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COCHLEAR IMPLANTATION: AN INNOVATION IN THE DEVELOPMENT OF TECHNOLOGY, MEDICINE, DEAF PEDAGOGY AND SPEECH THERAPY

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Abstract:
This article describes the role of cochlear implantation in the development of medicine and special pedagogy, the purpose and tasks of cochlear implantation.

Key words: innovation, technology, medicine, deaf pedagogy, technology, medicine, deaf pedagogy, reverberation condition, diagnostic, compensatory, adaptive.

Nowadays, it is becoming more and more common for many people living in many countries to recover their hearing with the help of a cochlear implant. Currently, various hearing aids are used to improve the hearing of children and adults with various hearing impairments. However, we cannot say that all devices can improve the effect of speech on auditory sensations during use. Some hearing aids partially affect the hearing of people who cannot hear due to various technical, physiological and pathophysiological reasons, and some do not at all.

Based on the analysis of theoretical data on the education of deaf and hard-of-hearing children, we made the following conclusions:

correct diagnosis is of great importance in the organization of education and upbringing of deaf and hard of hearing children;

it is necessary to give priority to the use of hearing aids in the development of speech of children with hearing impairment. In this process, it is important to choose different means of influencing the auditory sensation, taking into account the physiological and psychological characteristics of the child;

appropriate use of oral, written dactyl and gestural forms of speech is required as the most optimal way to develop spoken language in deaf and hard of hearing children;

when working with deaf and hard-of-hearing children, it is necessary to work on both hearing and speech in parallel from the first period;

In the development of hearing perception and speech of deaf and hard-of-hearing children, sound amplification devices, including a cochlear implant designed to restore hearing, have great potential.

The cochlear implant is recognized as a means of intensively ensuring the effectiveness of the work aimed at performing the correctional-pedagogical and developmental tasks with the listed deaf and hard-of-hearing children.

Over the past fifteen years, the development of the sciences of deaf technology and deaf pedagogy and the practical application of innovative technologies have increased the need for the use of a new multi-channel cochlear implant hearing aid for hearing impaired children. Cochlear implantation has the following goals:

- speech intelligibility increase by 10-12% in noisy conditions;
- improving the localization of the sound source in space;
- increasing the intelligibility of speech when talking with several speakers in reverberation conditions;
- teaching to distinguish and speak different sounds, increase vocabulary.

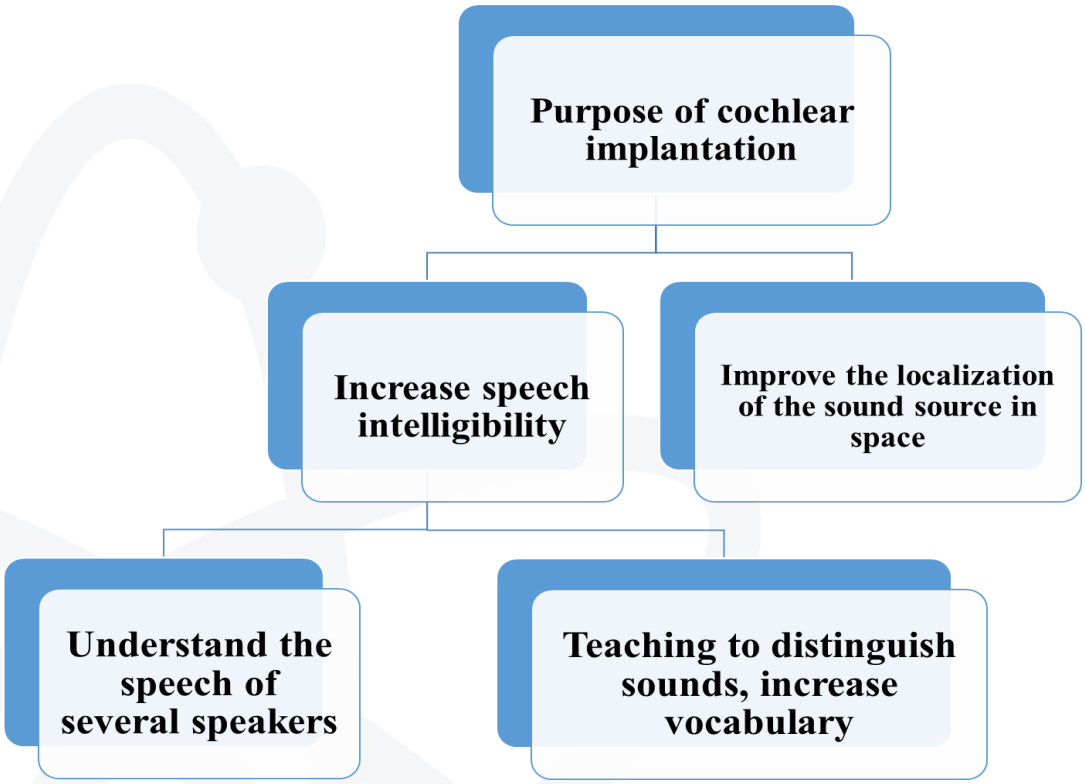

Figure 1. The purpose of cochlear implantation.

The tasks of cochlear implantation are as follows:

1. Early diagnosis of deviations from the norm in the child's development.
2. Restoration of hearing.
3. Development of speech due to the development of auditory perception.
4. Providing the possibility of harmony among healthy people.

Information about the history of cochlear implantation in which countries and what experiments were carried out is presented in the appendix.

Sensorineural deafness is caused by damage to the inner ear, i.e. fibrous tissues. However, despite damage to most of the sensory tissues, fibers of the auditory nerve are preserved in many such patients. When these fibers are directly activated by an electric current, they can send a signal to the brain that provides auditory sensations. The principle of cochlear implantation is based on this process, which in turn means an artificial inner ear.

Today, a cochlear implant is becoming a real means of hearing prosthesis for people with total deafness and a high level of sensorineural hearing loss. One of the most common cochlear implant systems is the 22-channel Nucleus cochlear implant distributed by Cochlear.

Different people may have different sensations as a result of electrical stimulation of the auditory nerve. Therefore, it is necessary to use different strengths of the stimulating current when stimulating different channels in the same person or when stimulating the same channel in different people. In addition, the same person has the ability to individually distinguish different tones of the voice under the stimulation of different channels. For this purpose, a fine adjustment is provided in the speech processor, which is individually adjusted according to the client's reception of electrical stimulation.

Restoration of hearing through the physical and technical capabilities of the above-mentioned cochlear implant device provides the following opportunities for a person.

- the sense of hearing up to 40 dB compared to normal hearing is restored;
- the level of differentiation increases by hearing everyday non-speech sounds found around;
- by hearing speech sounds, a person can effectively enter the world of listeners;
- children and adults with cochlear implants begin to understand the interlocutor's speech by hearing. These listed KI options are shown in the diagram below.

Conductive hearing loss or partial hearing loss can be compensated with individual hearing aids.

In practice, it was observed that there are many controversial questions, that is, is the sound amplifier good? or Cochlear Implant? As a practical solution to this question, we list the following medical, pedagogical, surtotechnical conclusions:

1. A multi-channel implant can restore the frequency selectivity of hearing, that is, the ability to distinguish simultaneously existing frequencies in an acoustic signal. Hearing aids cannot in principle restore the frequency selectivity of hearing.

2. The use of the implant does not allow acoustic feedback (often, when listening with a sound amplifier, the reverberation effect of the room has a negative effect on a person). Accordingly, it provides the ability to perceive extremely low sounds in spoken speech.

In addition to the conveniences of the above-mentioned cochlear implant, there are also some disadvantages:

1. Variability of the results of speech hearing improvement after cochlear implantation (various haze). To date, despite the fact that a number of factors have been identified to predict the perception of speech in implanted patients, there is no clear prediction of this.

2. People with implants have difficulty hearing concentrated sounds, such as musical sounds. In addition, the microphone can pick up sounds from a certain distance, but it is not possible to hear from great distances. Today's advances in electronic technology can eliminate this shortcoming.

The primary indication for cochlear implantation is the highest degree of sensorineural deafness. The standard of choice for subsequent cochlear implantation is attention to the efficiency of hearing prosthetics with a simple hearing aid. If a person understands 30-40% of words using a normal hearing aid, a recommendation for a cochlear implant may lead to good results. If the patient's responses are not less than 5% and there are no contraindications, it can be safely recommended for implantation.

Educators and parents should be aware of complications that may occur in a child after surgery. They are as follows:

- complicated cases of injury;
- damage to the facial nerve;
- loss of sensation and stiffness in the area behind the ear;
- disturbance of sense of taste and balance;
- a significant increase in noise in the ear;

It should be said that cochlear implant failure has been observed in rare cases. However, it is unlikely that the implant will significantly improve speech understanding. The duration of electrical stimulation has not yet been determined.

The first year after surgery is an important period in the formation and development of physical and mental characteristics that will be necessary for the child throughout his life. Researchers consider this period to be the period of the fastest development of children.

It is known that during the infancy of a normally born and developing child, the sensory systems, i.e. vision, hearing, and tactile senses, develop intensively. The social

situation of this period is characterized by the inseparable joint activities of adults and children. In this case, adults influence the child as a trigger of visual and auditory senses. Infancy and early childhood are critical periods in child development, when the brain becomes highly sensitive to sensing and using environmental stimuli such as speech sounds. This auditory function means that sounds are necessary for imitating speech, speech activity, feedback acoustic communication and understanding the meaning of words and phrases at the stage of brain development. Differentiated hearing of phonemes serves as a necessary condition for their correct pronunciation. A 5-6-year-old child develops his pronunciation and is able to fully master all aspects of speech development. That is, the phonetic and rhythmic structure of the word, variably embellishing phrases with tones, fully mastering expressive speech based on various communicative purposes, and in the later, older age periods, they also learn the nuances of emotional states.

In order for the first speech movements to appear, there must be a certain cognitive reserve that appears with the functioning of the cerebral cortex. The emergence of targeting when hearing the mother's voice and other sounds, seeing the speaker's face, looking at brightly colored toys, etc. are important factors for the overall development of the child. The first non-verbal reactions of communication appear in a 1.5-month-old child: smiling when he sees his mother's face and when he hears her voice. By the age of 3 months, the child's laughter is synchronized with the parents' laughter.

Visual communication determines verbal communication, which determines the emotional interaction of hearing, attracting and holding auditory attention, auditory perception, and speech perception. Eat. N. Vinarskaya said: "By the 9-10th month of a child's life, the child develops an understanding of adult speech, and at 18-20 months, he understands the first simple words that he can say in syllables."

Hearing impairment in deaf children reduces the sensory side of mental development. In addition, there are secondary disturbances in the emotional sphere, spatial imagination, objective-practical activity. Children who have lost hearing at an early age do not have the opportunity to independently acquire the mother tongue. In healthy children, this possibility is available at the level of imitation.

E.V. According to Mironova: "In a child with normal hearing, hearing impairment for some reason affects not only the ability to receive the speech of others directed at him, but also the quality of his personal speech. These are: intonation becomes impoverished, the pace of pronouncing words changes, the vocabulary becomes shorter, a defect in pronunciation of sounds occurs - not pronouncing them to the end, dropping them, etc. As a result, verbal communication is bilaterally impaired."

Scientists dealing with the problems of hearing-impaired children believe that children with severe hearing disorders can hear low-frequency sounds better when they use hearing aids. Experience shows that implanted children begin to perceive a wide spectrum of sounds, as well as high-frequency sounds, as soon as the speech processor is connected for the 1st time. In this way, we are sure that other possibilities of speech acquisition will appear.

Acoustic and speech signals transmitted through a cochlear implant differ from natural sounds. Nevertheless, in all categories of clients (congenital deafness or acquired deafness), adaptation to a new sound image involves a certain period.

It is observed that children with cochlear implants in their early years develop their personal auditory-speech skills when given comprehensive support, and have a high level of psychophysical development, being close to their peers with normal hearing.

In the early days of cochlear implantation in Uzbekistan, the priority was for specialists to work with children individually. That is, specialists conducted targeted training with a child with a cochlear implant before surgery and after surgery. In the initial period, the content of the pedagogues' training was developed on the basis of the tasks that teach the recognition of non-speech and speech sounds. Then, as a result of the organization of a scientific-practical seminar at the Tashkent RIPIAT center, a comprehensive pedagogical system of creating the content of the training was put into practice. The content of this system includes the following directions.

1. Learning to hear and distinguish non-speech sounds.
2. Learning to hear and distinguish speech sounds.
3. Learning to distinguish sentences and texts by listening.

The Russian practice of pedagogical work with children with cochlear implants is leading. Russian scientist O. Zontova put into practice a number of methods of working with children with cochlear implants. The peculiarity of these methods is that children with cochlear implants are given the opportunity to choose the type of communication that is convenient for them in the speech environment. In particular, this approach was applied to children who were implanted with cochlear implants after the formation of speech or while studying in special educational institutions.

In the listed studies, methodical recommendations regarding the preparation of hearing-impaired children for cochlear implantation, methodological aspects of deaf-pedagogical influence before and after surgery, specific forms of education, and the use of special didactic tools were put into practice. It is known that children with cochlear implants have the same opportunities for intellectual development as healthy children. Therefore, the views of the leading countries of Europe, especially Russia, regarding the appropriateness of education of children with cochlear implants in the

general education process, which are effectively used in practice, are also considered as a basis in Uzbekistan. That is, the priority is the demand for children with cochlear implants to be involved in general preschool education organizations and schools.

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