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# Therapeutic treatment according to the Bobath concept based on the International Classification ICF in a patient after a stroke - case report

## Postępowanie terapeutyczne według koncepcji Bobath oparte na Międzynarodowej Klasyfikacji ICF u pacjenta po udarze mózgu – opis przypadku

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**Streszczenie**

Terapia neurologiczna pacjentów po przebytym udarze jest głównie ukierunkowana na największy możliwy wzrost funkcji. Podczas terapii stosowane są różne techniki według koncepcji Bobath mające na celu hamowanie patologicznych wzorców ruchowych, a także stymulację reakcji o charakterze fizjologicznym.

Celem niniejszej pracy jest omówienie, na podstawie zaprezentowanego przypadku, postępowania rehabilitacyjnego u pacjenta po udarze niedokrwiennym prawej półkuli mózgu.

Badanie fizjoterapeutyczne opierało się na Międzynarodowej Klasyfikacji ICF, oceniające zaburzenia w obrębie struktur ciała, funkcji oraz aktywności i uczestnictwa, wykazało osłabienie mięśni dolnego tułowia, dna miednicy oraz lewego biodra, hipotonię mięśniową strony bezpośrednio zajętej, a także zwiększone napięcie mięśniowe dystalnie w lewej kończynie górnej. Problemami pacjenta na poziomie aktywności było samodzielne wstawanie i stanie bez asekuracji oraz brak aktywności kończyny górnej lewej.

Prowadzona terapia obejmowała regulacje napięcia mięśniowego, pracę nad wzmocnieniem mięśni tułowia lewego biodra oraz miednicy, torowanie prawidłowego obciążania strony bezpośrednio zajętej podczas zmian pozycji z siadu do stania oraz chodu, a także naukę czynności dnia codziennego.

**Słowa kluczowe**: udar mózgu, rehabilitacja, terapia neurologiczna, koncepcja Bobath, ICF

## Abstract

Neurological therapy of the patients after stroke is mainly aimed at the greatest possible growth of the function. During the treatment there are various techniques according to Bobath concept designed to inhibit pathological movement patterns, as well as the stimulation of a physiological response.

The aim of this paper is to discuss, on the basis of the presented case, rehabilitation methods of patient after ischemic stroke of the right hemisphere.

The physiotherapy examination, based on the International Classification of ICF, assessing problems in the body structures, functions and activities and participation, showed a weakness of the lower trunk muscles, pelvic floor and left hip, muscles hypotonia of directly occupied side, as well as increased muscle tension in left upper limb. Problems of patient activity levels were independent standing up and able to stand without help and lack of left upper limb function activity.

Neurological therapy included the muscle tone normalization, work on strengthen core, left hip and pelvis muscles, priming the correct loading of the directly occupied side during the position changes from sitting position to standing and walking, as well as learning of daily living activities.

**Key words:** stroke, rehabilitation, neurological therapy, Bobath concept, ICF

## Introduction

The Bobath or neurodevelopmental (NDT) approach continues to be the most widely used treatment approach by therapists. The NDT approach is known as the task-oriented (or occupation-based) that incorporates knowledge in motor learning, motor control, biomechanics, muscle physiology, and activity-dependent brain plasticity mediating recovery after a brain lesion. This approach is inspired by the dynamic systems theory of motor control which implies that movements are organized around behavioral goals (functional tasks) instead of reflexes or motor patterns in isolation. It allows for adaptive and anticipatory mechanisms. Therapists are called upon to try to manipulate environmental constraints to help the central nervous system solve motor deficits in a variety of ways.

Other factors, such as the ICF model of health status, perspectives of persons with disabilities and family-centered service delivery, which create an environment conducive to the identification of functional goals at the level of activity and participation rather than exclusively at the level of impairment, have driven the task-oriented approach. The focus of therapy has thus shifted from eliminating deficits to enhancing function across all performance domains to promote functional independence and a good quality of life despite existing impairments.

The primary objectives of neurodevelopmental treatment according to Bobath concept are to normalize muscle tone, inhibit primitive reflexes, and facilitate normal postural reactions. Improving the quality of movement and helping patients relearn normal movement patterns are key objectives of this approach. To achieve these objectives, therapists use a number of techniques, including handling techniques, weight bearing over the affected limb, positions that encourage the use of both sides of the body, and avoidance of any sensory input that may adversely affect muscle tone. In clinical practice today, many of these techniques and strategies are used within the context of purposeful activities.

## Clinical reasoning

| **Activity / participation** | | **Body functions / - structures** | |
|---|---|---|---|
| Resourcess<br>(What is the patient able to do?) | Limitations | Resourcess<br>(What is functioning?) | Impairments |
| - Alone in the sitting position take off shoes, socks without the use of the L upper limb.<br>- Take off sweatshirt zip from 20% the use of the L upper limb.<br>- Alone eats meals using only R hand.<br>- Turn in his bed.<br>- Take a sitting position from lying.<br>- Use the phone. | - Needs help with transfers another person.<br>- The patient can't stand alone.<br>- Needs help with walking another person he walk 50m.<br>- Needs help to prepare meals.<br>- The patient can't wash himself, to shave the tooth.<br>- The patient is not able to use the toilet.<br>- Learned non-use L hand. | - Communication preserved, speech writing correct.<br>- Feeling of deep and superficial preserved.<br>- The correct muscle strength in his R leg and upper limb.<br>- Normal rom without L and R hip.<br>- Selective finger movements. | - Postural set flexion.<br>- Head in protraction.<br>- Weak muscle strength - buttock muscle, quadriceps muscle, abductor, dorsal flexor toes L leg.<br>- Increased tension in distal part of L hand to the finger flexors, wrist flexor – limited the extension movement.<br>- Pectoral muscle contracture L side.<br>- Coming off scapula lata L.<br>- Increased tension in the triceps of the L arm.<br>- Deep abdominal muscles weakness.<br>- Position of the pelvis in the posterior elevation.<br>- Reduced ROM in the L and R hip in all directions. |

Tab. 1. Patient assessment based on ICF classification

Functional goal: self-personal hygiene.

Short term goal: shaving, shaving in standing position.

Hypothesis of the main problem:

- Trunk flexion pattern.
- Increased muscle tone in distal direction palmar flexor.
- Increased tension in the triceps of the L arm.
- Weakness of the muscles of L upper limb.
- L pectoral muscle contracture.
- Lack of postural control in high positions.
- Weakness of the extensor and abductor of L hip.

**The treatment and therapy**

First stage of therapy consist:

1. Undressing shoes, socks, sweatshirts, transfer from wheelchair to rehabilitation table. Therapist helps patient to block knee and give him support on the trunk – patient stand and rotate and sit.
2. Preparation feet in the supine position: deep massage of edge side to the fifth metatarsal and medial edge, massage fascia longitudinal, transverse feet, massage stimulation heel, stimulation of the dorsal flexor foot, rubbing it with a towel in the dorsiflexion direction.
3. The transition to the position of the lower limb bends at the knee and propped position hip with foot line, grip on the foot in the direction of dorsiflexion and lift the lateral edge with the other hand.
4. The bridge position – lifting hips upward with simultaneous load of lower limbs. One therapist hand gives stabilization on the quadriceps of paretic side, second in the abdominal muscles. Upper limb arranged along the trunk grabs the edge of the table in external rotation or grip the therapist ankle (Fig. 1).

Fig. 1. Bridge position and its modification.

5. Position as above raising hips to move parallel to the left of the right side.

6. Supine lower extremities bent, rotate of the trunk to the side of left limb, arranged along the trunk, grabs the edge of the table or ankle therapist in external rotation, right straight in external rotation of the arm touches the therapist nose, forehead, etc.

7. Supine lower extremities bent, rotate the torso to the side of a seemingly busy. Arranged busy supported limb in extension and external rotation by the therapist, seemingly busy straight in external rotation lies along the trunk or raised to the level of the affected limb and follow it.

8. In a sitting position to prepare the trunk therapist sideways on the side of a busy laid his hand on checkpoints motor and moves the torso in different directions: flexion, extension, rotation.

9. Preparation of arm in sitting position: setting body in extension through the KPC, use the KPC on the chest and back centrally with the patient sitting sideways with one hand therapist in front of m pectoral other slightly below the lower angle scapula, the motion for adduction and internal rotation of depression scapula back of, stretching musculus pectoralis inputs and outputs in the pattern, on the shoulder head support for better movement control.

10. Position as before the transfer hand on the scapula a little higher compression towards back of depression and adduction, changes grip hands with keeping the position as above. Stretching muscle pectoralis to belly, inputs and outputs in the pattern with the other hand in the armpit shoulder external rotation.

11. Normalization triceps arm muscle tension in the sitting position, forearm propped on a pillow in flexion. The therapist sits close to the patient, with one hand from the biceps near the shoulder joint sets a limb to external rotation of the second hand on the belly is the triceps performs massage.

12. In the position above one hand sets the left upper limb in the position of external rotation the second carries a deep massage on the forearm.

13. Position supported above the pillow preparation hand deep massage the palm, thumb, activation of extensor through massage in the direction of dorsiflexion use a soft brush towel. Activation of the dorsal extensor hand, forearm arrangement in an intermediate position with one hand on the straightened fingers of the other hand around of the thumb movement of the first hand in the forward back.

14. Support to left hand setting the limb in extension and external rotation moving the center of gravity in the direction of the affected side, therapist is close to the patient sets the arm in external rotation provides stabilization on towards activation muscle quadriceps.

15. Patient actively supports at left upper limb on the table, scapula stabilization in back depression, therapist is close to the patient sets the arm in external rotation, provides stabilization on towards activation muscles quadriceps, patient working right upper limb through the axis of the body towards the affected limb hitting a stick in the designated point between the two points, by moving the chair to a designated point (Fig. 2).

Fig. 2. Actively support at left upper limb

16. Position as above with component rotation patient supports up on both hands, work the trunk to extension, therapist's hands on the trunk motor control points, one hand on the KPC

ventral / dorsal, second hand shoulder external rotation or more options hands only KPC in different directions.

17. Seating in the support on forearms on the table - open beauticians, remove the shaver, connect it, connect it to a contact, shaving, wiping towel, cleaning shavers, shavers packaging, use the left and right arm:

- help from a therapist in these activities: giving of stability for the torso by KPC on the upper and on the lower trunk, on the front and back, in the area of the pectoral muscle of the lower right side trunk;
- stabilization of the shoulder scapula to the depression, the setting arm in external rotation.

18. The transfer to a standing position with support on the chair seat. Therapist has one hand on the shoulder of the left upper limb (in the direction of external rotation) and the second activate the left muscle quadriceps, position as the above change position sit from side to side.

19. The transfer from sitting to standing, therapist, one hand on the buttocks muscle activates it, the second activate the left muscle quadriceps (Fig. 3).

20. Walking: therapist one hand on KPC upper left trunk near the pectoralis, the other hand KPC lower trunk on the right side (Fig. 4).

Fig. 3. Transfer from sitting to standing

Fig. 4. Stabilization in walking

A  B  C  D 

Fig. 5. Patient position in the first stage of therapy – before (AB) and after (CD) therapy

Second stage of therapy:

Therapist used exercises from the first stage increasing number of repetitions and changing position. In addition, the treatment was used modifications in transfer from sitting in a wheelchair to sitting on the rehabilitation table. Therapist makes activation to quadriceps and gluteal muscles, and gives support to the KPC left pectoral muscle and right torso.

Additional types of exercises applied:

1. Seating with the support for forearms on the table: open beauticians, remove the shaver, connect it, connect it to a contact, shaving, wiping towel, cleaning shavers, shavers packaging, use the left and right arm:

- help from a therapist in these activities: giving of stability for the torso by KPC on the upper and on the lower trunk, on the front and back, in the area of the pectoral muscle of the lower right side trunk;
- stabilization of the shoulder scapula to the depression, the setting arm in external rotation (Fig. 6).

Fig. 6. Hand functional therapy in sitting

2. In the above item therapist used:

- screwing unscrew the bottle or jar - left limb hold when the right unscrew,
- pronation, supination during holding a bottle or the jar with left upper limb,
- take the bottle to lips with left upper limb,
- cleaning table with left upper limb,
- simulation of bread cutting with left upper limb.


Fig. 7. Patient position in the second stage of therapy – before (A) and after (B) therapy

Third stage of therapy:

1. Sit sideways on the table with right leg bend and left leg straight - activation of the left quadriceps and gluteus with task for the right hand.

Fig. 8. Sit sideways

A

B

Fig. 9. Patient position in the third stage of therapy – before (A) and after (B) therapy

Fig. 10. Hand functional therapy in standing - independent shaving.

**Summary**

The first days of therapy positive surprised the patient about his possibilities and functions that he had in the left upper limb, which was not used practically at all. The determination and clearly defined goal of the therapy met with a very positive reaction of the patient. He was aware of the direction in which the therapy was going. Forced use of the affected arm and gradual shaping of a variety of functional movements to overcome what is theorized as learned nonuse of the paretic limb may increase the incorporation of the affected arm into daily activities. During therapy the opportunity to shave first with the help and then almost alone, gave him great joy and satisfaction.

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