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Development of Speech and Motor Processes in Children with Dysarthria

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Annotation. The article discusses the etiology, symptoms and mechanisms of dysarthria, as they are represented primarily in the development of speech and motor processes in children with dysarthria. It has been shown that the features of speech motor skills are caused by impaired functioning of those motor nerves that are involved in articulation.
Key words: development, speech processes, motor processes, dysarthria, neurological symptoms, physical status, neurological status, mental status.

The problem of correlation and differentiation of speech and language is a well-studied topic in the history of world sciences. Initially, in a number of sciences (psychology and linguistics), both concepts were considered to be identical, occurring in human activity and representing a single system. With the development of Russian and foreign science, the concepts of "language" and "speech" began to appear as different, differentiated, and complementary to each other.

The etiology, symptomatology, and mechanisms of dysarthria have been fully covered in the specialized literature (M. E. Khvattsev, K. L. Semenova, O. V. Pravdina, E. F. Sobotovich, R. I. Martynova, M. V. Ippolitova, L. A. Danilova, E. M. Mastyukova, E. F. Arkhipova, L. V. Lopatina, N. V. Serebryakova, L. V. Melekhova, R. A. Belova-David).

In the anamnesis of a child with symptoms of dysarthria, as a rule, excessive motor restlessness, constant and unreasonable crying, persistent sleep disturbances, weakness of crying, refusal to breastfeed, difficulty holding the nipple, lethargy of the act of sucking, frequent choking, profuse regurgitation, rapid fatigue are mentioned (K. A. Semenova, E. M. Mastyukova).

Indicators of psychomotor development of children range from normal to pronounced delay. Children, as a rule, are somatically weakened, sometimes they have a convulsive syndrome.

A significant proportion of children with dysarthria have delayed language development. The first words appear at the age of 1.5-2 years. Phrasal speech appears at the age of 2-3 years, and in some cases at the age of 4, while the speech of children remains phonetically unformed (R. I. Martynova, G. V. Gurovets, and S. I. Maevskaya).

In dysarthria, there are neurological symptoms, which are revealed during a special examination with the use of functional loads. The presence of symptoms of organic lesions of the central nervous system in children is the main diagnostic criterion for dysarthria (R. A. Belova-David, G. V. Gurovets and S. I. Maevskaya, L. V. Lopatina, R. I. Martynova, L. V. Melekhova, E. F. Sobotovich, O. A. Tokareva). These symptoms manifest themselves in the form of a disorder of the motor sphere: in the state of articulation and mimic muscles, general and fine motor skills.

The general motor sphere of children with dysarthria is characterized by slow, awkward, stiff, undifferentiated movements. There may be a limitation of the range of motion of the upper and lower limbs, mainly on the one hand, there are synkinesis, muscle tone disorders, extrapyramidal insufficiency of the motor sphere. Sometimes mobility is pronounced, movements are unproductive and aimless.

The insufficiency of gross motor skills in preschoolers with dysarthria is most clearly manifested when performing complex motor acts that require precise control of movements, accurate work of various muscle groups, and the correct spatial-temporal organization of movements.

Disorders of manual motor skills are also characteristic, which manifest themselves mainly in impaired accuracy, speed and coordination of movements. Finger tests do not fully manifest themselves, as kinesthetic memory is reduced. A significant correlation has been established between the level of immaturity of manual and articulatory motor skills (M. M. Koltsova, L. V. Lopatina, et al.).

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As for the articulation and mimic muscles, dysarthric children, as a rule, have paresis, changes in muscle tone, and hyperkinesis.

All these symptoms of dysarthria in children without musculoskeletal disorders manifest themselves in a mild form.

The peculiarities of speech motor skills in preschoolers with dysarthria are due to the dysfunction of those motor nerves that are involved in articulation (E. M. Mastyukova, O. V. Pravdina, O. A. Tokareva, M. B. Eidinova, E. Y. Pravdina-Vinarskaya et al.).

Due to damage to the hypoglossal nerve (XII pair), the movements of the tongue to the side, upward, forward are restricted, the root of the tongue is passive, the dorsum of the tongue is tense, weakness of one half of the tongue may be noted, the tongue is restless, tense, its movements are uncoordinated, their amplitude is reduced, an increase in fatigue, as well as increased salivation are characteristic.

When the tongue is affected by the pharyngeal (XI pair) and vagus (X pair) nerves, there is an insufficiency of soft palate contraction, deviation of the small uvula to the side with a slight paresis of the palatine curtain on the opposite side[3].

The insufficiency of the innervation of the organs of articulation affects not only the articulation when pronouncing individual sounds, but also the switchability of individual movements.

In the case of facial nerve asymmetry (para VII), there is a slight flattening of the nasolabial folds on the right and left, which causes a slight puffing of the cheeks on one side. Due to the weak innervation of the lower jaw, the mouth may be slightly open.

Examination of the state of the mimic muscles most often revealed difficulties in performing such tasks as raising the eyebrows and alternately closing the eyes (closing two eyes at once or closing only the right eye), which is associated with damage to the facial nerve (VIIpara).

Differentiated movements of the lips, tip and back of the tongue are especially often disturbed. In some cases, there is some stiffness of movements, inability to perform complex movements, in others - motor restlessness, hyperkinesis of the tongue and facial muscles, difficulty or inability to find and hold the given articulatory postures, synkinesis (lowering of the eyelids when opening the mouth, movements of the lower jaw when raising the tongue, etc.). The speed of switching speech movements changes, which is caused by impaired perception of the motor series, the occurrence of perseveration and permutations (G.V. Gurovets and S.I. Maevskaya, R.I. Martynova, E.F. Sobotovich).

Thus, the movements of the mimic, facial muscles and articulatory apparatus in children with an erased form of dysarthria are characterized by rapid exhaustion, low quality, do not have sufficient accuracy, smoothness, some of them are performed sluggishly, with insufficient muscle strength, not in full.

In children with dysarthria, not only the motor link of the speech system is affected. There are disorders of kinesthetic perception of articulatory postures and movements. Impairment of reverse kinesthetic afferentation can delay the integration of various functional systems directly related to the speech process (motor-kinesthetic, auditory, and visual systems) [1,2].

As noted by O. V. Pravdina, speech motor disorders are the leading pathological link in dysarthria. Disorders of the entire motor sphere lead to disorders of the phonetic side of speech: articulation, voice and other prosodic components of the language are affected.

Sound pronunciation disorders in children are expressed in distortions of articulation, in mixing, substitution and omission of sounds. At the same time, anthropophonic defects of sound pronunciation clearly prevail over phonological ones, since sound pronunciation disorders are associated with paretic phenomena in certain muscle groups of the organs of the articulatory apparatus. Disorders in the pronunciation of hissing sounds and sonorants "r" and "l" are caused by the undifferentiated and small amplitude of movements of the tip of the tongue. Tension of the tongue root, its retention deep into the oral cavity, humped up lead to velar or uvular rotacism, blurred pronunciation of posterior lingual sounds. The most common distortions are the lateral pronunciation of whistling, hissing and "r", the interdental pronunciation of the anterior linguals ("t", "d", "n", "l", "s"), the softened pronunciation of all consonant sounds: due to the spastic tension of the middle part of the back of the tongue.

A characteristic feature is the simplification of articulation, when complex sounds are replaced by simpler ones in their articulatory and acoustic features: slit sounds are replaced by plosives, voiced sounds by voiceless sounds, hissing sounds by whistling, hard sounds by soft sounds, affricates are split into their constituent sound

elements. As already noted, the peculiarity of dysarthria is not only the insufficiency of voluntary articulatory movements, but also the weakness of their kinesthetic sensations.

In the literature, it is noted that the speech of children with dysarthria is "blurred", and sound pronunciation deteriorates in the spontaneous speech flow [5].

Until recently, the study of the state of the motor analyzer was limited only to the study of the motor function of the articulatory apparatus and its anatomical structure. Today, the speech therapy examination of children with certain speech disorders is supplemented by methods for determining the state of general and manual motor skills, in addition, during the examination, the neurological status is established. This is of great importance for a speech therapist to make a pedagogical and clinical diagnosis, to determine the optimal method of speech correction.

R.I. Martynova, having studied the physical, neurological, psychological and pedagogical status of children with dysarthria, revealed the following:

1) *Physical status:* some retardation in physical development; usually small stature, narrow chest, general physical weakness, etc.

2) *Neurological status:* the presence of micro-symptoms, which were revealed during a thorough examination and application of functional loads; erased, mild paresis, changes in muscle tone, hyperkinesis in mimic and facial muscles, etc.; disorders of the autonomic nervous system, often of a "mosaic, delicate" nature (sweating of the palms, redness or paleness of the skin, persistent red dermographism, etc.).

3) *Mental status:* unstable, scattered attention, difficulty in switching it, significant deviations in memory, some weakening of mental activity [2].

The phonetic side of speech is a close interaction of its main components: pronunciation and prosody. Various phonetic means of formulating an utterance (tempo, rhythm, stress, intonation) closely interact, determining both the semantic content and the speaker's attitude to the content. In children with an erased form of dysarthria, prosodic disorders affect the intelligibility, intelligibility, and emotional pattern of speech.

The timbre of the voice in such children is closely related to the emotional state of the child. In children with a predominance of the inhibition process, the timbre is low, the voice is quiet or muffled, unmodulated. In children with a predominance of the process of arousal, the timbre is high, the voice is loud, shouting, breaking into falsetto.

Children with erased dysarthria are characterized by a disturbance in the rate of speech: in some it is accelerated, in others it is slowed. According to L.A. Chistovich and V.A. Kozhevnikov, in both cases the duration of the sound of the consonant and vowel inside the syllable changes significantly. At a fast tempo, the vowels can disappear completely, and at a slow tempo, the syllable is lengthened by stretching the vowel. All this in one way or another affects the overall sound of speech, which becomes either unnecessarily hurried or unnaturally stretched.

The rhythm of speech in children with erased dysarthria is irregular, changeable, the stress in words is placed incorrectly (L.A. Chistovich, K.A. Semenova, E.M. Mastyukova) [4].

At the same time, according to a study conducted by E.M. Mastyukova and M.V. Ippolitova, there are children who do not notice distorted sounds either in their own or in other people's speech.

The analysis of literature data has shown that some disorders of sound pronunciation may be based on disorders of auditory and phonemic perception of a secondary nature. This is very evident in children with dysarthria, the severity of the pronunciation disorder depends in this case on the severity of the dysarthria itself.

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