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Patient's early rehabilitation after a brain stroke

Wczesna rehabilitacja pacjenta po udarze mózgu

INTRODUCTION

Currently, as defined by the World Health Organization in 1976, brain stroke is a clinical syndrome characterized by the sudden appearance of focal or global brain dysfunction with symptoms persisting longer than 24 hours (or leading to death) and having no other cause than vascular. However the Great Medical Dictionary of Polish Academy of Sciences presents the stroke as a sudden onset of more or less extensive signs of focal brain damage with loss or no loss of consciousness caused by cerebral hemorrhage, blood clot or embolism of cerebral arteries. Clinical syndrome depends on the location and extent of damage. The term of stroke was already used in antiquity. However, only in the seventeenth century, Johann Jakob Wepfer after a post-mortem examination concluded that the essence of disease is the damage of vessels [20]. The most traditional division includes hemorrhagic and ischemic brain strokes. Due to the mechanism of origin the ischemic strokes are divided into strokes caused by cerebral embolism or cerebral vessels thrombosis. However, intracerebral hemorrhage and subarachnoid hemorrhage are distinguished among the hemorrhagic strokes. It can be assumed that 80-85% of stroke cases are ischemic, and 15-20% of stroke cases are hemorrhagic [21].

CLINICAL AND EPIDEMIOLOGICAL ASPECTS OF A BRAIN STROKE

Brain stroke is the third most common cause of death and permanent disability. In Poland 30% of patients die from a stroke during the first month after the onset of symptoms. In the group of patients who have survived the stroke 30% die within a year of illness and 70% remain disabled demonstrating high functional deficits, mainly in the form of hemiparesis, aphasia, disorders of higher nervous functions, and 20% of patients are totally dependent on care of other people [1, 24]. Stroke can occur as a consequence of the disturbances in the frontal area of cerebral circulation, the carotid artery and its main branches, the anterior and middle cerebral artery or the posterior circulation area, which includes the vertebral arteries and basal rear cerebral arteries. Thrombotic strokes occur

most often due to atherosclerotic stenosis of carotid artery or middle cerebral artery. In this case, the symptoms are gradually growing, because closing the lumen by thrombus is a gradual process. In contrast to the former, embolic stroke is a sudden phenomenon, which is caused by the closure of one of the distal cortical vessels by platelets, cholesterol, fibrin and other blood components. Another cause of embolic stroke is rising off the studs of the walls of the heart origin due to acute myocardial infarction [6]. The most serious form with the worst prognosis are cerebral haemorrhages resulting in the destruction of pathways and centers of the central nervous system and leading to a sharp increase in intracranial pressure. The most common cause of brain hemorrhage is hypertension, occurring in 70-80% of patients with this type of stroke. The next important cause in the hierarchy of hemorrhage causes is the presence of vascular malformations such as small aneurysms, arterio-venous malformations and cavernous hemangiomas usually occurring with young men. The main cause of subarachnoid haemorrhage is a sudden rupture of an aneurysm [12]. Focal symptoms are neurological dysfunctions associated with specific localizations of the brain. In the case of generalized brain dysfunction, impaired consciousness can be observed. The essence of stroke is the acute cerebral circulatory insufficiency of various etiologies, resulting in decreased cerebral perfusion in the course of ischemia or hemorrhage. The clinical picture of ischemic stroke is a result of disturbances in a large artery supplying blood to the brain, changes in cerebral arteries and developed collateral circulation. Symptoms of stroke include paralysis or hemiplegia; semi-numbness, slurred speech - the aphasia type - the inability to speak the words and understand simple commands, blurred vision - Amaurosis fugax, disturbances in the field of view, dizziness and headaches, a feeling of spinning ambience, with nausea, vomiting, vertigo, double vision [18]. The purpose of primary prevention of stroke is to reduce the risk in the group without symptoms of the disease. It depends primarily on the impact of the so-called. modifiable risk factors. Modifiable risk factors include: hypertension, diabetes, lipid disorders (hypercholesterolemia), atrial fibrillation, among possible other modifiable risk factors for stroke there are also listed: physical activity, alcohol abuse, obesity, dietary habits [4, 18]. Unmodifiable risk factors of stroke include: age, male gender, black race and the Latin American population, a positive family history, socioeconomic status, genetic factors such as mutations in the genes for clotting factors, proteins involved in lipid metabolism or homocysteine, a recessive allele of the d gene encoding the converting enzyme. It should be noted that not only the first stroke is the goal of prevention. After ischemic stroke, relapses occur during the year in 6-12% of patients, and within 5 years in 40-50%; also within 2 years after stroke, 15% of patients suffer from myocardial infarction and 15% die from cardiovascular causes [4, 18].

REHABILITATION AFTER A BRAIN STROKE, INCLUDING EARLY REHABILITATION

Brain stroke is a neurological clinical syndrome, the image of which depends on pathomechanism of the stroke and the location and extent of the outbreak of the cerebral infarction. The location and extent of ischemia, the patient's general health before the onset of stroke and presence of co-morbidities, are the major determining factors for prognosis after stroke, and therefore planning of the program and course of rehabilitation must be individualized and adapted to the patient.

The basis for effective treatment of brain stroke is a rapid assessment of neurological and vital signs of patients, and as soon as possible starting of treatment for acute and life-threatening disorder [8]. The

sick patients after a fresh stroke, whether or not associated with mild symptoms, should be regarded as requiring urgent treatment [3,7]. Fresh treatment of stroke includes the „General treatment”, which aims at standardization of basic physiological functions, specific treatment aimed at streamlining the clogged vessel, or protecting neurons from damage, and treatment of neurological (secondary bleeding, swelling, tightness of the neighboring structures, causing meningitis, convulsions) and systemic complications (infections, pressure sores, deep vein thrombosis, pulmonary embolism) [20, 22]. The most important element of care in patients with stroke is the earliest possible improvement of the patient, which plays a decisive role in the treatment process and affects the obtained results. The earliest possible introduction of rehabilitation in the healing process is often more important than the after-years rehabilitation, which does not mean that you should discontinue the rehabilitation [5]. According to the Hellsingborg declaration, during acute stroke all patients have the right to rehabilitation care “without any selection” [10].

The rehabilitation process is distinguished by three periods, which duration is variable: (I) for prevention of functional rehabilitation hospital - 1-14-21 days; (II) functional rehabilitation period - from 2-3 weeks to 12-24 months; (III) period of adaptation, environmental rehabilitation - from 12-24 months to 2-5 years. Another division, essential for the rehabilitation, is associated with periods of stroke: (I) laxity period - 3 weeks; (II) spasticity period - 6-12 months (a year), (III) period of relative recovery – from a year to the end of life.

The main objectives of the rehabilitation of stroke patients are: the prevention of contractures, rigidities, pressure ulcers, systemic complications, abnormal motor patterns, motor memory formation, the recovery of functional capacity, patient education, not trying unnecessarily and in a manner hazardous to health to compensate the disability with the healthy part of the body, patient's independence.

Early rehabilitation consists of two stages: initial within first few days of hospitalization and later during 4-6 weeks of illness. The objectives of early rehabilitation include: (I) the reduction of mortality in the first month of illness and prevention of life-threatening complications, (II) the prevention of complications, which do not pose an imminent threat to life, but affect the fate of patients and the quality of life, (III) the reduction of the degree of disability of patients who survived a period of acute stroke, (IV) the improvement of the quality of life for patients who have survived a stroke, (V) the impact on the patient's mental state and motivation to be active and cooperate in the treatment [5, 15].

In the early stage of stroke, patients should be treated as if they had a chance to regain full physical activity. If the patient's general condition permits, rehabilitation should be started in the first days of illness, using the method of activating the largest, multi-level stimulation of the nervous system [13, 29]. This allows for getting better results and allows greater use of the possibility of compensating the CNS. Rehabilitation of patients after stroke is predominantly a process of learning, based on the theory of compensatory plasticity of the central nervous system [9, 16, 19, 26]. This means the ability of nerve cells to create new synaptic connections. This phenomenon reveals itself most intensely in the early period after damage to central nervous system [17, 23], which is why it is considered that the period immediately after a stroke is the most important for the future status of the patient's motor activity [5, 9]. Quickly started rehabilitation can also avoid the „learned non-use”

syndrome of damaged limbs. This syndrome is a consequence of several unsuccessful attempts to use the deficient limb, leading to the formation of negative reinforcement then to a conditioned reflex, in this case, the permanent non-use of the limb. Failure to use a falling limb paralysis phenomenon is thus learned, and serious neurological damage leading to depression of the sensory and motor functions [29].

In the early phase of treatment of a brain stroke rehabilitation procedures must be closely combined with intensive nursing care, which aims to prevent serious constitutional complications (bronchopneumonia, dysphagia, urinary tract infections, pressure sores, deep vein thrombosis) and to prevent bedsores and contractures. Therefore, at this stage, beyond the usual nursing duties (e.g. taking care of cleanliness of the patient, feeding) the correct routing and changing the position of the patient should be effected. Changing patient position (rotation) must take into account the positioning of the patient on his/her back, the abdomen and the sides, including those affected by paralysis and should be performed every 2-3 hours [14].

The intensity of rehabilitation must be adapted to the patient's general condition and the extent of his/her disability and should include: (I) the fast starting and putting the patient up, (II) the maintenance of airway and circulatory disorders alignment, (III) the earliest diagnosis of disorders of speech and swallowing, (IV) the prevention of pulmonary complications (breathing exercises). Total duration of the exercises should not be less than 45 minutes with the preferred repetition of six times a day around 10-15min [27]. In the case of unconscious patients, or not cooperating with cognitive disorders - passive rehabilitation is carried out, which aims to prevent contractures and painful joints, reducing the risk of a bed sore, and aspiration pneumonia. Passive rehabilitation during this period should include the exercises several times a day with full range of motion in each area on the infected side. Passive exercises should be performed with extreme caution, especially in the joints where subluxation is highly possible [13].

If the patient's consciousness is not significantly limited, he/she should be immobilized for 1-2 days after a stroke. After this time, the majority of patients after carrying out the necessary diagnostic tests can safely get out of bed; activation should be started from gradual orthostatic. Patients with circulatory balance and neurologically stable should be making full use of selective active movements and appropriate stimulation of the deficient side. The patient's bed should be positioned so that the cabinet, food, television, medical staff, visitors and guests of other points of interest of the patient were placed on this particular side [8].

The period of early rehabilitation is associated with reduced muscle tension, so it is important to stimulate permanently healthy limb locomotor activity, maintaining a full range of motion of limbs affected. It is recommended to stimulate both proprioceptively and exteroceptively. Proprioceptive stimulation includes early start, passive exercises and active-assisted (in the full range of motion) and the stages of orthostatic. Spastic muscles' patting (tapping), general gentle and segmental massage, provide exteroceptive stimulation to the patient [7, 17]. In addition, a massage should be applied to stimulate overall muscle trophy and exteroceptive afferentation. Since the spasticity occurs, it is recommended that certain methods of physiotherapy debilitating spasticity be used which also prevent half-neglect and non-use of limbs following symptom despite the feeling in them and force [2, 25]. Further improvement of the process involves passive motion exercises on the infected, followed by passive-active movement, aided and resistant [5, 28].

THE STANDARD PROGRAM OF PATIENT REHABILITATION AFTER A BRAIN STROKE

The standard program of rehabilitation of stroke patients comprising: the use of arranged positions, passive exercises, assisted, active, resistory, orthostatic state, walking re-education, learning the activities of daily living and hand rehabilitation, is often accompanied with several specialized rehabilitation methods.

Brunnstrom method is associated with stages of recovery in hemiplegia. The purpose of this method is to improve the condition of the patient obtained by controlling pathological responses and their use by the patient in reaching successive stages of recovery. The associated reactions are used (initially bending - which will usher in the future movements). These reactions mimic synkinesis if the movements are done symmetrically on both sides then the more difficult moves become easier to execute. It triggers a global bending synergy (through the use of distal extension we get a call to grip). Synergistic movements mastery is achieved by stabilizing the wrist (snap) for gripping by the use of: the impact of synergy, the whole system of the upper limb, tapping rectifiers, relaxation techniques of the clenched fist. Control of movements is achieved by synergistic weave in a synergistic components with antagonistic synergy. Initially stronger and then weaker components should be chosen. Single movements should be performed later. by other weaves. Manipulation is used to release the grip, they can overcome excessive flexor muscle tension.

Bobath method is based on paying attention to the entire upper limb in the process of improving your hand. Improvement is chosen according to the stages of recovery. Bobath distinguishes four phases of recovery: in the first period (laxity) work is done on facilitating the reaction of straightened infected limbs, for example, by changing the orientation of the head. In the second period (spasticity) there is working with the inhibition of the infected limb flexion spasticity example by inhibiting product. This stage aims to: prepare for the dissociation (separation of individual) movements, hypotonia, stimulate protective response e.g. shore of the infected limb. First, you work on the control of the shoulder, elbow and hand at the end - special attention is paid to the setting of the elbow (snap) and hand. In the third period hand improvement therapy begins. In the fourth term the actual improvement dominates. The basis of the method is to eliminate Bobach abnormal movement patterns. This method draws attention to the impairment of shoulder function, especially in hemiplegia and its action is based on preventing subluxation of the shoulder - especially during flaccidity. The shoulder joint mobilization is applied to restore proper joint play, orthopedic aids to prevent injury, active and passive movements in the area to prevent the „freeze“ the shoulder.

PNF (Proprioceptive Neuromuscular Facilitation) method is based on a combination of static, isometric and sometimes dynamic stretches, which are selected individually. PNF suggests natural movements in three planes, similar to those used in daily activities. Motion patterns are practiced both unilaterally and bilaterally.

Duration of early rehabilitation depends on the condition of the patient and should be completed as soon as the mobilization of the patient (using a wheelchair, learning to walk). Ending early rehabilitation phase should be followed by a plan of further proceedings, having regard to the current rehabilitation of the patient's clinical condition, functional performance, factors limiting treatment and family situation, and thus the possibility of the patient's home. Evaluation of the patient's clinical

condition should include the degree of neurological deficit and disability, the state of intellectual activity (including the degree of cognitive deficits such as aphasia, agnosia, apraxia, disorders of mood and motivation), severity of paralysis, sensory disturbances, the patient's biological age and emotional state (anxiety, depression, inadequacy, or emotional lability) [9]. Further rehabilitation should be the continuation of existing activities, enhanced by new forms of exercise and improvement, including occupational therapy, phased in along with improving clinical condition. Rehabilitation in this period can still be carried out on the ward or in the branches of stroke rehabilitation (stroke rehabilitation unit), and if the patient's general condition is good, and the degree of neurological deficit is small, rehabilitation may be conducted in an outpatient system. Outpatient rehabilitation is used for eligible patients with mild neurological deficits, no cognitive disorders and in overall good condition. Depending on local opportunities and family involvement, rehabilitation of the patient can be carried out at home under the supervision of a rehabilitation unit, in outpatient clinics and rehabilitation clinics, or day care centers, where patients spend 2-5 hours a day, a few days a week. The course of rehabilitation should be monitored using appropriate scales, at least once every two weeks. No improvement after two weeks without the presence of additional factors affecting the rehabilitation process (e.g., pneumonia) should lead to a change of the rehabilitation program [17, 28]. The greatest effects of rehabilitation and the most significant neurological improvement is observed within the first 3 months after onset of stroke. At the end of active rehabilitation the long-term rehabilitation program is introduced, which usually includes two series of 15-20 physiotherapy sessions per year, and that ensures the maintenance of the degree of efficiency obtained during the early rehabilitation [17].

Most effective rehabilitation can be achieved by maintaining an appropriate therapeutic program, designed individually for each patient. The rehabilitation process should stimulate structural and functional plasticity of the central nervous system, which allows to achieve significant improvement in patient's health and efficiency and reduce the number of patients who, following a stroke, are unable to live independently.

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SUMMARY

There is no „golden method” which allows for quick improvement of the patient after a stroke. Certainly post-stroke rehabilitation means rehabilitation of a modern, comprehensive, versatile, started early, continued in the place of residence and implemented by a highly trained team of rehabilitation. Individual members of this team are committed to achieving the specific targets depending on the individual and the current needs of the individual patient. No patient must be deprived of the right to rehabilitation. There should be an individualized rehabilitation program with consistently pursued individual points, so that the center of attention was the patient's problems and deficits. Any therapeutic action should be aimed at improving functional capacity and self-service of the patient, and thus the quality of life. In the early stage of stroke, all patients should be treated as if they had a chance to regain full physical activity.

Keywords: stroke, rehabilitation, rehabilitation program

STRESZCZENIE

Nie ma „złotej metody” umożliwiającej szybkie usprawnienie pacjenta po udarze mózgu. Na pewno rehabilitacja poudarowa oznacza rehabilitację nowoczesną, kompleksową, wszechstronną, rozpoczętą wcześnie, kontynuowaną w miejscu zamieszkania oraz realizowaną przez wysoko wyszkolony zespół rehabilitacyjny. Poszczególne członkowie tego zespołu zaangażowani są dla realizacji określonych celów w zależności od indywidualnych i aktualnych potrzeb konkretnego pacjenta. Żadnego chorego nie wolno pozbawiać prawa do usprawniania. Należy dostosować indywidualnie program rehabilitacji i konsekwentnie realizować poszczególne jego punkty tak, by w centrum uwagi był pacjent jego problemy i deficyty. Każde działanie terapeutyczne powinno być ukierunkowane na poprawę możliwości funkcjonalnych i samoobsługowych pacjenta, a co za tym idzie jego jakości życia.

Słowa kluczowe: udar mózgu, rehabilitacja, program rehabilitacji