

PHYSICAL THERAPY AND NEUROREHABILITATION OF PATIENTS WITH CEREBROVASCULAR STROKE

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Abstract: Cerebral stroke represents an acute disturbance of circulation in the brain, which occurs with local and general brain symptoms. Main etiological factors are: arteriosclerosis, increased blood pressure, arterial hypotension, heart diseases, malformations of brain blood vessels, etc. Stroke is the most common neurological disease and the leading cause of mortality in the world, right after cardiovascular and malignant diseases. Cerebrovascular stroke is a focal neurological deficit caused by intracerebral hemorrhage. It is a condition that occurs due to a change in blood circulation in the brain and a very low supply of oxygen and nutrients to parts of the brain, which results in their damage and disruption of the functions that depend on them. There are two types of cerebrovascular stroke: ischemic - thrombosis and thromboembolism (85%) and hemorrhagic – intracerebral and subarachnoid bleeding (15%). The clinical picture can develop gradually or, the patient can suddenly fall into a coma. Absence of movements of the affected limbs predominates, always opposite to the side of the impact with an outburst of the facial nerve of the central type. Hemiplegia is a loss of the voluntary movements of one half of the body, caused by damage to the opposite brain hemisphere. The musculature is atonic, tendon reflexes are reduced or lost. The aim of the research is to determine the effectiveness of physical therapy and neurorehabilitation in patients with cerebrovascular brain stroke. Treatment of stroke: In the acute stage, physical therapy is aimed at preventing complications of the loco-motor apparatus (contractures, muscle and tendon retraction, heterotropic ossifications), the respiratory system (hypostatic pneumonia) and the skin (decubitus). This is achieved through treatment with position (frequent change of the position of the body in bed), passive exercises performed according to strictly defined rules, breathing exercises, exercises for healthy limbs and great care of the skin. The trophic changes of the skin are treated with ultraviolet radiation in suberythemic doses or with D'Arsonval currents. The research was conducted at the University of Southeast Europe - (Stul University) at the Faculty of Health Sciences in the Department of Physical Therapy and Rehabilitation, over a period of 6 months, from the beginning of May - to the end of October 2023. The research included 27 stroke patients, of which 11 patients had a left-sided stroke, and the remaining 14 patients had a right-sided stroke. According to the gender structure, 12 patients are male and the remaining 15 patients are female. After completing the six-month treatment with physical therapy, kinesitherapy and the methods of Vojšta and Carl and Bertha Bobat, the results show great progress in almost all parameters. A decrease in tonic primitive reflexes, neck and labyrinthine tonic reflexes, reduction of extensor hypertonia, improvement of motor-reflex activity, proprioceptive afference, coordination, reduction of neck tone, foot reflex, stimulation of the grip reflex and improvement of the position of the neck, limbs and body. The presented results shows significant improvement in both groups of participants. Physical therapy and rehabilitation combined with kinesitherapy have an exceptional positive effect in: prevention of pathological primitive reflexes; creation and automation of normal active movements; saving irregular positions of the limbs and the whole body; establishment of balance and correct pattern of movement; fight against spasticity, secondary contractures and deformities; improvement of coordination and awareness of the body in relation to the environment.

Keywords: stroke, physical therapy, prognosis, rehabilitation, gait, postural control, hemianopia.

Field: Medical Sciences

1. INTRODUCTION

Stroke is a disease of the central nervous system of vascular origin. In order for it to occur, there must first be changes in the cerebral blood vessels, which are mostly chronic. There are two types of stroke, ischemic and hemorrhagic. Ischemic stroke occur most often as a result of atherosclerosis, which causes damage to the intima of blood vessels. The blood no longer circulates with a normal flow, eddies are created on which platelets are deposited, which, in turn, create thrombus. Clots can partially or completely block blood vessels, especially in the brain's delicate vascular network. Such a change can also be caused by an embolus, which usually originates from distant parts of the body, such as the heart valves in case of heart defects, etc. A hemorrhagic stroke is the result of increased blood pressure or the bursting of a blood vessel in the brain such as an aneurysm. It leads to the spilling of blood in the brain tissue, and thus to the destruction of many centers of vital importance for the body. Hemorrhagic stroke has a

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rapid onset, with a dramatic clinical picture. The dynamics of changes in cerebral circulation are clinically manifested by the following stages: Stage of prepathogenesis, Stage of stroke, and Stage of restoration of lost functions. In the stage of prepathogenesis, signs of cerebrovascular insufficiency appear. The patient feels dizziness, ringing in the ears, easy fatigue, insomnia, difficult contact with the environment, changes in mood and neurological sensory outbursts. In the stage of stroke - acute phase, the patient may suddenly fall into a coma or the clinical picture may develop gradually. Absence of movements of the affected limbs predominates, always opposite to the side of the impact with central type facial nerve outage. The musculature is atonic, tendon reflexes are reduced or lost. From the 3rd to the 5th day there is an increase in muscle tone and defensive hyperkinesias and reflex movements appear. If the patient survives, after one to two weeks the paralysis gradually decreases and turns into paresis. Pathological Babinski-type reflexes develop and atony turns into spastic muscle hypertonia. The stage of recovery of function lasts from 2 to 5 months and returns in the following order: reflex function, muscle tone and volitional movements, which are restored first in the proximal parts of the limbs, i.e. the hip and shoulder, and later in the distal joints. The function of the leg is restored earlier than the function of the arm. In addition to neurological symptoms, a stroke is characterized by aphasia (changes in speech) - on the right side hemiparesis, ataxia (absence of balance), altered sensory and visual perception of the environment, incontinence, and sometimes epileptic seizures. Almost all patients notice psychological changes, which are manifested by personality changes, alternating crying and laughing, often without reason or apathy, not experiencing anything, not being interested in anything, having reduced criticality, reduced memory, quickly tiring, etc.

The aim of the research is to determine the effectiveness of physical therapy and neurorehabilitation in patients with cerebrovascular brain stroke.

Treatment of stroke: In the acute stage, physical therapy is aimed at preventing complications of the loco-motor apparatus (contractures, muscle and tendon retraction, heterotropic ossifications), the respiratory system (hypostatic pneumonia) and the skin (decubitus). This is achieved through treatment with position (frequent change of the position of the body in bed), passive exercises performed according to strictly defined rules, breathing exercises, exercises for healthy limbs and great care of the skin. It is necessary to place the plegic limbs in the correct functional position. The shoulder of the plegic arm is placed in slight abduction, the elbow in semiflexion, the forearm and palm in pronation, and the fingers in slight flexion. If the fingers are curled, a roller is placed in the palm to keep the fingers half open. The legs at the hips are in slight abduction which is achieved by placing a pillow between the legs. The knees are straight, the feet should be placed at an angle of 90° with the help of a support.

After the end of the acute stage, physical therapy has a decisive role for the optimal physical recovery of patients, for their readaptation and resocialization. A major role in that stage is played by kinesitherapy through the special methods of Bobath, Brunstrom and Kabat.

After the critical 72 hours have passed, the patient's rehabilitation begins. Physical therapy has a decisive role for the optimal physical recovery of patients, for their readaptation and resocialization. A major role in that stage is played by kinesitherapy through the special methods of Bobath, Brunstrom and Kabat. At first, the patient's rehabilitation begins with postural therapy, and later with progressive active exercises. Particular attention is paid to the paralyzed side and the unaffected side should not be allowed to compensate for the functions of the paralyzed side. The choice of methods and techniques for kinesitherapy is made individually for each patient, after a precise kinesiological analysis of the spastic syndrome and a functional assessment, which provides data on the severity of the paresis.

In practice, patients are divided into three groups (according to the severity of symptoms), in which a differential treatment complex is applied:

- Patients with severe hemiparesis have severe spasticity, contractures and proprioceptive deficits. The motor activity of the affected limbs is minimal (without practical significance), and primitive synergies completely dominate. The treatment task in this group of patients is to achieve independent movement and improve the efficiency of the unaffected arm.

- Patients with moderate hemiparesis have better voluntary motor activity, control primitive movement patterns and sometimes even manage to stop them. Spasticity is moderate. The treatment task and goal in this group of patients is restoration and return of volitional movements in the paretic half of the body.

- Patients with mild hemiparesis have a variety of motor activity. Only fine distal movements are impaired. Movements are not automated enough. In these patients, the treatment task and goal is automation of movements and improvement of coordination and balance

- Rehabilitation of hemiplegia: Treatment of hemiplegia is carried out in three stages according to the neurological deficit: Stage of laxity; Stage of spasticity; and Stage of relative healing.

STAGE OF LAXITY

In the stage of laxity, the exercises should be performed passively from a different starting position. The most acceptable starting position is lying on the healthy side so that the painful side is available for treatment. The range of motion should not be forced, especially in the direction of flexion of the arm and extension of the leg, to prevent stretching of the antagonistic muscles. The patient's head is turned to the unaffected side to facilitate movement of the forearm, palm and fingers. To avoid stretching, in the stage of laxity, the following rules for passive exercises are applied:

- Palm flexion – finger extension
- Palm extension – finger flexion
- Upper arm abduction - forearm flexion
- Adduction of the upper arm - extension of the forearm
- Upper arm elevation – forearm extension – wrist flexion
- Flexion of the lower leg - flexion of the lower leg and extension of the foot
- Extension of the lower leg - extension of the lower leg - flexion of the foot

At the very beginning of the rehabilitation, diagonal movements should be included in the procedures.

STAGE OF SPASTICITY

The stage of spasticity is followed by: 1. Increased muscle tone; 2. Increased reflex activity, appearance of pathological reflexes - massive flexor reflex of the upper limb, massive extensor reflex of the lower limb and 3. Impairment of voluntary movements, inability to perform selective movements, paresis, paralysis, impaired coordination, occurrence of synkinesias. The goal of treatment is inhibition of abnormal activities and abnormal muscle tone:

- Reduction of spasticity
- Introduction of selective movement patterns
- Postural attitude modulation
- Selective inhibition of abnormal movements

The basic rule at this stage is to make every movement without great effort, which can cause a spasm.

3. RESEARCH METHODS

The research was conducted at the University of Southeast Europe - (Stul University) at the Faculty of Health Sciences in the Department of Physical Therapy and Rehabilitation, over a period of 6 months, from the beginning of May - to the end of October 2023. The research included 27 stroke patients, of which 11 patients had a left-sided stroke, and the remaining 14 patients had a right-sided stroke. According to the gender structure, 12 patients are male and the remaining 15 patients are female. Out of a total of 27 patients, 19 have Ischemic Stroke, and only 8 patients have Hemorrhagic Stroke.

The choice of methods and techniques for treatment is made individually for each patient, after a precise kinesiological analysis of the spastic syndrome and a functional assessment, which provides data on the severity of the paresis.

In the beginning, the rehabilitation of stroke patients begins with postural therapy, and later with progressive active exercises. Particular attention is paid to the paralyzed side and the unaffected side should not be allowed to compensate for the functions of the paralyzed side.

Treatment includes: passive exercises of the limbs at a slow pace, from the proximal to the distal joints and always in the opposite direction of the contractures, diagonal movements, reflex positions to reduce spasticity, techniques to master the spasm, selective movement patterns for the arm, selective leg movement patterns, symmetrical neck reflex, asymmetrical neck reflex and labyrinthine reflex. Right-sided hemiplegias should be supplemented with speech therapy.

The goal of treatment is inhibition of abnormal activities and abnormal muscle tone:

Depending on the degree of the consequences, the treatment tasks and the specific techniques used to treat the patient are very different. When choosing them, care should be taken to achieve the maximum adequate load for training the patient's neuromuscular apparatus. In doing so, the following sequence of treatment stages must be observed:

- removal of spasticity by means of relaxing and suppressing kinesitherapeutic techniques;
- termination of the primitive movement patterns after the achieved relaxation of spasticity and the adoption of new movements outside the primitive patterns;

- exercises for automating the newly adopted correct movements from a kinesiological point of view;

During the establishment of the program for physical rehabilitation and kinesitherapy, the following basic principles are observed:

- the first treatment task is the normalization of muscle tone;
- active movements are trained after the patient has acquired good static control of the posture;
- alleviating techniques are applied in order, which follows the spontaneous recovery of the patient.

It is necessary that they are proportional to the ability of the patient.

- achieved active movements with a correct trajectory are automated with the help of multiple repetition of the movements that are included in the movement models with practical application;
- Ergotherapy for training the patient to independently perform activities of daily life.

3. RESULTS

After completing the research, the achieved results of the treatment with Physical rehabilitation and Kinesitherapy are summarized. The results show: inhibition of abnormal movements, reduction of muscle tone, reduction of spasticity, suppression of primitive reflexes, improvement of coordination, good static control of the posture verticalization of patients and achieved active movements.

4. DISCUSSION

As for the motor deficit, kinesitherapy plays a major role. Established modern methods for kinesitherapy are the specialized methods for neuromuscular reeducation of Vojta and Bobath. The Rood and Rabat methods were also used to facilitate the required movements and train coordination.

Treatment with physical therapy, kinesitherapy and the methods of Vojta and Carl and Bertha Bobat, the results show great progress in almost all parameters. A decrease in tonic primitive reflexes, neck and labyrinthine tonic reflexes, reduction of extensor hypertonia, improvement of motor-reflex activity, proprioceptive afference, coordination, reduction of neck tone, foot reflex, stimulation of the grip reflex and improvement of the position of the neck, limbs and body. The presented results shows significant improvement in all participants.

5. CONCLUSION

Physical therapy and rehabilitation combined with kinesitherapy have an exceptional positive effect in patients with a stroke, stroke patients, in terms of: prevention of pathological primitive reflexes; creation and automation of normal active movements; saving irregular positions of the limbs and the whole body; establishment of balance and correct pattern of movement; fight against spasticity, secondary contractures and deformities; improvement of coordination and awareness of the body in relation to the environment;

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