Frequency of Occurrence and Severity of Motor Disorders in Different Clinical Variants of Cerebral Palsy.

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Abstract

Cerebral palsy (cerebral palsy) is a non-progressive motor and psycho-speech disorders that are the result of damage to the nervous system in the pre- and perinatal period. Infantile cerebral palsy (cerebral palsy) is a group of stable disorders of motor development and posture maintenance that lead to limited functional activity and motor disorders caused by non-progressive damage and/or abnormality of the developing brain in a fetus or newborn child. In cerebral palsy, motor pathology is often combined with sensory system disorders (most often vision and hearing), cognitive dysfunctions, speech and developmental disorders of the child, symptomatic epilepsy, autonomic disorders, secondary orthopedic problems and others. Based on this article, the percentage of occurrence and severity of motor disorders in various clinical variants of cerebral palsy is analyzed.

Keywords: motor disorders, children, cerebral palsy.

With cerebral palsy, there is always a syndrome of dependence of skeletal muscle tone on body position (in the supine position, muscle tone is close to physiological, and with verticalization it acquires signs of spasticity or rigidity). This phenomenon is associated mainly with the antigravity system, which is controlled by the stem structures of the brain [2,9]. At the same time, there is a clear dependence of muscle tone on the lack of timely reduction of neonatal tonic reflexes (grasping, labyrinthine, tonic, symmetrical and asymmetric cervical tonic reflexes, etc.). Due to the lack of timely reduction of the described tonic reflexes, pathological formation of muscle synergies occurs, and subsequently contractures, which are characteristic features in some forms of cerebral palsy [1, 10].

Spastic tetraparesis is characterized by predominant paresis of the upper extremities, which is more associated with the transfer of neuroinfections; at the same time, there is usually a much lower severity of paresis of the lower extremities. With spastic tetraparesis, a certain (limited) volume of movements remains in the hands of patients, but there is no ability to move independently (without support) [1].

The clinical picture of cerebral palsy is very diverse, it depends on the form of the disease, as well as on the localization of the lesion.

Spastic diplegia: bilateral limb damage, legs suffer more than hands, early formation of deformities and contractures, common concomitant symptoms – mental and speech development delay, pseudobulbar syndrome, cranial nerve pathology with optic disc atrophy, dysarthria, hearing impairment, moderate decrease in intelligence (develops mainly in premature infants, accompanied by the phenomena of periventricular leukomalacia with MRI of the brain).

Spastic tetraparesis (double hemiplegia): bilateral spasticity, equally pronounced in the upper and lower extremities, or predominant in the arms, concomitant pathology – the consequences of cranial nerve damage (strabismus, optic nerve atrophy, hearing impairment, pseudobulbar syndrome), pronounced cognitive and speech defects, epilepsy, early formation of severe secondary orthopedic complications (joint contractures and bone deformities), severe motor defect of the hands and feet sharply limits self-service opportunities, prevents the development of simple work skills, often leads to reduced motivation for treatment and training (a consequence of brain development abnormalities, intrauterine infections and perinatal hypoxia with diffuse damage to the brain substance – often with the formation of secondary microcephaly) [4,5,6,9,10].

Spastic unilateral cerebral palsy: unilateral spastic hemiparesis, in some patients – a delay in mental and

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speech development, a delay in age-related motor skills, the arm usually suffers more than the leg, less often – spastic monoparesis, focal epileptic seizures are possible, social adaptation is determined by intellectual capabilities (caused by hemorrhagic stroke or congenital anomalies of brain development).

Dyskinetic cerebral palsy (there are choreoathetoid and dyskinetic variants): involuntary movements /hyperkinesis (athetosis, choreoathetosis, dystonia), changes in muscle tone (multidirectional), speech disorders – more often in the form of hyperkinetic dysarthria, there is no correct installation of the trunk and limbs, intellectual functions are more often preserved, disorders in the emotional-volitional sphere prevail (GBN is most often caused by the development of "nuclear" jaundice, as well as acute intranatal asphyxia in full–term children with selective damage to the basal ganglia - the structures of the extrapyramidal system and the auditory analyzer are more often affected simultaneously).

Ataxic cerebral palsy: low muscle tone, ataxia, high tendon and periosteal reflexes; speech disorders in the form of cerebellar or pseudobulbar dysarthria are not uncommon, coordination disorders in the form of intentional tremor and dysmetry when performing purposeful actions, intellectual deficiency – from moderate to deep (observed with predominant damage to the cerebellum, frontal-bridge-cerebellar pathway, frontal due to birth trauma, hypoxic-ischemic factor or congenital malformations) [7,9,10].

The purpose of the study

To study the frequency and severity of motor disorders in different clinical variants of cerebral palsy.

Materials and Methods of Research

The research was conducted at the Department of Neurology with Pediatric Neurology of TashPMI, at the clinic of LLC "REACENTER-TASHKENT" and the Children's Neuropsychiatric Hospital named after U.K. Kurbanov. The work is based on a complete analysis of 134 patients with cerebral palsy. The age of the children ranged from 3 years to 15 years. Out of 134 patients, more boys were admitted (78%) than girls (42%).

Upon admission to the hospital, a thorough study of anamnestic data, complaints made by parents and children was carried out, the results of non-invasive examination methods were analyzed, and the clinical and neurological characteristics of children were evaluated.

In the study, we used specialized assessment scales: spasticity (Ashworth Scale), modified Tardieu Scale, assessment of muscle strength (MRC), gait analysis using the Gross Motor Function Classification System (GMFCS) and manual skills (MACS).

When distributing children according to the forms of cerebral palsy, we were based on the classification proposed by K.A.Semenova, as well as according to the International Classification of Diseases of the 10th revision (ICD-10). 134 patients were divided into 5 groups, as shown in Table 1.

Table 1.Distribution of patients by forms of cerebral palsy.

Form of cerebral palsy	Number of people (%)	Boys %	Girls%
spastic diplegia (G 80.1)	51 (38±0,24)	27±0,2	11±0,1
Children's hemiplegia (G 80.2)	18 (13±0,11)	9±0,08	4±0,04
Double hemiplegia (G 80.0)	35 (26±0,19)	13±0,11	13±0,11
ataxic cerebral palsy (G 80.4)	5 (4±0,04)	2±0,02	2±0,02
Dyskinetic form (G 80.3)	25 (19±0,15)	7±0,07	12±0,1

From Table 1. it follows that of all forms of cerebral palsy, children with spastic diplegia 51 (38±0.24) were more often admitted, then with double hemiplegia 35 (26±0.19), dyskinetic 25 (19±0.15) and hemiparetic 18 (13±0.11), patients with ataxic cerebral palsy were less likely to be admitted 5 (4±0.04).

Results and their Discussion

The frequency of occurrence and severity of motor disorders in different clinical variants of cerebral palsy were analyzed.

With spastic forms of cerebral palsy (unilateral and bilateral), only spastic paresis or the phenomenon of spasticity were noted without a decrease in muscle strength. In the dyskinetic variant, of all types of motor disorders, only hyperkinesis was detected. In the mixed variant of cerebral palsy, there were combinations of spastic phenomena and hyperkinesis, as well as a combination of spasticity with ataxia (Table 2.).

Table 2.Frequency of occurrence of clinical variants of cerebral palsy according to the topography and type of motor disorders

Clinical variant of cerebral palsy	(number of patients / %) N=134
Bilateral spastic	29 / 22±0,17%
Unilateral spastic	5 / 4±0,04%
Dyskinetic	7 / 5±0,05%
Mixed	93 / 69±0,21%

In children with cerebral palsy, a mixed form of cerebral palsy ($p<0.01$) significantly prevailed, which was expressed by the presence of spasticity and hyperkinesis syndrome, as well as spasticity and ataxia syndrome. The bilateral spastic variant of cerebral palsy was statistically significantly less

common than the mixed one ($\chi 2=61.63$, $p<0.001$). Less often, patients had unilateral spastic and isolated dyskinetic variants of cerebral palsy.

In patients with bilateral spastic cerebral palsy, spastic paresis occurred in 90 ± 0.09% of cases. In 10±0.09% of observations, spastic phenomena were observed without a decrease in muscle strength.

With unilateral spastic form of cerebral palsy, spastic paresis occurred in 80 ± 0.16% (4 patients) of cases. In 20±0.16% (1 patient) of observations, spastic phenomena were detected without a decrease in muscle strength.

In children with dyskinetic type of cerebral palsy, dystonic phenomena were observed in 100% of cases, athetosis occurred in 29± 0.2% (2 patients), choreoathetosis occurred in 14± 0.12% (1 patient).

In patients with a mixed variant of cerebral palsy, spastic paresis was detected in 91 ± 0.08% of cases. In 9± 0.08% of observations, spastic phenomena were observed without a decrease in muscle strength. Dystonic phenomena were detected in 95±0.05% of patients, in 14± 0.12% of cases (13 patients) there was athetosis, in 6±0.06% (6 patients) of observations there was choreoathetosis. Cerebellar ataxia was detected in 5±0.05% of patients (5 patients). The combination of ataxia with hyperkinesis in the mixed variant of cerebral palsy was not noted (Figure 1.).

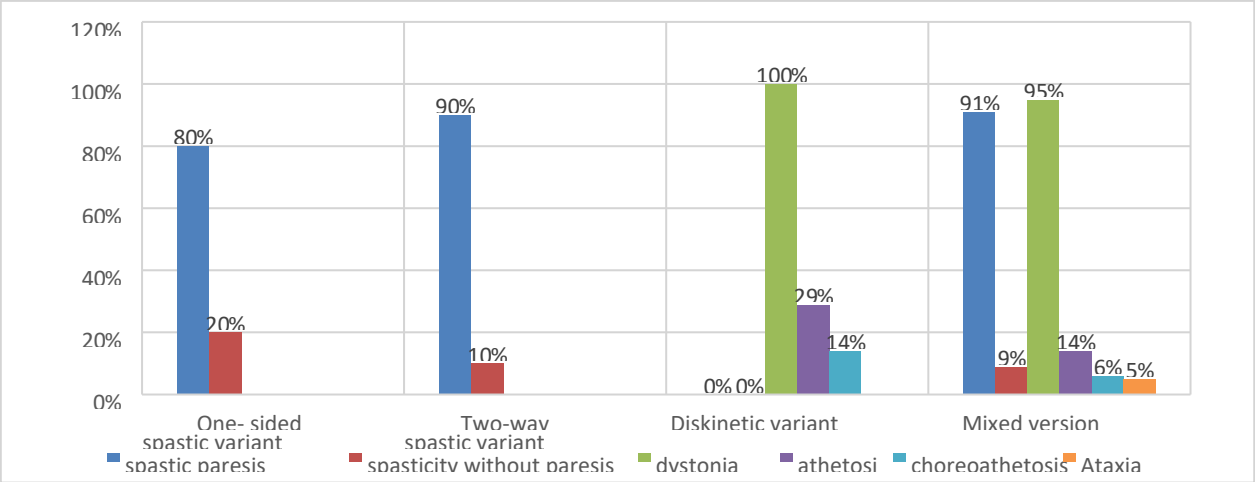

Figure 1. - Frequency of motor pathologies in various clinical variants of cerebral palsy.

There were no statistically significant discrepancies in the frequency of occurrence of spastic paresis in children with unilateral, bilateral and mixed clinical variants of cerebral palsy. There were also no statistically significant differences in the frequency of occurrence of dystonic phenomena in patients with dyskinetic and mixed forms of cerebral palsy.

Conclusions

We analyzed the percentage of occurrence and severity of motor disorders in different clinical variants of cerebral palsy. With spastic forms of cerebral palsy (unilateral and bilateral), only spastic paresis or the phenomenon of spasticity without a decrease in muscle strength were noted. In the dyskinetic variant, of all types of motor disorders, only hyperkinesis was detected. In the mixed form of cerebral palsy, there were combinations of spastic phenomena and hyperkinesis, as well as a combination of spastic changes with ataxia. The bilateral spastic variant of cerebral palsy was statistically significantly less common than the mixed one ($\chi 2=61.63$, $p<0.001$).

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