

Cochlear implant recipients at risk for meningitis

Reason for posting: Cochlear implants are electronic devices that allow sound perception in some people with profound sensorineural deafness. The US Food and Drug Administration (FDA) recently identified a possible association between cochlear implants and bacterial meningitis in 52 people worldwide.¹ The meningitis occurred in children and adults aged 21 months to 72 years and included 12 deaths. The onset of meningitis symptoms ranged from less than 24 hours to more than 5 years after insertion of the implant, and most of the organisms isolated in 14 cases were *Streptococcus pneumoniae*.¹ Vaccination histories against pneumococcus were known for 6 of the individuals, and none had been vaccinated.¹

Health Canada has received reports of 3 cases of bacterial meningitis in cochlear implant recipients in Canada (Ryan Baker, Health Canada: personal communication, 2002). Two cases were nonfatal and involved children aged 4 and 16 years; *S. pneumoniae* was isolated in both cases. The third case, involving a 12-year-old child, was fatal; the isolate was *Haemophilus influenzae* type b (Hib). A total of 2000 devices have been implanted in Canada since they became licensed in 1985.

The devices: The idea for an electrical device that could transmit auditory information to the brain was first proposed by Benjamin Franklin over 200 years ago.³ Since the 1980s several cochlear implant devices have been marketed, and nearly 60 000 implantations have occurred worldwide.¹ The devices are implanted in people with profound, bilateral sensorineural deafness (for whom the auditory nerves are intact but hearing aids are ineffective because of an absent or ineffective cochlear sensory neuroepithelium).^{3,4} Sounds are converted to electrical signals by an externally worn speech processor and transmitted through the skin to the implanted unit either by wires or an FM signal. The internal

unit transmits signals to single or multiple electrode arrays implanted along the auditory nerve.^{4,5}

Known complications of cochlear implantation include incorrect electrode placement, facial nerve paralysis (often transient), skin flap necrosis and rare but serious wound breakdown necessitating removal of the device.⁵

Adult recipients who had acquired speech and language before becoming deaf often recover a good degree of speech recognition (without the need for lip reading),⁶ and totally deaf prelingual young children (often less than 2 years old) also appear to benefit.⁷⁻⁹

Although often effective by hearing people's standards, the use of cochlear implants is controversial in the deaf community, where deafness is not seen as a disability requiring surgical intervention but, rather, as a way of life with a unique culture, language, schools and political structure.^{10,11} Implantation of the devices is elective and typically involves a 2-day hospital stay costing more than \$30 000.¹⁰

There are many possible reasons why meningitis occurred in these cochlear implant recipients. It may be that the implant, as a foreign body, acted as a nidus to local infection in patients who were bacteremic.¹ Another possibility is that the meningitis occurred as a result of the implantation procedure itself (occurring immediately postoperatively, sometimes as a result of preoperative otitis media²). Finally, some recipients may have been more susceptible than others because of immunodeficiencies, a prior history of meningitis, or congenital or acquired anatomical defects of the inner ear (involving inherent cerebrospinal fluid leakage).²

What to do: Potential recipients, or their parents, should be warned of the possible risk of meningitis associated with cochlear implants that may occur at the time of the operation or years later. Any sign or symptom of meningitis in an implant recipient (e.g., fever, lethargy, irri-

tability and loss of appetite in young children and infants, and stiff neck, headache, photophobia, nausea and vomiting, and confusion or altered consciousness in older children and adults) should trigger immediate investigation and treatment. Implant recipients should be vaccinated against organisms causing bacterial meningitis, including *S. pneumoniae*¹² and Hib,¹³ and consideration should also be given to meningococcal vaccination.¹⁴ Cases of bacterial meningitis should be reported to local medical officers of health, and those involving cochlear implant recipients to Health Canada (tel 800 267-9675).

Eric Wooltorton
CMAJ

References

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