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Rehabilitation Strategies for Children with Acquired Sensorineural Auditory Deficits

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Annotation: Acquired sensorineural auditory deficits represent one of the most challenging forms of hearing impairment in childhood. This condition arises when structural or functional damage occurs within the sound-perceiving components of the auditory system, ranging from the cochlear sensory receptors to higher neural pathways. Etiologically, pediatric sensorineural impairment stems from a broad spectrum of factors that may be hereditary—associated with genetic or familial influence—or non-hereditary, resulting from diverse external exposures. Depending on the timing of onset, hearing loss may be present at birth due to prenatal or perinatal insults, or it may develop later as an acquired condition triggered by environmental, infectious, traumatic, or toxic influences. Understanding the underlying mechanisms is essential for selecting effective rehabilitation approaches tailored to the child's developmental and psycho-emotional needs.

Keywords: sensorineural auditory deficit; pediatric rehabilitation; psycho-emotional adaptation; multifactorial etiology.

The revolutionary achievements of molecular genetics in recent decades have radically changed the understanding of the true nature of congenital hearing loss and determined the revision of the ratio (share) of causes in the etiological structure. Changes in the genotype are the cause of hearing impairment in 70% of children with congenital and pre-speech hearing loss, and in 70-85% of cases these are non-syndromic forms. More than 100 genes encode membrane, regulatory and structural proteins of the inner ear. Mutations in them lead to disruption of the organ of Corti, and, accordingly, to peripheral hearing loss [1, 2].

Congenital sensorineural hearing loss is an important public health problem. The need for early diagnosis of hearing loss and deafness is primarily due to the direct dependence of the speech and mental development of a hearing impaired child on the timing of the start of rehabilitation measures. The recommended optimal age for the prognosis of speech and psychoemotional development at making the final diagnosis and the beginning of rehabilitation measures is limited to 3-6 months of life, especially in the case of profound hearing loss. Therefore, the identification of sensorineural hearing loss in children should begin with the neonatal period, which makes it possible to immediately begin rehabilitation measures. With an increase in the age of making the final diagnosis and the beginning of hearing and speech rehabilitation, the integration of children with hearing loss and deafness into the speech environment becomes more difficult, and the likelihood of developing gross speech disorders, social isolation and, consequently, disability in a child increases.

Calculations show that for every 1000 physiological births, one deaf child is born. 20-40 children out of 1000 newborns from the population in need of intensive care have deafness or severe hearing impairment. The uncertainty and inconsistency of the data presented in the literature largely depend on the difficulties that occur in the study of hearing in a child, the inaccuracy of retrospective assessments, the lack of standards in determining various forms of hearing loss, the fluctuating nature of some forms of hearing impairment. Difficulties arising when comparing different sets of statistical data can be explained by geographical differences, epidemic factors, and also by the fact that cases of progressive hearing loss or hearing loss with late onset are included in retrospective analysis or analysis of results obtained in older children. Finally, assessments are significantly complicated by the fact that weak bilateral hearing loss and unilateral sensorineural hearing loss are practically excluded

from the analysis. Taking into account all the factors noted, the percentage of children with persistent hearing impairment increases to 3-4 per 1000 [15].

Epidemiological studies indicate a predominantly sensorineural type of congenital hearing impairment (about 80% in the structure of congenital hearing loss). Cases of congenital sensorineural hearing loss have historically been identified only due to delayed speech development, in contrast to conductive disorders, most often caused by ear malformations and other maxillofacial anomalies.

In recent years, there has been a steady trend towards an increase in the frequency of hearing impairments (2). This process has multifactorial causes, including, in particular, perinatal pathology, chronic and acute otitis media, hearing loss due to the use of ototoxic drugs in history, as well as viral and meningococcal infections (1).

The problem of hearing loss and deafness in children is of high medical and social importance. Congenital or early acquired hearing loss, even a slight decrease in hearing, entails not only speech, but also intellectual, severe emotional and socio-psychological disorders in the development of the child (4).

Annually in Russia 2-3 babies with hearing impairments are born per 1000 newborns, of which 10-12% of children have central hearing impairments. At the same time, given the difficulty of timely detection of mild hearing loss and unilateral hearing loss, the real frequency of hearing impairment can be significantly higher (11).

The development of children with hearing impairment, the effectiveness of treatment and rehabilitation measures is determined by the timely and correct diagnosis of hearing impairment (6). This necessitates further improvement of methods for early diagnosis of hearing impairment in children and their further rehabilitation.

It is known that persistent impairment of the auditory analyzer leads to significant deviations in the child's speech development, negatively affects the mental status of the individual, entails limiting the ability to cognize the world around, mastering knowledge, skills, skills, and prevents full-fledged verbal communication with people around (12).

According to the WHO, more than 665 thousand children with hearing impairments exceeding 40 dB are born worldwide every year. According to T. Lundborg, in industrially developed countries one deaf child is born per 1000 newborns, and A. Davis believes that with an increase in age by 10 years, the number of people with hearing impairment doubles and hearing deteriorates by 20 dB (11).

The American Academy of Pediatrics recommends considering the optimal age for the prediction of speech and psychoemotional development at the time of making the final diagnosis and the beginning of rehabilitation measures before 3-6 months of life.

Hearing impairment in children can develop at any age, which dictates the need for a systematic annual examination of children of preschool and school age (10). Moreover, the timely assistance provided contributes to a complete recovery in many children, and in some of them it prevents the progression of the disease.

It is well known that hearing disorders in early childhood lead to impaired speech formation, and even a small temporary hearing loss of 15-25 dB leads to a significant delay in the development of the 2nd signal system (7).

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