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A early rehabilitation trial for ischemic stroke

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Abstract

An apoplectic stroke is an urgent state requiring conservative treatment and sometimes even operational. A patient should be rehabilitated from the very first days in hospital. The main aim of early rehabilitating is obtaining maximally possible movements efficiency of a patient, improvement of his or her communicating abilities and abilities of independent living. Early rehabilitation should also include prevention from complications resulting from patient's immobility. A rehabilitation program should be prepared individually for every patient. A patient after stroke should have psychological care provided which aim is to prevent from depression and abandonment that have influence on rehabilitation success. Apart from physicians and nurses who directly take care of a patient, also a rehabilitating multi-specialization team should take part in treatment. Such team should be composed of a physiotherapist, a logopedist, a clinical psychologist and an occupational therapist

Keywords: Ischemic stroke, Prevention, Quality of care, Public health

Introduction

An apoplectic stroke is an urgent state requiring conservative treatment and sometimes even operational. According to the European Stroke Initiative, efficient care about a patient suffering from a quite recent stroke regarded as an urgent state, depends on a 4-element chain: Fast diagnosis and response to symptoms of a stroke, Urgent informing emergency medicine service, Urgent transport to a hospital (earlier informing it about arrival), fast and proper diagnosis and hospital treatment [2].

A patient should be rehabilitated from the very first days in hospital. The main aim of early rehabilitating is obtaining maximally possible movements efficiency of a patient, improvement of his or her communicating abilities and abilities of independent living. Early rehabilitation should also include prevention from complications resulting from patient's immobility. A patient after stroke should have psychological care provided which aim is to prevent from depression and abandonment that have influence on rehabilitation success. Apart from physicians and nurses who directly take care of a patient, also a rehabilitating multi-specialization team should take part in treatment. Such team should be composed of a physiotherapist, a logopedist, a clinical psychologist and an occupational therapist [9]. A rehabilitation program should be prepared individually for every patient. It is necessary to carry out an interview about health condition and lifestyle of a patient before a stroke, patient's expectations and possibilities of help of family members and friends. What is more, overall health condition should be evaluated (circulatory and respiratory efficiency, level of internal organs impairments) and level of physical and psychological disabilities according to suitable scales and tests [8]. Functional evaluation of a patient tests include the Barthel scale, the Rankin scale and the Brunnström test. The Barthel scale is used for evaluation of every day activities such as dressing up, personal hygiene, eating, physical abilities and constrictor muscles functioning. One hundred points means fully efficient functioning. The Rankin scale evaluates a level of patient's disability and a level of his or her dependence on other people's help in every day life. The Brunnström test is a 6-point scale including: movement organs efficiency, psychological condition, communicating abilities, constrictor muscles functioning, circulatory and respiratory systems efficiency, haptic and deep feel. The above tests can be used for evaluation of rehabilitation progress [7]. Lack of improvements between two consecutive tests should push therapists into changing or stopping current program unless particular circumstances disturbed a rehabilitation course [3].

Rehabilitation period after a stroke can be divided into several stages: Early rehabilitation during a peracute stage (2-6 weeks), including an initial phase (first days of hospitalization) and a later stage (a stay at a ward). Rehabilitation during a compensation stage – up to 12 months after a stroke. Late rehabilitation during a chronic stage, lasting till patient's death [10].

Early rehabilitation

The Period of early rehabilitation is related with muscles slenderness after a stroke. The aim of rehabilitation procedures is constant stimulating of motor activity of healthy limbs and sustaining possible movements of impaired limbs and controlling proper body position preventing from unbeneficial spastic positions in later time. Spasticity reveals itself gradually and establishes after about 12-18 months from a stroke [1]. Intensity of early rehabilitation depends on patient's condition and disability level. According to the European Stroke Initiative, "if a patient is not able to carry our exercises, passive exercises should be implemented which prevent from contractures and joints achiness. It prevents from many problems when a patient starts to make active movements later. Passive rehabilitation decreases a risk of bedsores and aspiration pneumonia. Patients who are able to cooperate should be encouraged to actively participate in rehabilitation" [2]. During therapeutic procedures, one should tend to activate a patient as early as it is possible after a stroke. Prolonged immobilization in case of hemiparesis may lead to serious disorders like deep veins thrombosis and pulmonary thromboembolism. Thanks to modern patient's activating, orthostatic disorders are negligible, psychotomimetic functions and every day decision making abilities return earlier and patient's and his or her family's well being are improved. There are also indications to delay patient's activation or to implement special precautions when doing it. These mainly include: coma or significant cataphrenia, intracerebral or subarachnoid hemorrhage, significant orthostatic hypotension, intensifying neurological symptoms, acute infarction, acute deep veins thrombosis [3].

Proper positioning

The moment after admitting a person to a hospital ward it is important to start frequent position changes and passive exercises. In case of impairment in the area of internal capsule, which manifests hemiparesis and is mostly typical, a patient takes the following position: an

upper limb adducted in humeral joint and bent in elbow joint, a prearm slightly reversed, wrist and fingers flexed; a lower limb slightly flexed in a hip joint, in a knee joint, slightly adducted and externally rotated, a foot plantarly flexed and reversed. Leaving paralyzed limbs in such improper position with low mobility in joints and impaired muscle tone may even lead to irreversible muscle shortening and joints stiffening [5].

Limbs must be set in an intermediate position which is most proper for slackening of muscles which tend to contracture. It is a good initial position for passive exercise. An upper limb should be set with an adducted arm (65-90°) and a reversed prearm, using proper cushions or an orthopedic rolls. Is a period of lower tension is prolonged, one should use a support under a scapula and a sling in later stages. These procedures prevent from subluxating scapuloclavicular joint and rotators cone impairment. A wrist should be set in a slight back flex, fingers flexed, a thumb inversed as a patient could hold a roll or a ball. A lower limb is set in an upright position in a hip joint and slightly flexed in a knee (about 5°) and slightly rotated externally. A foot should be set in a back flex at a right angle. Such position requires usage of appropriate rolls, wedges (for knee flex) and blocks holding back flex of a foot. It is important to prevent every part of body jutting out from compression by quilt and mattress using appropriate objects preventing from bedsores [5].

A patient should be encouraged to take positions on a paretic side. A shoulder should be forwarded as body mass is supported on the whole shoulder surface preventing from adverse compression onto humeral joint. A lower limb at impaired side should be set in an intermediate position with slight knee flex. Such position enables patient to freely reach for objects with a healthy arm. Transferring body mass over nearest joints during such activity will cause early posturing reactions.

At position on a healthy side, position of paretic limbs is similar as in case of impaired side position. However, in this case supporting cushions may be necessary. A patient should be taught how to reach and feel a bed edge.

Supine position is not suggested. It causes adverse position of paretic limbs. An upper limb is most often adducted and prearm and arm rest on a thoracic cavity. A lower limb is slightly flexed in a hip joint and externally rotated what may cause bedsores at a lateral malleolus area. A foot is plantarly flexed and reversed. In order to avoid this position one should lay cushion along patient's body, from shoulders to knees under a paretic side [6].

Exercises in bed and beside bed

During initial period of rehabilitation, important exercises include: respiratory (prevent from lungs impairments), active exercises of healthy limbs and passive of impaired limbs (prevent from contractures and circulatory and respiratory disorders). A light massage having positive influence on tissues trophy. Proprioceptive and exteroceptive stimulation should be implemented by light movements exercises and mechanical vibrations [1]. Proprioceptive stimulation is achieved by early activation, passive and active exercises with limbs supporting and gradual orthostatics. Exteroceptive stimulation is achieved by fast short slapping of spastic muscles, delicate general and segmental massages [5].

Passive exercises initiate reeducation of mobility activity. Initially, these should be simple movements, done 3-4 times a day, several times at single series, synchronically with respiratory movements under constant monitoring of basic bodily parameters. Initially, movements should be done at all joints of a healthy limb and next for a paretic limb, in full physiological range for particular joint. They should enclose successively proximal and next distal segments. Keeping full scope of movements, multi-axial and multi-plane movements are implemented. Passive exercises should be preceded by and finished with respiratory exercises [1,4].

In the course of progress of patient's clinical state, one should implement active-passive exercises, assisted exercises, self-assisted exercises, active and unloaded exercises. In order to achieve this, appropriate block systems with exercise carriers should be hang above patient's bed. Exercise time, number of series and repetitions should be determined by rehabilitation specialist after consultations with a neurologist and whole therapeutic team.

Teaching patient how to move in bed is an indispensable part of rehabilitation after a stroke. These include: turning on a healthy and paretic sides, sitting starting from supine position, moving around a bed, lying down on a pillow. In order to have this initial moves done by a patient on his or her own, they need to be assisted by treating staff [5].

When a patient is able to sit on a bed with lowered legs, without losing balance, he should be taught to change positions from one place to another – e.g. from a bed to a chair, from a wheelchair to a chair, a cover or a seat in a car. This activity is executed with help of another person until patient's condition allows him or her to do it individually. After mastering this activity, a patient should learn how to stand up from a sedentary position. If a patient sits deeply on a bed or in chair, he should transfer body mass from one buttock to other until a body is on the edge of a seat. One should remember that it is forbidden to pull a patient by paretic upper limb as a shoulder may be impaired. During turning over, re-sitting or standing, therapist's arm should embrace shoulder girdle of a paretic side [6].

Walking

The next stage of rehabilitation is teaching patient how to walk. This part can be started when a patient can keep dynamic balance when standing and make single steps. A patient makes first steps with help of other person or using railings. Physical help can consist in supporting patient's paretic arm. The first step should be made by a healthy leg - walking is similar to physiologic and gets more competent and esthetic. It has beneficial influence on walking stereotype as proprioceptive stimulation from a paretic lower limb is increased. It must be seen that a patient transfers body mass from one leg to other by holding patient's hip by a therapist. A patient should be encouraged to flail an opposite arm at every step.

Next stages of walking training include, depending on patient's condition, walking with a tripod (walker), with a cane, overcoming obstacles like stairs and walking on longer distances. These exercises should be accompanied by walking aside and backwards, interlacing, walking on various surfaces (like on carpets, blankets), turning round, opening, going through and closing door. During these activities, one can implement various obstacles like distracting patient's attention.

During later stages, exercises should include carrying various objects in a healthy and paretic limb or both.

Final exercise is walking on uneven and rough surfaces like gravel, grass, tortuous paths and next on instable surfaces like a raceway [1,5,6].

Orthopedic equipment

During early rehabilitation, most of patients requires special orthopedic equipment. It should be used from the very first days of staying in hospital. In case of hemiparesis, rolls for upper and lower limbs, slings, carriers, stabilizers, equipment preventing from upright in a knee joint, traditional rolls or orthoses for feet are used.

When a patient learns to walk, one should individually match canes, crutches, tripods, quaterpods. Also walkers and walking supports may be necessary.

Some patients require orthopedic shoes correcting improper feet position. In this way, patient's walk is more similar to a proper one [1,5].

Occupational therapy

It is the therapy linking typical rehabilitating treatment and undisturbed activity and professional work. It is the most physiologic way of reeducation thanks to the one of inborn abilities of human organism – compensation of function loss. Due to more engagement of patient's psyche, occupational therapy can be more attractive form of kinesitherapy. It is especially useful in case of chronically ill patients and patients requiring longer rehabilitation. It has one particular advantage over other forms of treatment – a patient has a specified aim i.e. execution of a particular task. In such case, a patient is conscious of own abilities and usability in society, thus his or her psychological balance is restored. A patient, focusing on task execution, forgets about tiredness or sometimes even about pain and can make more moves than at a gym.

Occupational therapy should incorporate 'self service' elements. A therapist should instruct a patient how to use cutlery, to wash, get dressed, use toilet etc. It is necessary for patient to be independent [5].

Physiotherapy

Physiotherapy is successfully used in rehabilitation of patients suffering from a stroke. It is used as a supplement to a rehabilitation program and is a helping mean. It should be individually adjusted to every patient enabling realization of established exercises program.

In case of pain syndromes, most often physiotherapeutic treatment include: electrotherapy, cryostimulation, lasing therapy, magnetotherapy, ultrasounds and thermal treatments. Classic massages, vortical massages, underwater massages, pneumatic and carrying massages are also used. They have positive influence on tissues' trophy, muscle tones and blood and lymph circulation. Blood and lymph transfer towards heart eliminates stagnations and edemas [5].

At lower muscle tone, one can additionally implement muscle stimulation using low frequency current. Such treatment causes movement similar to physiologic activity of a limb. A patient observing effects of electro-stimulation is aware that his or her muscles are able to make moves. Thanks to this fact, a patient is more willing to cooperate with a rehabilitating team during next exercises [1].

Physiotherapy is also used in spasticity treatment. In such case, thermal, cold and electric treatment is implemented. These procedures should be done before movements therapy in order to prepare a patient to mobilize joints, redress muscles and to decrease retarding muscles paralyzed by spastic antagonists [5].

Specialized methods

Rehabilitation procedures of patients suffering from a stroke include also specialized methods. These methods have been elaborated by kinesiotherapists within last 50 years. They are characterized by specific theoretical concepts. Most often used methods include: the Kabat method (PNF, Proprioceptive Neuromuscular Facilitation) and the Bobaths method (NDT, Neuro-Developmental Treatment) and many other described by e.g. Signe Brunnström, Margaret Rood and Edmund Jacobson. It must be said that every specialized method has limited abilities and efficiency. Thus, only some elements of particular methods are incorporated in a rehabilitation process and they are individually chosen for every patient and depending on the level of physiotherapists abilities [5].

Speech rehabilitation

Speech disorder after a stroke are mostly of various characters (movement-feeling aphasia). A patient does not understand heard words and can not articulate own words as well. In case of patients with aphasia, speech learning is used as a supplementary method. It should be executed by a proper specialist – a logopedist or a psychologists trained in this branch. It is necessary to explain the essence of aphasia to a patient and his or her family and to require that family members take part in treatment. Logopedic exercises consist in establishing contact with a patient by means of gestures, pictures, objects and slow pronunciation of their names. During further stages of speech exercising, one should make use of patient's interests, emotional states, professional status, current situation, radio, TV, magazines i.e. to use all possible stimuli reaching a patient. These exercises should be conducted in short lasting sessions, few times a day, due to fast tiring of patients. Learning atmosphere should be friendly and a room free of any distracting elements [1,5].

Psychotherapy

A stroke is a very stressful event in patient's life which radically changes his or her way of life. Thus, proper psychological care preventing from depression and lack of motivation should be provided. Such pathologic states most often decrease chances of rehabilitation success. Patient's mental condition, conscious, active and motivated attitude have

much influence on rehabilitation effects. Psychotherapy uses supporting, relaxing and mental reeducation methods [5].

Social rehabilitation

Social rehabilitation is coordinated by a social worker. Such program includes contacts with patient's family, environment i.e. visits of friends or passes to home. If it is necessary, a social worker tries to be accommodated in care place. When needed, a social worker consults with a local government in order to guarantee due money and social consideration for a patient and to organize care from a welfare or a health visitor [5].

Early ambulatory rehabilitation

Such treatment is used in case of patients with low neurologic deficiency, without cognitive disorders and having good general health condition. Active participation of a family is also necessary. Taking local possibilities into consideration, a proper form of ambulatory treatment should be chosen, including: rehabilitation at home – run under control of rehabilitating team, rehabilitation in clinics and rehabilitation clinics, rehabilitation in daily health centers, where patients spend 2-5 hours a day, few times a week; patients can fully use possibilities offered by a rehabilitation center; availability of a transport mean for a patient is necessary [9].

The aim of ambulatory rehabilitation is that a patient obtains optimal movements efficiency and improved well-being and adaptation to new situation. Ambulatory rehabilitation includes: respiratory exercises. guided exercises of paretic limbs, self-guided exercises, active exercises with load, walking practice, manipulative and gripping exercises, slow active exercises, teaching doing of every day activities, occupational therapy [5,6].

Late rehabilitation

Duration of early rehabilitation correlates with general patient's condition and should be terminated when a patient is activated i.e. is adapted for using a wheel-chair or walking lessons start. In every case, a patient discharged from a ward should receive a referral to further rehabilitation. An optimal solution is a rehabilitation ward or a rehabilitation center. Patients of better clinical condition may be referred to a health resort clinic. If it is not possible, a

patient should have possibility to take part in further rehabilitation near home in rehabilitation facilities. Rehabilitation continuity in home environment should be provided by a family doctor with a health visitor and a physiotherapists and full engagement of patient's family members who should be appropriately trained during patient's stay at a ward [5].

A patient discharged from a rehabilitation ward should be under constant care of a rehabilitation clinic. A general practitioner can refer a patient, depending on a general condition, to a periodical hospital or health resort treatment. Late rehabilitation should be based on current exercises scheme, secondary preventive treatment and periodical evaluation of patient's progress. In case when symptoms are fixed, rehabilitation procedures should be focused on keeping psychotomimetic efficiency and learning to compensate lost abilities. In this case, general exercises and occupational therapy are implemented. A person suffering from a stroke requires continuous rehabilitation, lasting even for the whole life [10].

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