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The Physiological Response Of The Body To The Practice Of Physical Therapy After Spinal Cord Injuries.

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ABSTRACT

The most common severe injuries include damage to the spinal cord. In most cases they are the result of compression fractures of the vertebrae. In contrast to fractures of the vertebrae, is not accompanied by injury of the spinal cord, in the latter case there are significant changes in the General condition of the patient, motor and sensory areas. In this regard, rehabilitation of these patients is a very difficult task, which is solved with the use of therapeutic physical culture. Only traumatic injuries of the spine and spinal cord complicated by impaired motor activity of the patient are minimized due to the mobilization of compensatory abilities of the body. The success of this action is provided comes on the background of the regeneration of the spinal cord conductors, restitution and compensation. Developing conductors regeneration of the spinal cord — structural-functional restoration of the integrity of the authority. It is possible to soon after injury, as well as in the late period of traumatic disease of the spinal cord, if the spinal cord conductors eliminates degenerative processes. Compensatory development of functions in these patients is achieved by performing movements with muscles usually not involved, and on the background of activation of the muscles innervated by the distal segment of the spinal cord.

Keywords: spinal cord, Central nervous system, exercise, therapeutic physical training, physiological response.

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INTRODUCTION

Environmental effects on the body are not always beneficial [1,2].The result of the influence of environment in the body can lead to various dysfunction [3,4] and pathological processes [5,6], and sometimes mechanical damage [7,8] that threaten health and life [9,10]. Recently mechanical trauma can cause the most severe damage [11,12] contributing to the permanent loss of various functional characteristics [13,14].

From the variety of injuries the most serious of these are spinal cord injury, which is in most cases a consequence of compression fractures of the vertebrae [15]. In contrast to fractures of the vertebrae, is not accompanied by injury of the spinal cord, in the latter case there are significant changes in the General condition of the patient, motor and sensory areas [16,17].

The severity of the consequences of a spinal cord injury is largely determined by its localization: the higher the injury site, the more dangerous the consequences [18]. Thus, with injuries at the level of the lumbar segments of the spinal cord, paresis or paralysis develops, as well as disturbances in the sensitivity of the lower extremities, a disorder in the function of the pelvic organs is noted [19]. When the cervical and upper thoracic segments of the spinal cord are damaged, the patient's position is further complicated by changes in the sensory and motor spheres of the upper extremities [20], in the activity of the abdominal organs [21], and partly in the thoracic cavity [22]. With damage to the cervical and upper thoracic spine, the chest and abdomen are partially involved in respiration [23], which leads to the development of congestion in the lungs [24].

In this regard, the rehabilitation of such patients is a very difficult task, which is solved with the use of therapeutic physical culture. Only with its help, traumatic injuries of the spine and spinal cord, complicated by a violation of the patient's motor activity, can be minimized by mobilizing the compensatory capabilities of the whole organism. Given the importance of this problem, the article aims to: consider aspects of the physiological reaction of the body to therapeutic physical culture after suffering spinal cord injuries.

FUNDAMENTALS OF THERAPEUTIC PHYSICAL CULTURE IN SPINAL PATIENTS

In recent decades, medicine has noticeably changed views on the rehabilitation of patients with injuries of the spinal cord, which made it possible to achieve a much more effective and complete restoration of their condition [25].

The basis of the rehabilitation of spinal patients is a functional approach. The essence of the method is based on the fact that the regenerative processes in the spinal cord are much more perfect than is commonly thought. For their effective start, constant motor exercises are necessary, and the powerful streams of propriopulses arising from their implementation are a stimulus for the synthesis of new nerve structures and the beating of new nerve pathways. The effectiveness of the muscular load is determined by two main factors - the formation of a personal attitude towards the success of treatment and an orientation towards one's own responsibility for achieving this success [26].

PERIODIZATION OF THE USE OF THERAPEUTIC PHYSICAL CULTURE IN SPINAL CORD INJURIES

In the first (acute) period in the hospital, the patient is placed on a special "functional" bed or on a bed with a wooden "shield" over which a water or ordinary mattress is placed [27]. The head end of the bed rises from the floor level by 20–60 cm. The victim is placed in the supine position, traction is carried out in case of injury below the fifth thoracic vertebra due to straps placed in the axillary areas, and in the case of damage above the fifth thoracic vertebra using a Glisson loop. Gauze strips are superimposed on the soles of the feet and the feet are suspended [28].

Despite the serious condition of the patient, it is recommended to start gymnastics as early as possible - almost immediately after the patient leaves the state of shock. Practice shows that any delay in the start of exercise affects their effectiveness [29].

Methodical techniques used in the practice of therapeutic physical culture, vary depending on the nature of changes in muscle tone. For flaccid paresis and paralysis, exercise is used to strengthen weakened

muscles [30]. Passive exercises are used with caution so as not to cause loose joints. Given the rapid exhaustion of weakened muscles, active movements are performed with a small number of repetitions "fractional" doses, several times during the session. Passive movements are performed slowly and smoothly [31]. With spastic paresis and paralysis, physical exercises are combined with elements of a relaxing acupressure. Active movements are performed without much tension and alternate with relaxation exercises. The treatment is applied by position (fixation of the lower limbs in the position of extension and some abduction) [32].

In the first period, various exercises that stimulate metabolism, blood circulation, respiration, and the work of nervous structures can be used. The main importance here are exercises that involve active muscle groups (including paretic ones), paying particular attention to those that are on the border with paralyzed areas of the body. At the very beginning, active muscle groups should be involved in the work and passively stimulated non-performing [33]. At the same time, special attention is paid to general developmental special exercises for training the muscles of the shoulder girdle and back in the initial position, lying on the back and abdomen. As for the motor links in the affected area, in addition to traditional passive exercises - movements in the corresponding joints with the help of a specialist in therapeutic physical training, sending impulses, during ideomotor exercises. At the same time - various training devices are used. This allows the patient with the help of active muscles (mainly the shoulder girdle) to affect the affected areas. Thus, the formation of a powerful flow of impulses from the zone of damage in the central nervous system is achieved, which contributes to the regeneration of nervous structures and the clearing of new nerve paths, preventing the development of the effects of hypodynamia [34].

It is necessary to begin a course of medical physical culture with the isolated movements, simple on structure from the simplified initial provisions. Then it is increasingly necessary to involve new muscle groups in the work [35]. The most important condition for the success of exercises in the first period is their repeated repetition before the obligatory achievement of pronounced signs of fatigue. While doing the exercises, a certain sensation of pain is perfectly acceptable.

In order to prevent the formation of bedsores, the patient should turn over from the back to the side during the day and in this position perform massage of those parts of the body under which local blood stasis and violation of the skin trophism is possible. If it is possible for patients to perform self-massage, they should repeatedly perform this procedure [34, 35].

Restriction of chest movements and a forced long-term supine position provoke congestion in the lungs, and therefore the most frequent complication of prolonged skeletal traction is pneumonia of the lower lung lobes. An effective means of preventing stagnation is the performance of dynamic exercises, and to prevent this complication in the lower lobes - diaphragmatic breathing ("abdominal breathing") [36].

The onset of the second period corresponds to the stabilization of the life support systems of the body and the partial restoration of movements in the affected areas of the body. The specific duration of the first period and the time of transition to the second are determined by many circumstances: the location and nature of the damage to the spinal cord, the activity of the applied functional therapy [37].

Early in the second period, the patient should be trained to independently turn on your stomach, then sideways, and eventually get on all fours (if not associated with a significant impairment of motor activity of the shoulder girdle). Later gradually introduced in class exercises focusing on the elbows and knees, on all fours, and moving on all fours with pulling up of legs due to the muscles of the body. In the supine position and abdomen are recommended exercises to reduce buttocks and vaginal muscles [38].

The patient is usually allowed to sit with their feet, gradually increasing the duration from 1 – 2 min to a longer period of time repeatedly during the day. However, any mode change of the seat should determine its state of health [39].

At the first attempts to move to a vertical position, the patient may experience dizziness and even nausea due to the gravitational effect of blood outflow from the brain, associated with a decrease in vascular tone. To restore it before going into a sitting position, the patient should perform several exercises with the

inclusion of large muscular zones of the lower extremities: static tension of the muscles of the thighs and lower legs, movement of the feet and flexion of the legs at the knee and hip joints [40].

The third stage in the rehabilitation of the spinal patient is his preparation for walking. It begins in the supine position, when it performs exercises to strengthen the muscles of the back, neck, shoulder girdle, and coordination exercises. The patient is trained to "walk lying" with the displacement of the pelvis, along with a straightened leg. When performing passive movements, it is necessary to force the patient to send impulses to the paralyzed areas and mentally restore the lost movement. An equally important exercise is to train the patient to reduce the quadriceps muscles of the hips. These exercises are given in a significant dosage with repeated repetitions during the day and in alternation of their implementation with other exercises. With the appearance of active contractions of the quadriceps muscle and the active movement of a straightened leg due to the pelvis, the dosage of these exercises can be significantly increased [41].

The fourth step is to restore the skill of walking - this is standing on crutches (in a corset), and then walking sequentially on “walkers”, tripods, in parallel bars. Training for walking itself is carried out in three stages: the first is the simultaneous transfer of two legs back and forth at the expense of the body in the support on the arms; the second - alternate pulling up due to the pelvis straightened (in the apparatus and orthopedic shoes) legs with simultaneous pulling of the perineum and contraction of the buttock; the third is the alternate movement of the straightened leg forward, backward, and to the side.

GENERAL GUIDELINES FOR REHABILITATION

At each stage of training, in the event of difficulties for the patient, associated with the weakness of the muscular system of the body, he can first be offered to master the corresponding movements in the corset, with the help of an assistant, but in each case stimulating him to independence. During the second stage of functional rehabilitation, classes in the therapeutic swimming pool are very effective, which allow not only to facilitate the performance of movements with weak muscles, but also contribute to the normalization of the emotional state of the patient. Throughouttherehabilitation, theroleofmassageremainsimportant.

In the third period, the main task of medical physical culture is the most complete household and social rehabilitation of the patient [39].

Already at the beginning of independent walking, active movements are assigned to the patient in various parts of the locomotor system while standing on crutches: pulling the straight leg up, rearranging the leg forward, sideways, backward, buttocks, perineum, and torso [40].

After the patient has mastered the movement around the room, they proceed to his training in walking with obstacles and on the stairs. When descending from the stairs, the weaker motor leg should be lowered first and another should be attached to it. The same procedure is maintained when climbing stairs. Later, when the patient learns to freely tear off his legs from the floor and to make wing-like movements of the legs in the rest with his hands on crutches, in a certain sequence he is taught to walk without a corset on a flat surface. Then there is training with obstacles, then with one crutch and a stick, with two sticks, with crutches without fixing one knee joint and then on crutches without fixing two knee joints. Finally, walking is performed without apparatus with sticks and without sticks. While walking without fastening devices, the patient cannot always do active dorsal flexion of the foot, in such cases it is necessary to carry out this movement with the help of rubber traction attached to orthopedic shoes and wearing on a special belt [40].

After the end of the inpatient phase of rehabilitation following a spinal cord injury should be an individual programme of further recovery, under periodical supervision of attending doctor and specialist medical physical culture [41].

CONCLUSION

Traumatic damage to the spinal cord can be complete or partial interruption of the spinal cord. In their result of flaccid or spastic paresis or paralysis with rapidly advancing muscular atrophy. Rehabilitation of such patients must be carried out comprehensively with the mandatory application of therapeutic physical culture. The success of this action is provided comes on the background of the regeneration of the spinal cord

conductors, and compensation. The most active it can occur soon after injury and in the late period of traumatic disease of the spinal cord, if the spinal cord conductors eliminates degenerative processes. The development of compensatory functions is achieved by performing movements with muscles usually not involved, and when you activate the muscles innervated by the distal segment of the spinal cord.

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