes of deafness as meningitis can also damage the auditory nerve and other central components that are required for effective listening and language development. Balance can also be affected.

## Increased risk of meningitis following CI surgery

For patients with cochlear implants there is a small increase in risk of meningitis. This is due to the pneumococcal bacteria that can sit in the middle ear having a pathway to the meninges via the cochlea as a result of the surgery.

## How is that risk minimised?

The current national childhood immunisation programme in the UK provides three doses to vaccinate against the 13 most common strains of meningitis (PCV 13), given at eight weeks, 16 weeks and one year. In addition, children who have cochlear implants and are over the age of two years should be further vaccinated with PPV23 which provides cover against a further ten strains – this vaccination is not effective under two years. (Pneumococcal: the green book, chapter 25 – GOV.UK)

CI centres should check that children have received the appropriate vaccinations prior to surgery. At the University of Southampton Auditory Implant Service GPs are asked to return a signed form confirming vaccination. For those implanted under the age of two, parents/carers and GPs are sent reminders for the child to have their PPV vaccine following their 2nd birthday.

Unfortunately, even when fully vaccinated, children do not have total immunity against meningitis. There are over 90 strains of pneumococcal meningitis. Vaccines protect against the most common strains that cause bacterial disease but there are still cases where children are fully vaccinated and suffer from this disease. One in ten cases of pneumococcal meningitis are fatal.

## Symptoms of meningitis

- *Fever with cold hands and feet*
- *Vomiting/refusing food*
- *Drowsiness, unresponsive*
- *Stiff neck*
- *Dislike of bright lights*
- *Convulsions/seizures*
- *Severe headache*
- *Rash – What does the rash look like?*

*The rash can start anywhere on the body. It begins as tiny red pin pricks but may quickly develop to look like fresh bruising. The Glass Test can be used to see if the rash might be septicaemia – if you press the side of a clear drinking glass firmly onto the spots or bruises, they will not fade. A rash will not always appear with meningitis and can be one of the last symptoms to be displayed.* ***Never wait for a rash if you suspect meningitis.*** (Meningitis Now).

*Ethan listening to the sounds of washing up with his cochlear implants*

A young girl who received bilateral cochlear implants at the University of Southampton Auditory Implant Service died suddenly and unexpectedly at just over 3 years of age as a result of this dreadful disease. In spring 2019 three members of the team: Anna Duncan, Speech and Language Therapist; Mary Hamilton, Teacher of the Deaf; and Suzanne O'Gara, Clinical Scientist, have challenged themselves to skydive to raise money for Meningitis Now in her memory. Her father is hoping to join us. In addition seven team members cycled from Bath to Bristol and back (27 miles) in May 2018. More details can be found at mydonate.bt.com/fundraisers/aisskydiveforayesha

**References:**

www.meningitisnow.org (accessed on 31 May 2018)

www.gov.uk/government/publications/pneumococcal-the-green-book-chapter-25 (accessed on 31 May 2018)

*Anna Duncan is Team Lead and Speech and Language Therapist, University of Southampton Auditory Implant Service.*

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