

## SPEECH-HEARING REHABILITATION IN CHILDREN WITH COCHLEAR IMPLANTS: INTEGRATIVE APPROACHES

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**Annotation:** *This article analyzes effective ways to develop speech and hearing in children with cochlear implants. In particular, the role of music therapy, speech therapy exercises, sensory integration, DENS therapy and neurogymnastics in activating the child's auditory system, improving pronunciation, speech perception and developing communication skills is highlighted. The article also provides practical recommendations for organizing the rehabilitation process by speech therapists and defectologists based on an integrated approach.*

**Keywords:** *cochlear implant, rehabilitation, hearing development, speech formation, music therapy, speech therapy exercises, sensory integration, DENS therapy, neurogymnastics, integrated approach.*

**Annotatsiya:** *Mazkur maqolada koхlear implantatsiya o'tkazilgan bolalarda nutq va eshituv qobiliyatini rivojlantirishning samarali yo'llari tahlil etiladi. Ayniqsa musiqa terapiyasi, logopedik mashqlar, sensor integratsiya, DENS-terapiya va neyrogimnastika mashg'ulotlarining bola eshituv tizimini faollashtirish, talaffuzni yaxshilash, nutqni idrok etish hamda muloqot ko'nikmalarini shakllantirishdagi o'rni yoritilgan. Maqolada shuningdek, logoped va defektologlar tomonidan reabilitatsion jarayonni kompleks yondashuv asosida tashkil etish bo'yicha amaliy tavsiyalar berilgan.*

**Kalit so'zlar:** *koхlear implant, reabilitatsiya, eshituvni rivojlantirish, nutqni shakllantirish, musiqa terapiyasi, logopedik mashqlar, sensor integratsiya, DENS-terapiya, neyrogimnastika, kompleks yondashuv.*

**Аннотация:** *В статье анализируются эффективные способы развития речи и слуха у детей с кохлеарными имплантами. В частности, освещается роль музыкотерапии, логопедических упражнений, сенсорной интеграции, ДЭНС-терапии и нейрогимнастики в активации слуховой системы ребенка, улучшении произношения, восприятия речи и развитии коммуникативных навыков. В статье также даны практические рекомендации по организации реабилитационного процесса логопедами и дефектологами на основе комплексного подхода.*

**Ключевые слова:** *кохлеарный имплант, реабилитация, развитие слуха, формирование речи, музыкотерапия, логопедические упражнения, сенсорная интеграция, ДЭНС-терапия, нейрогимнастика, комплексный подход.*

In recent years, medical and pedagogical approaches to ensuring the social adaptation and speech development of children with hearing impairments have been radically changing. In particular, the introduction of cochlear implantation technology has opened a new chapter in life for children with profound hearing impairments. With the help of this technology, the auditory nerve can perceive sound signals directly through electrical stimulation, which restores the child's ability to hear, distinguish and pronounce speech.

However, it should be noted that a cochlear implant cannot completely replace a child's natural auditory system. It only partially restores physiological hearing, but complex psycholinguistic processes such as speech perception, the formation of phonemic hearing, and the development of pronunciation are formed through special rehabilitation exercises. Therefore, speech and hearing rehabilitation is the most important stage in working with children with cochlear implants.

According to modern rehabilitation theories, along with restoring the child's auditory system, it is necessary to re-form neural connections between the auditory, motor, speech and emotional centers of the brain. This is more effective if it is not limited to speech therapy alone, but is carried out on the basis of a multi-component - integrative approach.

Today, various techniques such as music therapy, voice exercises, sensory integration, neurogymnastics exercises, speech therapy massage and DENS-therapy are successfully used in the rehabilitation of children with cochlear implants. Through music therapy, the child increases auditory sensitivity, begins to distinguish rhythm and intonation; voice exercises activate the phonation and articulation systems; sensory integration therapy creates a balance between the auditory, visual, vestibular and tactile systems. Neurogymnastics exercises increase neural plasticity, which reactivates the speech centers of the brain. At the same time, while speech therapy massage normalizes the condition of the muscles of the articulation apparatus, DENS therapy supports hearing and speech processes at the neurophysiological level.

It should be noted that the key to success after cochlear implantation is the organization of an individual, systematic and integrated rehabilitation program. It is important to take into account the hearing experience, age characteristics, level of psychomotor development and family environment of each child, and to gradually complicate the training.

Although the cochlear implantation process is an important stage in the restoration of the child's auditory system, its real result depends on the quality and consistency of subsequent rehabilitation activities. Because the implant creates a new acoustic experience for the child's brain, but the correct perception, processing

and application of this experience to speech activity is possible only through a complex educational and rehabilitation process.

At the initial stage of rehabilitation, the sound signal processing system in the child's brain is activated. The goal is to gradually expand the child's auditory experience and teach him to perceive sounds meaningfully.

The following practical methods are used in this direction:

Exercises for distinguishing and comparing sounds of different intensities;  
games to determine the location of the sound source (localization);  
exercises that form the connection between words and sounds;  
auditory training on distinguishing household sounds, music and speech sounds.

These exercises strengthen the child's auditory attention, form phonemic perception and lay the foundation for the ability to distinguish speech.

Therefore, the work carried out after implantation consists of several interrelated areas, which are aimed at integrating the child's auditory, speech, motor, emotional and cognitive activities.

After the implant, the child learns to hear sounds, but producing correct speech through them requires special skills. Therefore, the second area of rehabilitation is focused on the development of speech-motor activity.

At this stage, the following are carried out:

correct formation of speech breathing - exercises for synchronizing breathing and pronunciation;

voice exercises (phonation) - lengthening vowels and consonants, rhythmic pronunciation;

articulation exercises - activating the movements of the muscles of the lips, tongue, jaw;

logorhythmic exercises - performing movements and speech in rhythmic harmony.

Through these activities, the child consciously controls sounds, pronunciation accuracy increases, and speech acquires a natural rhythm and intonation.

Hearing restoration for children with implants does not by itself guarantee an increase in vocabulary and the formation of a grammatical system. Therefore, the next direction of speech therapy work is focused on the meaningful mastery of the language system.

In this process:

learning new words in context;

naming objects, actions and adjectives based on hearing;

constructing simple and complex sentences;

exercises are conducted to form dialogical and monological speech.

As a result, the child learns to semantically analyze the information heard and develops speech thinking.

The restoration of hearing has a strong impact on the child's mental state. Some children are afraid of extraneous sounds, are overly sensitive or fatigued. Therefore, one of the important components of rehabilitation is ensuring psychological adaptation.

At this stage:

Emotional stability is created through games, music and relaxation exercises;

Positive motivation, self-confidence and openness to communication are fostered;

A favorable psychological environment is created for the child in cooperation with parents.

Emotional balance accelerates the child's auditory learning process and enhances a positive attitude towards rehabilitation.

Sensory integration therapy is aimed at balancing the interaction between the child's different sensory systems. In children with implants, an imbalance between visual, vestibular or tactile sensations may be observed while the auditory system is actively recovering.

Therefore:

looking at the source of the sound, pointing to it;

balance games (balance board, exercises with a ball);

exercises that require coordination of vision and hearing are performed.

These strengthen the connections between neural networks, increase the level of brain plasticity and accelerate speech processes.

The result of rehabilitation depends not only on the work of the specialist, but also on the regular participation of parents. Special training programs are developed for them, which teach the following aspects:

daily listening exercises with the child;

use of correct speech communication techniques;

monitoring and encouraging the child's successes.

Home-based training allows the child to continue their rehabilitation process in a natural environment.

The rehabilitation process requires close cooperation between representatives of several fields. This team includes a speech therapist, a deaf-mute teacher, a psychologist, an audiologist, a physiotherapist and a music therapist. Their mutual exchange of information and work on an individual program ensures the child's comprehensive development.

As a result of rehabilitation carried out in this way, the child consistently develops not only auditory activity, but also speech, perception, attention and social communication skills.

Music therapy is an effective tool that supports not only auditory perception, but also emotional, social and speech development in children with cochlear implants. Music smooths the child's adaptation to the new sound environment, forms a positive emotional attitude towards using a hearing aid. Through singing, musical movements and rhythmic games, the child acquires important speech skills such as breathing control, pronunciation clarification, and intonation.

In addition, through music, the child's inner feelings find expression, which helps to relax and build self-confidence. Musical activities develop attention, memory and auditory attention, and also strengthen the emotional bond between parents and children. Therefore, music therapy should be widely used in post-cochlear implant rehabilitation as a comprehensive method that provides sensory, emotional and speech integration.

Music therapy after cochlear implantation, along with activating the child's auditory system, is an important factor facilitating his psychological adaptation. Music directly affects the child's emotional world, forming a positive mood and readiness for communication. In the process of singing, rhythmic movements and musical games, the child feels the difference between sounds, perceives intonation and clarifies pronunciation. Music therapy also strengthens the child's attention, memory, auditory focus and increases speech activity. The soothing melodies of music reduce stress in the child and strengthen a positive attitude towards using a hearing aid. Musical classes with the participation of parents strengthen the emotional connection between the child and the family, which further increases the effectiveness of the rehabilitation process. Therefore, music therapy is of great importance as a complex tool that ensures the coordination of hearing, speech and emotional development at the post-implant stage.

DENS therapy plays an important role in improving the general condition of a child after a cochlear implant, increasing his psychophysiological readiness for auditory activity. This method, using gentle electrical impulses, calms the nervous system, reduces muscle tension and protects the child's body from stress.

During the sessions, the child's attention, concentration and balance of movement improve, which allows him to perform speech and hearing exercises more effectively. DENS therapy strengthens the child's confidence in rehabilitation, he feels comfortable and calm. Therefore, this method is highly effective when used in conjunction with speech therapy, psychological and auditory training.

Speech therapy training is the most important practical stage aimed at forming the child's ability to hear and pronounce sounds correctly after the implant. The

training is carried out through elements of games, poetry, stories and songs, creating an opportunity for the child to learn speech in a natural environment.

Articulation exercises strengthen the muscles of the lips and tongue, and voice exercises form the tone and rhythm of speech. In the process of speech therapy, the child gradually learns to express his thoughts in words, which facilitates his social adaptation. Therefore, speech therapy is the central psychopedagogical direction of post-implant rehabilitation.

Sensory integration therapy helps to harmonize the child's auditory, visual, motor and sensory experiences. After a cochlear implant, a child often experiences difficulty in adapting to a new sound environment. Therefore, it is important to ensure coordination between different analyzers through play, movement and sensory exercises.

For example, listening exercises with looking at the source of the sound, touching it or rhythmic movement activate the child's perception. This increases auditory sensitivity, balance and attention. As a result, the child can clearly distinguish sounds and is ready to communicate. Sensory integration therapy thus has a comprehensive effect on the child's auditory-speech, motor and emotional development.

In general, the final rehabilitation from a cochlear implant requires a consistent approach not only medically, but also pedagogically and psychologically. The combined use of music therapy, sensory integration, speech therapy, DENS therapy and neurogymnastics during the rehabilitation process activates the child's auditory-motor systems and creates a favorable environment for speech development.

This process develops the child's skills in distinguishing sounds, perceiving speech, forming pronunciation, controlling breathing, and engaging in social communication. Most importantly, such a comprehensive approach increases the child's self-confidence and reduces psychological barriers to communicating with the environment. Therefore, it is advisable for speech therapists, defectologists, psychologists, and parents working with children with cochlear implants to consistently use modern rehabilitation technologies in their work.

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