

COCHLEAR IMPLANT AND ITS ASSOCIATION WITH AUDITORY VERBAL THERAPY

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ABSTRACT

The purpose of this study was an attempt to give an insight and association between Cochlear Implant and Auditory Verbal Therapy. We can see the historic developments in the amplification devices for individual purpose is growing so fast, when it comes to cochlear implant it is playing vital role in the life of children with hearing impairment. As soon as cochlear implant surgery completed, the child with cochlear implant required some sort of training like listening training, auditory training and speech therapy/training for the benefit of the child and family as well. So, in that connection Auditory Verbal Approach/Therapy (AVT) makes a significant consequence in the child with cochlear implant by attending the AVT sessions with a qualified and trained professional. Majority of the children with cochlear implant are getting benefit from AVT. The relationship between cochlear implant and AVT is so crucial for the betterment of the child with hearing impairment. So, it is suggested to the parents to attend and make the child to participate in the AVT sessions regularly for the bright and dazzling future of their children.

Key Words: *Cochlear Implant, Auditory Verbal Therapy, Children with Hearing Impairment*

1. HEARING IMPAIRMENT

Hearing loss refers to a diminished ability to hear sounds like other people do, while deafness refers to the inability to understand speech through hearing even when sound is amplified. Profound deafness means the person cannot hear anything at all; they are unable to detect sound, even at the highest volume possible. Hearing loss comes in many forms. It can range from a mild loss in which a person misses certain high-pitched sounds, such as the voices of women and children, to a total loss of hearing. It can be hereditary or it can result from disease, trauma, certain medications, or long-term exposure to loud noises and aging. Hearing loss, also known as hearing impairment, is a partial or total inability to hear. A deaf person has little to no hearing. Hearing loss may occur in one or both ears. In children hearing problems can affect the ability to learn language and in adults it can cause work related difficulties.

If not detected hearing loss early, a hearing loss can change the way children speak, learn and interact with others. Being aware of a child's hearing abilities soon after they are born, e.g. through neonatal hearing screening, gives hearing health professionals time to manage a young child's hearing loss with effective habilitation. Once a hearing loss is detected, and appropriate measures put in place, a child can usually continue down the pathway of speech and language development. As soon as hearing loss identified and diagnosed further process is fitment of appropriate hearing aid. Audiologist will suggest to have either hearing aid or cochlear implant as the diagnosis results. It is the responsibility of the parents to decide either getting hearing aid or fitment of cochlear implant.

2. COCHLEAR IMPLANT

A cochlear implant is a cochlear prosthesis. It is an electronic device designed to provide sound information and improved communication ability to children and adults who have a profound Sensori-neural hearing loss (“nerve deafness”) in both ears and obtain limited benefit from appropriate binaural hearing aids. Hearing aids make sounds louder and deliver these amplified sounds to the ear. For individuals with a profound hearing loss, even the most powerful hearing aids provide little if any benefit.

The big advantage of a cochlear implant over a normal hearing aid is that children able to hear spoken language and speech sounds more acutely, and this facilitates more natural speech development. The implant is particularly proficient at facilitating the perception of certain frequencies of speech and the child is also able to monitor their own speech more successfully. When children receive a cochlear implant they will require a huge amount of input from the Speech and Language Pathologist/Therapist, the professional implant team, and the parents/care-givers of the child. For adults acquiring a cochlear implant, it is likely that they once had some hearing and already have speech skills, so any input from professionals may be less demanding. Normal hearing aids amplify the sound, implants attempt to bypass the damaged parts of the hearing mechanism and take the sounds straight to the auditory nerve. Implants require a surgical procedure to implant an electrode into the cochlea. The whole device is made up of several parts:

- A microphone which picks up the sounds
- A speech processor that selects the relevant sounds from the microphone
- A transmitter that turns the sounds into electrical impulses
- A receiver under the skin that sends the impulses to an electrode array which sits in the cochlea. This sends electrical impulses to the auditory nerve.

Once the operation is over for the child, and the cochlear implant is working, there will be several years work by all those involved with the child to facilitate listening, speech, and language development. There are several aspects of the child’s development and their environment that need to be a focus for the comprehensive development of the children with hearing impairment. There are various approaches are being followed and practiced to enhance the listening, speech, language, communication, social skills of the children with hearing impairment.

One of the most successful approaches for facilitating speech and listening for children with cochlear implants, is Auditory Verbal Therapy. This approach focuses on listening and sound awareness, as this is the most natural and efficient way that children learn speech. With auditory verbal therapy every possible opportunity to listen and learn is used through the day, using the child’s environment as a learning tool.

Auditory Verbal Therapy (AVT) involves the family and Speech and Language Therapist/Pathologist (SLT) who facilitate the child to learn to talk through listening (as a naturally hearing child would learn). Listening, speech, and language are all developed through active listening activities which become a part of play, education and communication on a daily basis. Parents are encouraged to be the primary facilitators of their child’s listening and speech development.

The process is helped by early diagnosis of hearing impairment and the fitting of a cochlear implant for optimal amplification. Parents also have to be committed to participate and work closely with the relevant professionals. The child learns through listening rather than watching. AVT should be administered by a qualified Auditory-verbal therapist who will guide and work with the parents so that they re-produce therapy activities at home in a natural way. Many of the activities we have discussed earlier will be part of the AVT program.

One of the techniques used in AVT is called an “auditory sandwich” where the therapist sits on the aided side of the child repeating auditory information several times, then presenting a visual clarifier (object, picture etc), and then presenting the auditory information again, making sure to use language that is rich in Suprasegmental aspects of speech such as Pitch, prosody etc. Acoustic highlighting is also used to stimulate the listening environment. This involves using variables such a background noise, distance, complexity and rate of utterance to vary the acoustic conditions and really train the child to listen. There are a number of levels of development of speech and listening skills following the Cochlear Implant:

- Awareness of sound - responding to sounds.
- Sound has meaning - associating a specific sound with an object in the environment.

- Early Listening - responding to music, vocalizing, imitating mothers vocal play, some approximations of short words - e.g. "Mama"
- Discrimination - discriminating between environmental sounds (inside and outside), quiet and loud sounds and different peoples' voices. Beginning to recognize own name, discriminating some short common phrases, imitating some short phrases.
- Localization Skills - beginning to be able to localize sounds from increasing distances.
- Distance and directional listening - having awareness of sounds in all directions. Discriminating familiar words and familiar commands from all directions at increasing distances.
- Listening in background noise - recognizing familiar words, phrases and commands with increasing differences, in all directions with background noise.
- Auditory memory and sequencing - ability to make choices from several options, starting to have ability to select pictures in sequence. Imitating several word sequences.
- Development of short term memory - ability to pick several named objects from a larger group. Longer term memory will also expand, remembering names and more vocabulary.
- Using more words and phrases, and knowing some simple songs. Ability to recount information such as addresses and describe past events.

This development will not happen overnight and the success of therapy will be dependent on total commitment from the parents, caregivers and educational healthcare team around the child.

3. AUDITORY-VERBAL THERAPY

Auditory-Verbal Therapy is a specialized type of therapy designed to teach a child to use the cochlear implant for understanding speech and learning to talk. The child is taught to develop hearing as an active sense so that listening becomes automatic and the child seeks out sounds in life. Hearing and active listening become an integral part of communication, recreation, socialization, education, and work. The philosophy of Auditory-Verbal Therapy (AVT) is Deaf and hard of hearing children to grow up in a regular learning environment, enabling them to become independent, participating, and contributing citizens in the mainstream society.

- AVT is a parent centered approach that encourages the use of naturalistic conversation and the use of spoken language to communicate.
- AVT is an approach that emphasizes the use of residual hearing to help children learn to listen, process verbal language, and to speak.
- AVT Maximizes the use of the child's aided residual hearing for the detection of sound.
- The earliest possible identification of hearing loss with immediate fitting with amplification, as well as prompt intervention helps to reduce the extent of language delays commonly associated with hearing impairment.
- AVT is based on teaching parents, during their child's individual therapy sessions to emphasize residual hearing and interact with their child using the auditory-verbal approach.
- AVT encourages interaction and mainstreaming children from the beginning with normal-hearing peers.
- Participation in playgroups, library story hours, and attendance in community schools can provide children highly motivating natural language models.
- AVT teaches the child to develop self-monitoring skills.
- The child learns to listen to his/her own voice as well as to others during natural conversations thereby promoting natural voice quality.
- AVT follows a logical and critical set of guiding principles. The parent, therapist, and child engage in play activities that teach the child to his or her amplified residual hearing to learn auditory-verbal communication like children with normal hearing.

3.1 Basics of AVT

The earlier we detect hearing loss, the sooner we need to start the therapy to lower the impact on child's learning. Usually all the parents expects that their child need to attend a regular school that will equip them for a relatively normal life and career.

The learning process is designed to be fun, positive and rewarding for both parents and child. Together, parents will teach and learn through play and of course, by speaking and listening to each other. The parents need to see it as a great way to develop a closer relationship with child rather than a rigorous duty.

3.2 Principles of Auditory-Verbal Therapy

- To detect hearing impairment as early as possible through screening programs, ideally in the newborn nursery and throughout childhood.
- To pursue prompt and aggressive Audiological management and maintenance of appropriate aids (hearing aids, cochlear implants, etc.).
- To guide, counsel, and support parents and caregivers as the primary models for spoken language development and to help them understand the impact of deafness and hearing impairment on the entire family.
- To help children integrate listening into their development of communication and social skills.
- To support children's auditory-verbal development through one-on-one teaching.
- To help children monitor their own voices and the voices of others in order to enhance the intelligibility of their own speech.
- To use the developmental patterns of listening, language, speech, and cognition to stimulate natural communication.
- To continuously assess and evaluate children's development and, through diagnostic intervention, modify the program when needed.
- To provide support services to facilitate children's educational and social inclusion in regular education classes.

3.3 Importance of Auditory-Verbal Therapy

- When aided properly, children with even profound hearing losses can detect, most if not all, speech.
- A child who has a hearing impairment need not automatically be a visual learner (i.e. sign language), rather he/she can learn how to be an auditory learner.
- Children learn language most effectively through consistent and continual, meaningful learning interactions in a supportive environment.
- As verbal language develops, with audition, reading skills can also develop.
- Parents in AVT programs do not need to learn sign language.
- AVT uses and encourages the maximum use of hearing, and stresses listening rather than watching.
- AVT uses a team approach to therapy that allows for a more complete education environment.

3.4 Family Role in the AVT

This approach is very intense and requires involved and dedicated families for it to be successful. In order for AVT to work for child with cochlear implant it is up to the parents, as parents and caregivers, to be a strong advocate for him/her. It is essential that child with cochlear implant receive consistent Audiological management, appropriate and consistent therapy, and adequate support in all environments with the expectation for their child to listen.

3.5 The Relationship among various important dimensions in development of children with hearing impairment

Communication environment at home and school

As well as helping the hearing impaired child to communicate, everyone around the child must also have a heightened awareness of their own communication and the communication environment. As communicators with deaf children we must be aware of a number of our own behaviours, including facing the hearing impaired child when communicating, talking clearly so they can see our lip patterns, and when needed, using gesture, sign or visuals to help understanding (with Auditory-Verbal Therapy, which we discuss later, you may actually not follow some of these processes, as you are trying to teach the child to listen and discriminate). We must also pay attention to the physical environment and communicate in an area that is well lit and where there is less background noise.

Speech and Language

Hearing impaired children are likely to have difficulty learning language, but implanted children should have a good chance of catching up with their peers provided they are implanted early and have frequent language input from those around them. Be aware that hearing children in the pre-verbal stage get feedback from an adult when they look at things, like a running commentary. It is important to have a joint focus, letting the child explore and control their environment, but you can facilitate language development by sitting with the child and talking about what they are doing. As an adult with a hearing impaired baby, try and respond as often as possible, and try to follow your babies focus (as you would with a hearing baby or young child). Keep bringing your child's attention to sounds that you can hear.

Pragmatics, social skills and conversational skills

These areas of communication describe learning the use of language in context, turn taking, attention getting, initiating, responding, repairing, topic maintenance, shared knowledge and inference, facial expression, eye contact, proximity and touch. These are all skills that most of us learn easily in the first few years of life, but they may not evolve naturally for children with hearing impairment. The important point here is, don't let the deaf child be a passive participant, we want them to learn to turn-take, respond and share their thoughts and feelings. Videoing the hearing impaired individual interacting is a good way to highlight certain skills to them.

Speech development and expressive communication

Speech development has a number of elements:

- Phonological awareness and letter sound knowledge
- Articulation of speech sounds
- Prosody and intonation (sign language does not have this, but the use of facial expression adds emphasis to meaning)
- Voice quality is another aspect of speech that is sometimes an issue for hearing impaired children. Children with hearing impairment are often not able to monitor their own voices effectively and may speak too quietly or loudly. They may also not be aware of breath control when talking.
- Cochlear implanted children will have the benefit of having a device that allows them to "tune into" speech sounds more easily and monitor their own speech. However, there will be a number of key listening skills the child will need to learn through auditory training before they can develop speech sounds.

3.6 Things to remember when communicating with an individual with cochlear implant

- Always be on the implanted side of the person when you talk to them
- Think about the environment - lighting, clothing, background noise etc
- Use facial expression and gesture to add meaning
- When carrying out listening activities try not to let the child read your lips and refrain from signing or gesture
- Repeat and rephrase your communication if not understood
- Request confirmation from the hearing impaired individual

- Comment on what the child is doing or looking at, have a joint focus
- Do not over articulate, but do not mumble either
- Think about the volume and rate of your own speech
- Set the context to help the hearing impaired person understand
- Always respond and reward with a smile
- Keep bringing your child's attention to sounds that you can hear

3.7 Activities to encourage the Child's language for parents/siblings/caretakers

- Talk to the child constantly, realizing that he/she can hear you
- Respond to your child's coos, gurgles, and babbling
- Talk to the child as you care for him or her throughout the day (diapering, getting dressed, fixing meals, trips to stores)
- Read colorful books to the child; talk about what is happening in the pictures.
- Tell nursery rhymes and sing songs
- Teach the child the names of everyday items and familiar people with a lot of repetition
- Take the child with you to new places and situations
- Play simple games with the child such as "peek-a-boo" and "pat-a-cake"
- Cover their favorite toys (while they are watching) and wait for responses
- Give the child toys that make different noises
- Reward and encourage early efforts at saying new words
- Talk to the baby about everything you're doing while you are with him/her
- Talk about new situation before you go, while you are there, and again when you are home
- Look at the child when he or she talks to you
- Describe what your child is doing, feeling, hearing
- Let the child listen to children's tapes and CD's
- Praise your child's efforts to communicate
- Repeat new words over and over
- Take the child on "listening walks"
- Let the child tell you answers to simple questions
- Read books every day, as parts of routines as well
- Listen attentively when the child talks to you
- Describe what you are doing, planning, thinking
- Have the child deliver simple messages for you
- Ask questions to get your child to think and talk
- Show the child you understand what he or she says by answering, smiling, nodding your head
- Expand what the child says, if he or she says, "more juice", you say, "Alex wants more juice."

3.8 Common pitfalls

To clarify what AVT is, we also need to look at what AVT is not. Many parents fall victim to these pitfalls, and they're all too easy to fall into. Here are some common errors that every parent of child with Cochlear implant should avoid at all costs.

Using visual cues: Parents should not use visual cues with child. Real life won't offer the same cues, and aim of AVT is to equip the child with listening and speaking skills. Visual cues don't fit into the picture at all!

Speaking very loudly: The temptation to pump up the decibels is a real one as soon as we know that someone is hard of hearing, parents don't want their child to rely on overly loud voices for the simple reason that they want them to be as 'normal' as possible.

Using overly simplified language: Use the same vocabulary as parents would naturally use. It's all about learning skills that equips the child for a normal existence.

Playing ‘teacher’: We tend to think of the learning process as something that consists of regimentation, drills and teachers that simply observe and comment. Too much pressure will reduce child’s learning ability. A parent is a participant, and they and their child are playing a really cool game.

3.9 Important terms which the parents should aware and understand during AVT

- **Learning to Listen Sounds-** The list of sounds that are used to represent objects. For instance, "aaah" represents an airplane and "moo" represents a cow. They are used with the beginning listener.
- **Ling 6 Sound Test-** A test of listening that is done periodically throughout the day where the child which requires the child to respond to 6 sounds (ah, oo, ee, sh, s, and m) presented auditorally. The child completes an action or imitates the sound when heard. These sounds represent the sounds across the frequency range for speech.
- **Modeling-** The verbal-visual demonstration of what you want the child to do, especially for imitation purposes. For instance, if you wanted the child to drop a block in a box upon hearing a sound, you the parent would model this for the child.
- **Suprasegmentals-** The way in which we use vocal qualities such as stress, duration, pitch, and volume, to relay the meaning being said. Intonation. It is with these intonation/suprasegmental changes in our speech that we are able to make a question or a statement with the same words, (i.e. You're going to the beach? Or You're going to the beach.)
- **Critical Elements-** The parts of a message that contain the critical information in regard to comprehension of the message (i.e. Pick up the blue circle after the red square. This sequence has 5 critical elements)
- **Residual Hearing-** The amount of hearing an individual has at various frequencies without his/her hearing aid/cochlear implant.
- **Hearing Age-** The length of time the child has been receiving auditory input. (i.e. a 3 year old child who was born deaf, and received her cochlear implant at 2 years of age, as a hearing age of 1 year.)
- **Motherese -** Speech used by parents/caregivers in talking with young children to help them in learning language.
- **Acoustic Highlighting-** Techniques that can be used to make speech easier to hear.
- **The Hand Cues-** is covering of the mouth (by hands, a toy, book, picture, etc.) during speaking when the child is looking directly at the face of the speaker.

4. CONCLUSION

One of the most successful approaches for facilitating listening and speech for children with cochlear implants, is Auditory Verbal Therapy. This approach focuses on listening and sound awareness, as this is the most natural and efficient way that children learn speech. With auditory verbal therapy every possible opportunity to listen and learn is used through the day, using the child’s environment as a learning tool. Auditory Verbal Therapy (AVT) involves the family and Speech and Language Therapist/Pathologist (SLT) who facilitate the child to learn to talk through listening. Listening, speech, language and communication are all developed through active listening activities which become a part of play, education and communication on a daily basis. Parents are encouraged to be the primary facilitators of their child’s listening and speech development. Auditory Verbal Therapy will be successful in collaboration efforts of parents and Speech and Language Therapist/Pathologist or Auditory Verbal Therapist/Trainer.

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