

Cochlear Implants/ Cochlear Implants in the management of deafness

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Sapna will turn two in a few months time. But she is not like other 2-year olds; she is born as a special child. She was born profoundly deaf in both ears and her shortcoming was detected when she was nine months old. But after knowing about Sapna's hearing impairment, her parents did not lose heart and instead decided to get her treated with a Cochlear Implant.

Now, six months after the implantation, Sapna responds to the sounds. She even speaks and calls out to her parents, who feel delighted after seeing their daughter playing with the sound. Sapna is actually one of those few lucky children whose problem has been corrected at an early age. After the Cochlear Implant, she is likely to develop as much language skills as any other normal child would.

What is a cochlear implant ?

A cochlear implant is an electronic device that can restore useful hearing and provide improved communication abilities for persons who have a bilateral (both ears) severe to profound sensorineural hearing loss. Persons who receive little to no benefit from hearing aids are considered for cochlear implant candidacy. There are more than 80,000 children and adults worldwide who utilize cochlear implants.

How is an implant different from a hearing aid?

Cochlear implants differ from hearing aids in two important ways:

1. Hearing aids and other assistive listening devices simply amplify sounds. A cochlear implant, on the other hand, transforms speech and other sounds into electrical energy that is used to stimulate surviving auditory nerve fibres in the inner ear.
2. Unlike most hearing aids, cochlear implants have both internal and external components. A surgical procedure is needed to place the internal processor component of the implant. The implant system consists of an external speech processor and headset and an internal, surgically implanted receiver/stimulator package with an electrode array.

How does the cochlear implant work?

For people who are cochlear implant candidates, the outer ear and the middle ear function normally. However, as the fluid travels in the cochlea, the cochlear hair cells are not stimulated and do not generate electrical pulses to be sent to the auditory centres of the brain. Therefore, the brain does not perceive the sound. The hair cells may be absent or damaged although typically there are some residual nerve fibres and ganglion cells.

The cochlear implant attempts to utilize these residual fibres by replacing the function of the hair cells with electrical stimulation. The surgically implanted electrode array stimulates the residual nerve fibres and ganglion cells in the cochlea. These electrical pulses are sent to the brain and interpreted as sound.

Cochlear Implant Surgery

Cochlear implant surgery lasts about three hours and is performed while the patient is under general anesthesia. The surgeon makes a postauricular (behind the ear) incision. A small depression is created in the mastoid bone to hold the receiver/stimulator so that it is flush with

the skull. The surgeon drills through the mastoid bone to the inner ear. The electrode array is then inserted into the cochlea. The receiver/stimulator is secured to the skull, and the incision is closed with stitches. Typically, patients remain in the hospital for one or two nights. Patients return to school or work as soon as they feel well enough to do so, usually within a week of surgery. Activation of the implant takes place three to four weeks after implantation, allowing enough time for the incision to heal properly.

Postoperative Rehabilitation

Rehabilitation is an essential part for those who have undergone Cochlear Implantation. All patients need Auditory Verbal Therapy (AVT) which is different from the traditional oral rehabilitation. In Auditory Verbal Therapy, the emphasis is laid on making the child listen and speak normally, rather than on lip reading and visual cues. Learning to listen takes time and requires concerted efforts from the patient, the family and the person providing habilitation services. Careful listening and reflective responses used in conjunction with information presented sensitively act as the best counselling tools.

Who can benefit from Cochlear Implants ?

Any adult or child with bilateral severe to profound sensorineural hearing impairment who obtains little or no benefit from hearing aids would be considered a candidate for a cochlear implant. Such deafness may be acquired following infection (such as meningitis), toxic effect of ototoxic drugs, trauma or age associated hearing loss.

Congenital hearing impairment is not uncommon with 1 to 2 out of every 1000 live births are born with significant hearing impairment. Such children ought to be identified early in order that their degree of hearing impairment may be established and appropriate measures undertaken to rehabilitate their hearing loss. Many of these children may eventually require a cochlear implant. Early identification is best brought about through parent awareness and neonatal hearing screening measures. Early identification allows for early intervention. This is critical in the growing child to ensure good hearing, speech and language all of which develop maximally in the first few years of life.

Parents are often advised to speak to those parents and children who have undergone the surgery and cochlear implant centres are happy to facilitate this. First hand experience always acts in the right direction, as the parents are convinced of the positive results of the implants.