

Synkinesis and Hemispheric Interaction in Cerebral Palsy

Nadezhda V. Zaytseva¹, PhD, Elena M. Berdichevskaia², MD, PhD

¹Kuban State Medical University,

²Kuban State University of Physical Education, Sport and Tourism
Krasnodar, Russian Federation



Dr. Zaytseva



Dr. Berdichevskaia

Background and Hypothesis

The basis of behavioral and motor skills forms mainly in the first years of life. In connection with this, the analysis of particulars of hemispheric interaction is very important in outlining a rehabilitation plan for patients with cerebral palsy (CP). The aim of this study was to evaluate the specifics of intra- and interhemispheric connections in the motor domain in children with CP as well as the dynamics of the disturbances in the process of rehabilitation.

Methods

We studied 215 children 4 to 7 years old. Ninety five of them were patients had common forms of CP: spastic diplegia (n=40), right hemiparesis (n=30) and left hemiparesis (n=25), who underwent a 3.5 month-long course of complex treatment in Krasnodar Regional Neuropsychological Sanatorium, and 120 healthy children from a Krasnodar kindergarten. The study was performed in two phases. The first assessment was done 2-3 weeks after arrival of the patients with CP to the sanatorium. The second assessment was done 2 weeks before the end of treatment. Finger synkinesis probe was used for the assessment of the functional mechanisms of intra- and interhemispheric interaction in the organization of motor activity.

Results

Patients with CP had significantly larger levels of diverse synkineses in comparison with normal individuals; and, therefore, their scores were lower ($p < 0.05$). The preservation of interhemispheric connections was dependent on the form of the disease. The integrity of one brain hemisphere ensures the tendency for more preservation of balance of hemispheric connections, just as the median localization of the pathological nidus in patients with spastic diplegia significantly impairs the functional interaction of brain hemispheres. The detailed analysis of the pattern of synkineses showed different patterns in patients with different forms of CP. The rehabilitation efficacy and the specifics of restoration of hemispheric interaction were dependent on CP form. In spastic diplegia, symmetric defects in the brain were associated with uniform restoration of interhemispheric connections and less disturbed intrahemispheric connections. In contrast, in hemiparesis disbalance in intrahemispheric connections prevailed, and compensation was noticed only in left-hemispheric pathology.

Conclusions

The magnitude, character, and positive changes in synkinesis in the course of treatment vary based on the form of CP.