

## COCHLEAR IMPLANTATION

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### Cochlear Implantation

In the past, there was little anyone could offer to alleviate severe to profound sensorineural hearing loss and the deaf person had to learn to cope as normally as possible in the absence of hearing. In time if the hearing faculties are not developed well, the child invariably becomes too. It was accepted by most otologists, audiologists, teachers and other professionals that the most practical means of educating deaf children was to teach them primarily using 'sign' language, utilizing the visual system. The cochlear implant has radically changed the outlook for profoundly deaf adults and children. The Cochlear Implant can provide sufficient hearing sensation to enable most deafened persons to continue communicating using speech and can provide the opportunity for children born deaf or deafened early in life to use speech as their primary means of communication. In this surgery an array of electrodes is placed within the cochlea to electrically stimulate the damaged hair cells.

January 17<sup>th</sup>, 2006 was a land mark in the history of Department of ENT, Head and Neck surgery in our institution as the first Cochlear Implantation surgery was carried out by Prof. A. Ravikumar and his team. This was the first time a Cochlear Implantation surgery was being performed in a medical college in Chennai. Our patient was a 3 yr old girl, daughter of a bank employee, who was diagnosed to have bilateral profound hearing loss from childhood. She was using hearing aids in both ears for the last one and half years with no hearing benefit. She was evaluated in detail with a battery of audiological tests like BERA, OAE, Tympanometry, ASSR, Speech evaluation and Behavioral observational audiometry in the Department of SLHS. All tests confirmed the diagnosis of bilateral profound hearing loss. Radiological evaluation with CT scan and MRI studies of the temporal bone revealed normal inner ear anatomy. After detailed counselling of the parents on several occasions she was selected to undergo cochlear implantation in the right ear. The surgery was carried out successfully and the performance of the implant was assessed after implantation in the operation theatre and found satisfactory. Patient was discharged from the hospital after one week. 3 weeks following surgery switch on of the implant was carried out on 10<sup>th</sup> February and child could appreciate sound for the first time in her life. She is on regular follow up at present. An intensive habilitation program has been started, which will be spread over a period of 6 months as it is an important and



integral part of the cochlear implantation. The mapping and habilitation program is under the supervision of Prof. Roopa Nagarajan, Head of the Dept of Speech and Audiology. SRMC & RI (DU) is the first medical college to have an exclusive Cochlear Implant Program (CLIPS). Cochlear Implant package is offered at a cost of rupees six lakhs (inclusive of investigations). Implant that was used for the surgery was a Nucleus C124, manufactured in Australia. The cost of this implant alone is 5.14 lakh rupees. At present we have a dozen candidates who are being evaluated for the same problem in our institution. India is the country with the highest number of potential candidates for cochlear implantation. We hope that we will continue to bring ray of hope into the lives of those million deaf children in our country.

### Historical Background

The first suggestion that electricity could be used to help the deaf has been attributed to Benjamin Franklin. In 1957, Djourno published the first description of cochlear implants inserted into two totally deaf patients. This stimulated much interest especially in the USA. In 1961, House et al implanted a single electrode into the cochlea and soon afterwards Simmons et al (1964) inserted six stainless steel electrodes directly into the auditory nerve. Both devices were initially successful but met a howl of criticism as the scientific community did not feel sufficient basic research had been accomplished to justify human implantation. Several workers began some careful animal experimentation. It was William House who recommended human implantation in 1969. In 1972, the single wire intracochlear device was designed by House and Urban. Clark and coworkers developed a multielectrode intracochlear implant at the University of Melbourne. This device was developed further as a 22 electrode array by a commercial company called Nucleus Ltd. The Melbourne/Nucleus implant device was the first commercially available cochlear implant which was capable of providing recognition of speech without any contextual clues by listening alone. The device is now being produced commercially by Cochlear Ltd and since 1994 several improvements to the speech processing strategies have occurred. The nucleus is the first implant to get FDA approval. We have used the Nucleus 24 channel implant in our patient.

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