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Kinesiotherapeutic Treatment in the Case of the Multiple Sclerosis — Case Report

Leczenie kinezyterapeutyczne w przypadku stwardnienia rozsianego — opis przypadku

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Abstract

Introduction. Multiple sclerosis is understood to be an autoimmune disorder causing progressive inflammatory damage to myelin and finally destruction of axons. It is characterized by diffused deposits of demyelination which cause trespassing of the nervous impulses transfer. These deposits can trigger numerous symptoms including paresis, nystagmus or dysarthria, whereby their character depends on the place of the lesion in the central nervous system (CNS). As a demyelinal disease, multiple sclerosis is incurable and we still do not know the exact reason for its rise. The non-pharmacological treatment of multiple sclerosis includes also rehabilitation as well as appropriate lifestyle which are really very important in case of these patients.

Case Report. The paper describes the case of a 68-year-old woman diagnosed with multiple sclerosis in whom weekly therapy and rehabilitation programme have been proposed. Also, recommendations for long-term rehabilitation have been submitted.

Discussion. The plan of rehabilitation always corresponds to the degree of classification of the patient's handicap assessed by rating scales.

Conclusions. Patients' impressions after the training in case of the multiple sclerosis vary, but long-term exercising positively influences their overall health condition. We recommend to the patients doing exercise which ought to be done as long as their health condition allows to do it. The patients can obtain here a lot of relevant information which is connected with their lives. (JNNS 2015;4(2):69–75)

Key Words: multiple sclerosis, rehabilitation program, motion

Streszczenie

Wstęp. Stwardnienie rozsiane jest chorobą autoimmunologiczną powodującą postępujące uszkodzenie zapalne mieliny i ostatecznie zniszczenie aksonów. Charakteryzuje ją rozproszenie obszarów demielinizacji ingerujących w przekaz impulsów nerwowych. Obszary te powodują wiele objawów, takich jak niedowłady, oczopląs lub dyzartria, przy czym ich postać zależy od miejsca uszkodzenia w obrębie ośrodkowego układu nerwowego (OUN). Jako choroba demielinizacyjna, stwardnienie rozsiane jest nieuleczalne i wciąż nie jest nam znana prawdziwa przyczyna jej występowania. Częścią nie farmakologicznego leczenia stwardnienia rozsianego są rehabilitacja oraz prawidłowy tryb życia, tak ważne w przypadku pacjentów cierpiących na tę chorobę.

Opis przypadku. W niniejszym opracowaniu opisany został przypadek 68-letniej pacjentki, ze zdiagnozowanym stwardnieniem rozsianym, dla której zaproponowana została terapia tygodniowa oraz program rehabilitacji. Przedstawiono również zalecenia dotyczące długoterminowej rehabilitacji.

Dyskusja. Plan rehabilitacji powinien zawsze uwzględniać stopień kalectwa pacjenta, określony według skali ocen.

Wnioski. Odczucia pacjentów po wykonanych ćwiczeniach, w przypadku stwardnienia rozsianego, nie są takie same, jednak ćwiczenie przez dłuższy okres pozytywnie wpływa na ich ogólny stan zdrowia. Pacjentom zaleca się wykonywanie ćwiczeń, które mogą być wykonywane tak długo, jak pozwala na to stan ich zdrowia. Pacjenci mogą uzyskać tu wiele potrzebnych oraz interesujących ich informacji związanych z ich funkcjonowaniem. (PNN 2015;4(2):69–75)

Słowa kluczowe: stwardnienie rozsiane, program rehabilitacji, ruch

Introduction

Multiple sclerosis (MS) is a chronic, long-lasting disease which usually begins at the age ranging from 20 and 30. At the beginning, typical process consists in attacks and remissions. During the attack, focal or multifocal neurological dysfunction develops, and after a certain period the condition improves and remission occurs. After the first attack, the complete improvement and remission can take several years. In the case of approximately 25% of patients, there occurs the relapse after the first attack and another attack takes place within the first year, whereas in the case of 50% within 3 years. Such exogenic factors as the virus infection, excessive physical loading or emotional stress sometimes precede the attack. Gradually, the attacks are more frequent and from the point of view of symptoms, they are more intensive, and it comes to progression and to the rise of the neurological symptoms and functional deficit. In the further stages, the attacks are less common, the disease changes into the form of secondary progressive, later into the chronically-progressive disease which leads to the gradual disability or even immobilization of the patient. The primary progressive form which does not have beginning of the attack is rarer and symptoms gradually progress following its rise [1,2].

Clinical Picture

It is conditioned on the location of the inflammation deposits in the Central Nervous System (CNS). The first symptoms can include the retrobulbar neuritis which means the inflammation of the eye nerve as well as frequent occurrence of various types of sensitivity disorders. Disorders of movement which develop in the case of the central spastic paresis, and also cerebellar signs, often combined with vestibular symptoms are considered to be the most serious. Sphincter failures are also common. In approximately a half of patients suffering from depressions and cognitive disorders, there sometimes develop: disorders of memory, concentration etc. A typical symptom of the MS is tiredness which usually has more than one reason. 80–90% of patients with the MS suffer from increased tiredness which is proved to be one of the symptoms which are most stressful to the patient. Therefore, there were concerns in the past that the physical loading will trigger the rise of the physical temperature in the case of the patient with the MS as well as aggravation of tiredness and neurological symptoms. Therefore, the patient was recommended always to train only until the moment when the first symptoms of tiredness occur. It led however to the undesirable inactivity and passiveness of some patients [3].

Problems with walking are also quite common in the case of the MS and they can include:

- muscular weakness,
- pulling of the leg and various walking disorders,
- spasticity which can affect walking, loss of balance — it can cause “the drunken type“ of walking known as “ataxia”,
- desensitization — it is most common in the area of legs whereby desensitization can be the reason, in the case of patients with the MS, for their not feeling the floor — such a condition is defined as “sensory ataxion”,
- tiredness — most of people will feel problems with the increase of tiredness.

Constipation is yet another problem of people with the MS. It can be caused by insufficient reception of liquids or by deceleration of peristaltics of the intestinal tract. Also, some therapeutic procedures used for dealing with the symptoms related to the problems with the bladder can be the reason for constipation [4].

Movement treatment

Non-pharmacological treatment of the multiple sclerosis, can also include rehabilitation, which apart from appropriate lifestyle, is very significant in the case of such patients. Exercising must be rhythmic, slow, accurate and it is advisable to count each movement within periods to improve coordination of the patient; they must not be too tiring because the inter-current infection can arise which can subsequently cause an attack. Therefore, it is worth noting that the patients in the course of the whole training, ought to be checked and we should communicate with them.

During the non-pharmacological treatment also the physical therapy can be much of help where we can add various baths or half-baths with the temperature of water ranging 33°–36°, twice or three times a day, each 15 minutes' long, under-water-massages 1–3 times a week, daily 10–15 minutes' ice compresses on every or every second day, 4-chamber galvanizations, inhalations whenever there are speech system disorders, solarium, classical massages, or magneto-therapy [5].

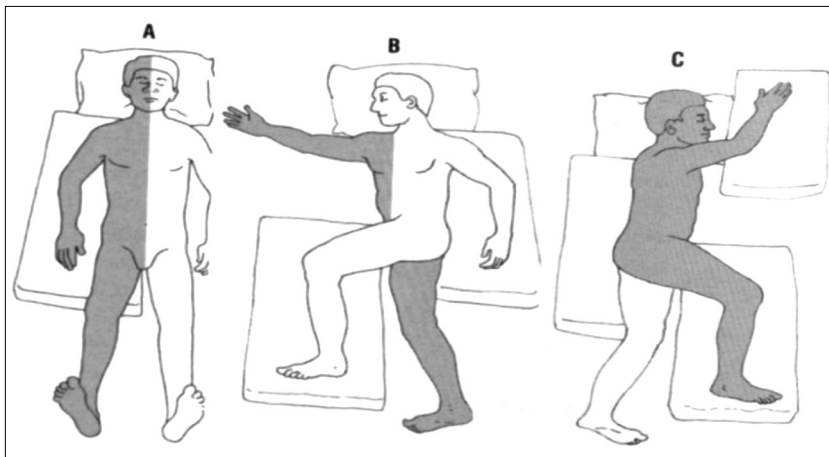
According to the overwhelming opinion, it is necessary to concentrate above all on spasticity, muscular strength, disordered coordination and consequences of ataxion during the rehabilitation treatment. In the aspect of the type of this disease and of variability of clinical findings, it is impossible to recommend a universal rehabilitation programme which could be applied to all patients with the MS. When drawing up the rehabilitation programme or plan, it is necessary to determine which the current phase of the disease is in the patient because we select and apply a slightly different proce-

ture in the case of stabilized condition of the patient and another one when the patient's condition suddenly deteriorates [3].

The first of all examinations is the examination of sensitiveness of the patient whereby we examine and observe both the deep as well as superficial sensitiveness. Another important examination is the examination of pathological reflexes the positivity of which indicates the lesion of the central motoneuron. The best-known and the most examined pathological reflexes include the Babinski's reflex which was described by Babinski, a neurologist from Paris as a pathognomical symptom of the pyramid lesion. We detect the positivity of this test by inciting the foot with a sharp object when the patient reacts by the dorsal flexion of the toe.

A very important part of the neurological examination is the examination of the tendon-wholebone reflexes. This examination is most commonly applied by neurologists. Tendon-wholebone or tendon-muscular reflexes are known as live /symmetrically/, diminished, missing /vanished/, raised /bilateral, on the right, on the left/ and polykinetic. Hyperreflexion, which means increment of reflexes can relate to impairment of the central motoric-neuron. On the contrary, hyporeflexion, which means diminution of reflexes mostly indicates impairment of the peripheral motor-neuron. Special tests which are simple, fast and repeatable help us to find a lot of disorders in the area of the nervous system. They enable an accurate and immediate diagnostics [6].

In the acute phase of the MS, positioning of the patient is the most important part of physiotherapy is positioning, as it is not recommended to exercise with patients. It must be changed in regular intervals and it should be done every 2–3 hours. We must change positioning for such a long time till the patient is able to change the position independently and until the acute phase subsides.



Picture. Forms of correct positioning of patients with hemiparesis: A — at the back, B — the paretic side, C — the healthy side (Source: Lippertová-Grüne-rová, 2005) [7]

Correct and common positioning is the base of all therapeutic activities. For patients who are not able to do independent movement as well as for those unconscious, correct positioning is one of the first therapeutic steps. The purpose is to find an accurate compromise between the stated conditions and the therapeutic aim of positioning [7].

Positioning of patients with the MS, in the case of central paresis (picture), and also of spasticity is the same as in the case of central paresis after the CMP, which is after the Bobath couple. Also, ergo-therapy is classified to the physiotherapy for patients with the MS. Ergo-therapy is a therapy of motor-intellectual functions as well as of social abilities with the aim to reach independence in personal, social and professional life. The main task of ergo-therapeutic work is the target training of perception and sensitivity. It also refers to the formation and adaptation of appropriate aids according to individual needs of the patient. The aim of ergo-therapeutic intervention is to achieve improvement of the functional injury of the patient by means of work in an interdisciplinary team, to prevent progression and rise of the secondary injury.

Ergo-therapeutic tasks include more trainings which cover the training of such cognitive functions as concentration, steadiness during the moments of loading and psycho-motor rhythm, the training of self-sufficiency in daily life where there can be included personal hygiene, dressing, eating, drinking and other activities in the household, training in the domestic environment (a visit to one's own household in the company of a therapist, consultation in the case when occasional reconstruction of the flat or the house is considered) [8].

The basis of the rehabilitative programme addressed to patients with the MS disease consists of methods which are implemented according to neurophysiologic basis. They are used particularly in the case of light and mild serious neurological effect whereby the plasticity of the CNS is used when neurophysiologic procedures are applied. This therapy is built on cognitions about the sensory-motor teaching and adaptation. In the course of the physiotherapy, such elements as motor turning — teaching what the direction of the movement is, repetition of the movement with the purpose of improving its quality and optimization of performing the movement are used. It also applies adaptive motoric teaching, understood as a modification of the motoric output based on sensor inputs and relevant associative motoric learning which means the use of the relation between the impulse and motoric

input to the conditioning of the response. The last fact which is used by sensory-motoric teaching, is non-associative motoric teaching. During this teaching, habituation and sensitisation for repeated movements, facilitative techniques are combined in such a manner that the optimal function will be achieved [3].

For the influence of the cerebellar ataxion, the Frenkel's method is most suitable because in the first turn elementary components of single movements are applied and then more complicated movements are trained. The movements must always be performed with the eye control. At first patients train in the lying position, later in the sitting position, then in the standing position and in the end we attach some exercises which are done with closed eyes. When this exercise is being done, we can use rhythmic stabilization during which the therapist changes the position of the patient's limb coincidentally and the patient's task is to stand up to it and to keep the limb in one position. The multiple sclerosis can also be manifested in a different way consisting in minor brain disorders. Another manifestation is the spastic paresis when patients are fixed in a way in the so called spastic patterns which the patients are not able to change themselves. The spastic pattern is a kind of an image what the patient with the spastic paresis looks like. They are actually enforced positions of single segments of the human body which are fixed in a concrete pattern affected by the muscular spasm. In the case of spastic paresis, postural activities, which include upstanding reaction, are affected. They have a function of upstanding of the head in relation to the trunk and limbs, poised reactions which are important for supporting and keeping balance of the body whenever in move, as well as defensive reactions which are important for the protection of the physical identity because of imminent danger [9].

Bobath's concept is also used for so called inhibition movements whose aim is to control the spastic pattern. Inhibition movement is mostly the contrary position which is performed by the segment influenced by the spasm in a concrete spastic pattern. The inhibition positions stated include: flexion of the head, extension of the head, extra-rotation, inclined extension of the shoulder to the back and elevation of the shoulder. Other positions which are known are loading of the palm root, flexion of both coccyx, extension of the toes, pressure of the palm on sternum, latero-flexion and rotation of the trunk.

In the case of the patient with spastic paresis, we practice simple exercises, at the beginning in the lying position, later in the sitting position, in the standing position and in the end we also train walking. At first, we train each position with the patient and every day we try to attain the situation when the patient is able to do independently everything which was previously done with our assistance [9].

Another method used in the case of spastic paresis, and also of the multiple sclerosis, is Kabat's or also the so called Proprioceptive Neuromuscular Facilitation Method (PNF) which means the proprioceptive neuromuscular facilitation. It is *proprioceptive* which means that the strength for the movement is taken from patient's own organs — from their proprioceptors. They are joint receptors which note the position and movement of the joint, the muscular spindle which notes both tension and release of the muscle, as well as its unchanged position, Golgi's tendon corpus the function of which is to register the tension of the tendon and skin receptors which register touch for example.

The aim of this study was to propose a weekly therapy and rehabilitation programme for the patient with multiple sclerosis.

Case Report

A 68-years old woman has suffered the MS since she was 45 years old. The patient reports aggravation of her walking connected with occasional loss of balance and stumbling as well as total weakness of the upper and lower limbs. Pins and needles from the spine occur and they radiate into the right lower limb and causing pain of the central spine and the left side of the spine. In the childhood, the patient was cured due to a fracture of the right knee, currently the chronic polytop Vertebro-genic algic syndrome (VAS), discopatia L5/S1 without an oppression of the nervous structures, stato-motoric disorder of the spine, generalized osteoporosis/coxarthrosis suspensoidal arthrosis of the knee joints and the ankle joints were diagnosed, she was cured also because of the arterial hypertension.

Subjective examination: the patient feels pins and needles radiating from the spine to the thigh of the right lower limb, freezing of both lower limbs alternately during swimming, she complains because of pains of the jugular spine, head and the left side area. She also informs about her worsened walking connected with occasional stumbling.

Physiological functions: the patient informs about urinating disorders with significant obstruction disorders of the urinary system (feeling of the incomplete depletion). **Examination of the standing position:** the patient stood in the narrow basis with opened eyes, when she closed her eyes, she had to increase the basis — a positive Romberg's symptom. The patient felt slight imbalance when her eyes were closed, she slightly bent backwards.

1. Standing position with mildly straddled legs and opened eyes — she managed it without any problems,

2. Standing position with jointed legs and opened eyes — she managed it without any problems,
3. Standing position with jointed legs and closed eyes — she had some problems with it, the patient bent backwards with the whole trunk, she tottered and she was not able to keep balance well. She had to hook on me.

Examination of walking: the stereotype of walking was unchanged, synergies of upper limbs were symmetric, lengths of steps were equal, the rhythm of walking was physiological, keeping of the trunk kyphotic.

1. We have examined walking with eyes opened whereby we found that the patient was walking in the wide basis. The patient complained of instability of her body and she had mildly disordered coordination.
2. Examination of walking with eyes closed was problematic for the patient, she was swinging backwards and she was afraid of it.

Walking on the toes and heels was instable, the patient kept a mild flexion of the lower limbs, little brain walking — a mild ataxion and a backwards bend of the trunk, her legs were conducted into inversion while walking. The patient uses a stick during long lasting walks. **Tropics of the skin.** Hypotrophy of the m. triceps brachii is bilateral, tropics of the skin is adequate to the age.

Muscular tone: hypotonia

Active and passive mobility. Active mobility in all joints was physiological, mobility of the right lower limb mildly restricted because of weakness, the patient did not inform about any problems during her walking and the passive mobility could be performed without any problems.

Sensitiveness disorders: are not present. Deep and also superficial sensitiveness are preserved.

Examination of position-sensitiveness and motion-sensitiveness: no deviations from the norm are proved.

Orofacial disorders: are not present.

Ability of self-service: is preserved. But the patient has got an assistant who is required during longer walks. She also assists her with housework or with cooking.

Test of coordination

Finger — nose: positive hypermetria, dysmetria negative

Heel — knee: hypermetria in the right lower limb positive, in the left lower limb negative, dysmetria — negative in both lower limbs.

Test of adiadochokinesis: positive in the case of upper limbs, adiadochokinesis of the tongue negative. The patient stuck out the tongue in the middle and the motions into the sides were coordinated.

Test of asynergy. Positive, the patient extended the knee joint and also the trunk.

Rebound test: negative.

Classification of the patient according to the Kurtzsky scale: degree 3 — the handicap is more evident, efficiency and mobility are worsened, working ability is preserved. Carrying out normal way of life is possible without dependence on the assistance from another person [10].

Therapeutic — rehabilitative programme

1st day — we train in the lying position on the back, applying the blood vessel gymnastics. We include the breathing gymnastics and localized breathing into the belly, this way reinforcing the diaphragm. Then we persist with exercising according to Mojžišová for reinforcement of the pelvis bottom. Isometric contractions follow m. quadriceps femoris and m. glutei, as well as soft techniques for the central and left area.

2nd day — we continue doing everything we did during the first day. We add active exercising aimed at reinforcing the muscular strength as well as some exercises according to Kabat's techniques, we pull out abbreviated hamstrings. We exercise also in the lying position on the belly, reinforce inter-bladebone musculature and we teach anti-gravitational relaxation on the m. erector spinae and in the sitting position Antigravity Relaxation (AGR) on m. trapezius.

3rd day — we persist with exercises done the previous days, add repetition during active exercises of the lower limbs. When we carry on with exercises according to Kabat's techniques, we add resistance to the patient whereby we increased exercises with two repetitions on the right lower limb, then on the left lower limb. Apart from training in the lying position on the back and the belly, we start exercising also in the standing position reinforcing deep stabilization system. We include exercising at the wall bars on toes, heels, with one leg bent at 90 degrees in all joints and by changing lower limbs. Also, there are added exercises aimed at improving motional coordination, we exercise fluently, slowly and rhythmically with the help of the taxion tests finger — nose and heel — knee and we do other exercises for stretching and bending of upper as well as lower limbs in all joints [11].

4th day — we continue exercising according to L. Mojžišová aimed at reinforcing the pelvis bottom, the patient does the exercise until she feels tired, it is beneficial for the patient's health condition. Muscular groups of lower limbs are reinforced henceforward, we add some exercises with the over-ball and the thera-band. We reinforce the deep stabilization system in the lying position on the back where we attach some exercises from the Bobath's concept. We add some exercise on

the fit-ball for reinforcing the deep stabilization system, as well as for the improvement of keeping balance.

5th day — we continue exercising, apply soft techniques for the central and left area, the patient is on the BIODEX for 3 minutes, at the beginning she makes short, rubbing steps, but afterwards we lengthen her steps and in the end the length of steps is constant and the patient succeeds in walking on the BIODEX without any problems.

6th day — we continue exercising on the BIODEX where we extend both the time by 1 minute and also the speed of the belt. The patient manages her walking without any problems again. Then we attach some exercise for reinforcing the deep stabilization system on the fit-ball.

7th day — we continue exercising in the standing position, train stability and correct walking with the help of marks on the floor. We practice exercising on the fit-ball which aims at the reinforcement of the deep stabilization system. We complete the training on the BIODEX where we extended time by one minute and set higher speed.

Long-term rehabilitative program

We recommend that the patient ought to continue reinforcing enfeebled muscles on her lower limbs, we also recommend improvement of the stereotype of walking and of balance in the standing and sitting position on the fit-ball or with the use of other aids available at her home. The patient is informed about the fact that if she suddenly begins to feel tired, she has to stop her training and she must have a rest.

Discussion

The plan of rehabilitation is always chosen on the base of the degree of classification of the patient's handicap in accordance with ingrained rating scales. Rehabilitation can be carried out in the periods free of attacks, therefore we monitor the patients during the whole rehabilitative treatment asking them how they are feeling [12]. Kačinetzová [8] states that opinions on the procedures of the therapeutic rehabilitation are not absolutely coincident. She also declares that it depends on possibilities and abilities, on patients themselves as well as on circumstances. It is generally agreed however, that the most important factor is the early commencement of treatment, optimal cooperation of the rehabilitative team, intensive approach and cooperation with the family. Motivation of the patient is also very important. In the case of this patient, we decided to choose Kabat's methodology as the main method of rehabilitation. This

methodology was implemented in such a way that movements began acrally and they continued to the root of the limb. It is advisable to carry out each movement by the rotation and it should not be completed before the flexion. According to Kolář [3], we aimed physiotherapy in the case of patient No. 1, who had a middle degree of the handicap, at affecting her weakness, ataxia as well as at the improvement of quality of her walking. We also draw particular attention to the correct use of orthotic aids. Patients with the diagnosis of the multiple sclerosis often have problems with the urinary bladder, therefore it is important to reinforce muscles of the pelvis bottom. The so called Kegel's set of exercise was applied.

Conclusion

Impressions of patients after the training in the case of the multiple sclerosis are different, but long-term exercising positively affects their overall health condition. We recommend to the patients doing exercise and carrying on doing it for such a long period until their health condition is satisfactory. Patients can obtain here a lot of relevant and necessary information related to their lives.

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