Auditory rehabilitation of cochlear implant recipients: A review

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Abstract

To discuss the perioperative auditory rehabilitation practices in patients of profound sensorineural hearing loss, who are potential candidates for cochlear implantation and to deliberate upon the post implant therapy required in order to achieve best results, this review was undertaken. Recent findings like advancements in technology, cochlear implant design and refinements in surgical procedure for cochlear implantation, may give better surgical results and better hearing access, but it is the therapeutic rehabilitation, that would assist these patients in being able to use these devices. Though cochlear implant has established itself in patients with profound sensorineural hearing loss and the importance of a good auditory rehabilitation is recognized, there has not been a serious attempt to converse upon it and adapt it to an Indian setting. Most centers have their own protocols and there is a need to converge these into a working model that can be replicated. A comprehensive educational and habilitation program that would help an implant recipient to achieve maximum benefit is discussed. An implant rehabilitation program should be able to educate parents and caregivers as regards how to use methods in daily activities to help the recipient to develop speech and language. This would go a long way in achieving the best possible results, especially as technology is so advanced in current scenario.

Keywords: Rehabilitation, Auditory, Cochlear implant.

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Introduction

The cochlear implantation (CI) procedure provides an excellent access to the auditory signal in rehabilitation of profound hearing loss. This CI recipient requires a comprehensive rehabilitation program, which would help in using the CI device for development of speech and language skills.

A good auditory rehabilitation program forms one of the most important components of a cochlear implantation (CI) program. The importance of including the family members at early stage prior to CI that continues throughout the lifespan of the recipient is vital.

The rehabilitation program should aid and teach the CI recipient to integrate various components of communication including listening, speech language, reading and thinking with the auditory signal provided by the CI device. The CI recipient can thus benefit in learning and practicing strategies and skills that can help bring the process of communication under their control.

The importance and evolution of CI rehabilitation

The benefits of the cochlear implantation in children, includes overall improvement in auditory development, language growth, and improved speech production and greater speech intelligibility.[1-3] To achieve these goals to the fullest parental involvement is quintessential.[4] Parents and caregivers are extremely sensitive to the developments of speech and language, hence parental questionnaires are well accepted in assessing children.[5-7] A validated tool has been reported in Hindi in auditory rehabilitation.

A successful program should give regular assessment to the parents and also take feedback from them at regular intervals.[8]

Auditory rehabilitation set up

Requirement for setting up the facilities for Post Cochlear implant rehabilitation centre:

1. Room with minimum size of "11 x 10" feet.
2. Age appropriate furniture (tables and chairs) for children for providing one to one session and group sessions.
3. Equipment:
   a. Laptop for Intra operative testing / Mapping.
   b. Laptop to show videos and therapy sessions to parents and also to take Group Therapy.
   c. Toys: Noise makers, puzzles, educational toys, age appropriate games, etc.
   d. Reading Material across all age groups.
   e. Assessment Material.
   f. Group FM systems for group therapy (not essential).

g. Video Camera to record therapy sessions (not essential).

Rehabilitation services

The following services should form a part of cochlear implant program:

1. Switch on and counselling regarding warranty and maintenance of the device.
2. Post Cochlear Implant Speech Therapy to cochlear implant recipients: Four days a week.
3. Mapping facility as and when required by the recipient: Scheduled once a week.

Progress and outcome assessment

The progress of CI recipients as assessed by the various scales depicted at Table 1.[9-18]

The rehabilitation should start preoperatively and continue in the postoperative period. The ability to develop a rapport between the therapist, caregiver and CI recipient is vital. The rehabilitation aspects, on which the outcomes of CI is dependent includes family participation, emotional state of the parents/caregiver, skills of the therapist and parents and candidate's intelligence quotient.

The parents/ caregiver should be familiarized regarding all issues connected with the CI including knowledge about the surgery, liasoning with schools and forming support groups and meeting other families where members have received CI. Also, the parents/ caregivers should have a sense of responsibility and be confident regarding use of the auditory signal in order to achieve speech and language.

Table 1: Assessment tests / curricula frequently used in Cochlear Implant clinics of India[9-19]

a.	Early speech perception test for profoundly hearing impaired children
b.	Speech Intelligibility Rating (SIR)
c.	Evaluation of Auditory Responses to Speech (EARS)
d.	Categories of Auditory Performance (CAP)
e.	Glendonald Auditory Screening Procedure (GASP)
f.	Integrated Scales of Development
g.	Meaningful Auditory Integration Scale (MAIS)
h.	3-Dimensional Language Acquisition Test (3D-LAT)
i.	Meaningful Use of Speech Scale (MUSS)
j.	Linguistic Profile Test – Hindi
k.	Mac Arthur Communicative Development Inventories
l.	Peabody Picture Vocabulary Test – Fourth Edition (PPVT-4) (Dunn and Dunn, 2007)
m.	Receptive Expressive Emergent Languages Scale
n.	St. Gabriel's Curriculum – Second Edition

Conclusion

CI has revolutionized the rehabilitation of patients with profound hearing loss who gain no benefit with available hearing aids. The candidacy has now increased and encompasses less than profound hearing loss, single sided deafness and tinnitus. Working in unison with a rehabilitation team is quintessential to obtain maximum benefit.

Recommendations and key points

Auditory rehabilitation teaches the recipient to utilize the auditory signal in the best possible way to develop speech and language skills.

The participation of parent/caregiver at an early stage is vital.

The importance of forming a rapport between the therapist parent/caregiver and child cannot be overemphasized.

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