

The Role of Transcranial Magnetic Stimulation in the Rehabilitation of Patients with Ischemic Stroke

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Abstract

Stroke is an acute violation of cerebral circulation, it is accompanied by structural changes in brain tissue and persistent organic symptoms. According to WHO materials, the frequency of strokes ranges from 1.5 to 7.4 per 1000 population. It is well known that stroke ranks 2nd after coronary heart disease in the list of causes of death and disability. In Uzbekistan, about 60,000 cases of ischemic stroke are observed annually (stat. Department of the Ministry of Health of the Republic of Uzbekistan and the Stroke Registry in Uzbekistan). The mortality rate is approximately 44%, and disability is 70-80%. Only about 10% of patients return to normal life after a stroke. The task of rehabilitation is to return these 60% of patients to their former life or to adapt them physically and socially to everyday life as much as possible, taking into account their condition and lost functions.

Adequate, timely and comprehensive rehabilitation helps the patient to quickly restore certain functions lost due to the disease or to minimize the resulting defect and adapt to his condition. [1]

According to the recommendations of the world's leading organizations involved in the study of stroke, rehabilitation after stroke should be carried out by a multidisciplinary team.

The use of innovative methods to obtain the best result in the rehabilitation of post-stroke patients plays a crucial role. One of the new innovative and safe methods is transcranial magnetic stimulation.

The use of the method increases the results of medical

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rehabilitation in the acute and early recovery periods. To achieve the optimal result of rehabilitation measures, it is recommended to perform magneto stimulation of the affected hemisphere with a frequency of magnetic pulses up to 10 Hz, and of the unaffected one — 1 Hz with synchronous electromyostimulation according to the classical method.	
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THE USE OF TMS IN REHABILITATION

When carrying out neurorehabilitation measures, great importance is attached to strategies aimed at improving plasticity processes at the level of synaptic transmission and neuronal connections, which is clinically manifested by the restoration of lost functions. [2,3]

Experiments on electrical stimulation of cerebral cortex started somewhere in 1874 in which contralateral motor response was elicited. The laws of electro-magnetic induction were given by Faraday in 1881.[4] d'Arsonval (1896) pioneered the use of magnetic fields to induce cortical stimulation.[5] In 1959, Kolin *et al.*[6] achieved nerve stimulation by using magnetic energy in frogs which laid the foundation for EM stimulation of neural tissue for diagnostic and therapeutic purposes. In the past few years, there have been rapid advances in the development of shape of coils to ensure concentrated magnetic field to achieve better control over the spatial extent of excitation. While the old form of treatment took up to 37 min per session, with high-frequency (HF) theta-burst stimulation the session may last for few minutes only.[7] It is likely that treatment protocols will undergo further refinements in the years to come making it more comfortable for patients.

All this dictates the urgent need to develop new effective non-drug technologies aimed at correcting motor, affective and cognitive disorders in patients after a stroke. In recent years, innovative technologies such as training on stable platforms, transcranial magnetic stimulation aimed at improving postural stability and maintaining a vertical posture with the regulation of the main training parameters using dynamic tests have been used in clinical practice [8,9,10].

THE RESULTS OF RESEARCH

The work was carried out on the basis of the Department of Neurology, Pediatric Neurology and Medical Genetics of Tashkent Pediatric Medical institute in Uzbekistan in the private clinic "Neuromed". Our study included 60 patients aged 50 to 79 years who had suffered an ischemic stroke. The follow-up period of patients was from 2020-2022

The main group included 30 patients with ischemic stroke who, together with standard pharmacotherapy and standard comprehensive rehabilitation, received TMS procedures. The comparative group (n=30) included patients who received only pharmacotherapy and a

comprehensive rehabilitation program without the use of TMS. The whole complex of measures was carried out in the early and late recovery period. Then, a second examination was carried out at the end of a comprehensive rehabilitation course.

In the study of neurological status, attention was paid to the presence and severity of insufficiency on the part of cranial innervation, the motor sphere, the nature of muscle tone, the degree of change in tendon reflexes, the presence of pathological signs, coordination disorders and sensitivity disorders, the presence of disorders of higher brain functions.

To assess the functional state and severity of motor disorders of the upper extremity, we examined the tone of the muscles of the extremities, and we also used such research methods as a modified scale for assessing Eshfort spasticity,

All patients of the main and control groups had increased muscle tone before the comprehensive rehabilitation, in general, in patients of the main group before rehabilitation, the total average value on the modified Ashworth scale was 4 points, and in the control group 4.1. Thus, the intergroup differences were insignificant.

After comprehensive rehabilitation and therapeutic Transcranial magnetic stimulation (10 sessions of 20-25 minutes each), the average value on the modified Ashworth scale was 2.3 points, while the control group had 2.5 points(pic 1.)

In the main group, before and after the rehabilitation procedures, spasticity decreased by 45%, and in the control group by 38%, Thus a significant difference in the reduction of spasticity by 7% in the main group was revealed.

The Rankin scale made it possible to assess the degree of disability after a stroke and includes five degrees of disability after a stroke.

In the main group, before the study, the average statistical value was 2.3 points. At that time, the control group had 2.1 points on the Rankine scale.

After the procedures performed, these indicators in the main group were 0.7 points, and in the control group 0.9 points

A complete visual percentage shows that the reduction in the degree of disability on the Rankine scale in the main group is 8% higher than in the control group The clinical and neurological characteristics of the patients did not differ in the groups we examined. Motor disorders were observed in all patients.

The implementation of rehabilitation measures allowed to reduce spasticity in comparison with the outcome in the main and control groups of patients. Relatively minor improvements were observed in patients in the main group than in the comparative group.

Patients of the main group demonstrated a better reduction of motor deficit, improvement of motor skills.

It was also possible to significantly reduce the degree of disability of all patients who received a comprehensive rehabilitation program.

But the difference after the rehabilitation procedures between the main and control groups were noticeable.

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