

Eclectic/mixed approach to physiotherapy in post-stroke patients – case study

Eklektyczne lub mieszane podejście w fizjoterapii pacjentów po udarze – opis przypadku

Emilia Mikołajewska^{1,2,3}

¹Chair of Physiotherapy, Ludwik Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun, Poland
Head of the Chair: Prof. Aleksander Goch PhD

²Rehabilitation Clinic, 10th Military Clinical Hospital with Polyclinic, Bydgoszcz, Poland
Head of the Clinic: Krzysztof Radziszewski MD

³Neurocognitive Laboratory, Interdisciplinary Centre for Modern Technologies, Nicolaus Copernicus University in Torun, Poland
Head of the Laboratory: Prof. Włodzisław Duch PhD

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Abstract

The prevalence of stroke, and its associated costs, are going to rise with the aging population and changes in lifestyle in developing countries. Further research should better identify modifiable and non-modifiable determinants of poor outcomes in stroke survivors. Complex rehabilitation of post-stroke survivors still needs novel solutions. An eclectic/mixed approach to intervention, regarded as synthesis of the classical intervention methods, techniques, and tools, may be regarded as one of them, but it still needs more research. The aim of the article is to familiarise the aforementioned approach based on the presented case report and to investigate the extent to which available opportunities of an eclectic/mixed approach to physiotherapy is being exploited.

Streszczenie

Zachorowalność na udary i związane z tym koszty rosną wraz ze starzeniem się populacji oraz zmianą trybu życia w krajach rozwiniętych. Dalsze badania powinny lepiej zidentyfikować modyfikowalne i niemodyfikowalne czynniki decydujące o słabych wynikach u chorych po udarach. Kompleksowa rehabilitacja tej grupy pacjentów ciągle wymaga nowych rozwiązań. Jednym z nich jest podejście eklektyczne lub mieszane, uznawane za syntezę tradycyjnych metod, technik i narzędzi, lecz ciągle wymaga ono wielu badań. Celem pracy jest przybliżenie omawianego podejścia na podstawie przedstawionego opisu przypadku, a także ocena, na ile obecne możliwości w tym zakresie są wykorzystywane w codziennej praktyce klinicznej.

Introduction

Despite stroke being regarded as the fourth cause of mortality and the leading cause of disability in the adult population in the United States, the worldwide negative impact of stroke may be even more serious [1–3]. Stroke epidemiology in the adult population is as follows:

1) as stroke risk factors are regarded:

– modifiable risk factors (in approx. 90% of ischaemic and intracerebral haemorrhagic stroke cases in the study): hypertension, diabetes, cardiac causes, smoking, alcohol, obesity, hyperlipidaemia, diet, physical inactivity, psychosocial stress, and depression [4],

– non-modifiable risk factors: age (> 55 y.o.), race/ethnicity (higher among African Americans, Hispanics, Chinese), sex (risk 24–30% higher in men, although women live longer), first-degree relatives to ischaemic stroke victims, geography (e.g. the so-called “stroke belt” in the U.S.) [1],

2) in the U.S.: 3% of the adult population (approx. 7 million patients), including 87% are ischaemic infarctions (87%), primary haemorrhages (10%), and subarachnoid haemorrhages (3%) – overall worldwide estimates vary widely [5],

3) incidence of stroke increases with age: from 30–120/100,000 citizens (35–44 y.o.) per year to 670–970/100,000 citizens (65–74 y.o.) per year – it seems

that the current incidence of stroke in developed (high-income) countries has diminished thanks to better risk factors control and higher life expectancy, but will rise due to the aging of the population [1],

4) percentage of primary haemorrhages among all strokes: 10–17% in Western countries, approx. 25% in Asian countries [5], with frequency of primary haemorrhage lower in persons of European origin, and higher in individuals of African, Asian, and Latin American origin [6],

5) general mortality in the U.S. in 2006: 47% [1], but highest mortality rates may be observed in Eastern Europe, North Asia, Central Africa, and the South Pacific [1],

6) as factors influencing general dependence and therapy (including neurorehabilitation) outcomes in stroke-survivors are regarded:

- outcomes in admission,
- age: 3 months after stroke older patients stay longer in hospital, and were more disabled and severely handicapped [7],
- socioeconomic status,
- race/ethnicity,
- gender: predictions are less favourable in women,
- geography.

It seems that the prevalence of stroke and associated costs are going to rise with the aging population (in developed countries) and changes in lifestyle (in developing countries). Undoubtedly, further research should better identify modifiable and non-modifiable determinants of poor outcomes in stroke survivors. Moreover, the aforementioned situation may change with advances in medical science (including acute stroke care, neurology, neurosurgery, neurorehabilitation, and secondary stroke prevention), advances in medical technology and assistive technology, and worldwide and local societal and economical changes.

The eclectic/mixed approach is regarded as a synthesis of classical intervention methods, techniques, and tools [8]. Despite the fact that it is not a purely innovative idea of therapy, it still requires the design and evaluation of experimental research studies of its efficacy. It seems that the eclectic/mixed approach has been unconsciously, intuitively used by experienced therapists but has not been properly defined previously. It not only stimulates change and advancement, but also allows for flexible transition from a traditional approach to a patient-tailored therapy. Advanced clinical practice requires the use of an individual and problem-solving approach and advanced skills in the therapy of patients with complex dysfunctions. Based on diagnosis there is a need to formulate the treatment plan consisting of the most effective combination of available (and acceptable in the current patient's health status) procedures, methods, techniques, and tools. An evidence-based decision-making process may be difficult due to evidence allowing for the most effective combination choice.

This study aims to familiarise the aforementioned approach based on the presented case report and to investigate the extent to which available opportunities of an eclectic/mixed approach to physiotherapy are being exploited.

Functional results of stroke

There may be a close connection between cognitive and functional deficits in post-stroke patients. Poor cognitive outcomes, particularly in executive functions, may be a predictor of poor recovery after stroke. But we should be aware that cognitive impairments may be observed in up to 78% of post-stroke patient in the post-acute phase [9], and they may be perceived, particularly in ischaemic stroke, as predictors of poor long-term survival. Among the cognitive deficits seen in post-stroke survivors in the post-acute phase the most frequent are: attention disorders (48.5%) – still the most frequent at 1-year follow-up, language disorders (27%), short-term memory disorders (24.5%), executive function disorders (18.5%) [9].

Executive dysfunction, aphasia, and long-term memory disorders were the least frequent at 1-year follow-up [9].

General dependence of stroke survivors 6 months after stroke were observed as follows: 30% were unable to ambulate without assistance, 26% were dependent in activities of daily living (ADLs) [5].

High variability of functional deficits in patients after stroke makes therapy in these cases among the most difficult. The general goals of post-stroke rehabilitation are complication management and restitution of function. Most of the patients need gait re-education and rehabilitation due to upper limb paresis (as many as 80%) [10].

Case study of eclectic/mixed therapy in a post-stroke survivor

Materials

Women (57 y.o.), 1 month after ischaemic stroke (left side of the brain), right hemiparesis, was admitted to the Posttraumatic Paraplegia Ward of the Clinical Military Hospital No. 10 in Bydgoszcz in January 2014. As a result of functional assessment, her functional abilities at admission were as follows: patient could sit without support in a wheelchair and could move in a wheelchair.

Goals of the therapy

- Long-term goals: recovery of gait function, recovery of upper limb function.
- Short-term goals: reinforcement of trunk muscles, reinforcement of right lower limb muscles, reinforcement of right upper limb muscles.

– Elementary goals: muscle tone normalisation, improvement of sensation in the upper limb, improvement of sensation in the lower limb, adaptation to vertical position.

Methods

Eclectic/mixed therapy was implemented in the described case, where available – 5 days a week. Elements of the eclectic approach to intervention were as follows:

- 1) elements of the Bobath Concept (method);
- 2) elements of the kinesiotherapy:
 - supported exercises,
 - active exercises (without load),
 - active exercises (with load),
 - exercises using body-weight support systems,
 - exercises using body-weight support systems with resistance;
- 3) vertical posture re-education;
- 4) gait re-education;
- 5) massage (dry);
- 6) kinesiology taping (method);
- 7) traditional physiotherapy techniques;
- 8) elements of hydrotherapy.

The kinds of exercises, numbers of repetition, and level of the load changed with the recovery of muscle strength. The features of the traditional physiotherapy techniques changed with the recovery of the patient (Table 1).

Various measures were introduced to assess changes in functional abilities as a result of the therapy. Functional abilities were assessed using our own scale (Table 2) since there is a lack of such wide clinical scores and scales. Strength of the muscles was assessed using the Lovett scale. The results of the therapy were assessed according the rule: recovery or lack of recovery. Such a global approach to the assessment of functional abilities recovery caused a lack of application of the more detailed scores and scales such as the Ashworth Scale for Grading Spasticity.

Results

After 2 months of the aforementioned eclectic therapy the patient achieved functional recovery (or) in 27 out of 33 assessed abilities, including inter alia: independent active standing, ADLs abilities (independent: dressing and stripping, toilet, washroom, eating, moving inside and outside), independent walking.

Abilities 1, 2, 3, 27, and 28 were assessed as existing before the therapy, and did not change during the therapy. Only one ability was not achieved: car driving.

Discussion

Changes in the lifestyle and life quality of stroke-survivors significantly influence their everyday func-

tioning. The aforementioned changes depend on the kind, extent, and location of changes within the nervous system. Due to problems with cognitive functions and voluntary movements, the common (with the patient and his/her family/caregivers) patient-oriented goal-setting can be very important. The most frequent preferences of patients are walking and upper limb function. Thus the most important tasks of the therapist may be perceived as follows: prevention of pathological secondary changes, recovery to walking, recovery to upper limb(s) function.

Functional recovery should be associated with avoiding compensation. Compensations always generate other abnormalities; moreover, extensive effort during movement tasks may cause an increase in muscle tone and decrease the chance of recovery of normal upper limb and lower limb function. Thus the therapist should pay particular attention to the coincidence of tasks and conditions, to fulfil them without pathological elements. Overly rapid transition to the next task may demotivate and (paradoxically) extend the time of rehabilitation.

The eclectic/mixed approach needs a higher level of clinical reasoning and professional development in physiotherapy. I have observed a positive attitude – many physical therapists are convinced of the advantages of the use of an eclectic/mixed approach to intervention.

There is a lack of strict standards and clinical guidelines concerning rehabilitation (especially physiotherapy) in post-stroke survivors, despite the fact that the mixed approach to intervention is the suggested means of operation. Each therapist wants to apply the most effective set of therapeutic methods, but there is a need for more research on the efficiency of a mixed approach, especially more detailed randomised, controlled trials engaging larger groups of patients. The main facilitators for the implementation of the aforementioned eclectic/mixed approach in post-stroke rehabilitation includes physical therapists' competence, practice organisation, and the availability and feasibility of a known approach to intervention (a core set of therapeutic methods). The main barriers can constitute lack of knowledge and not focusing on the patient's goals and best available outcomes of the therapy as far as organisational factors are concerned: lack of time, room, management support.

The main limitation is caused by the case study itself, but based on the solutions and factors identified herein, an increased number of therapeutic strategies can be developed and evaluated in future research.

Conclusions

There is a lack of similar case studies to compare with that described above. Many contemporary case studies describing simultaneous use of various methods and techniques may unconsciously prove the effi-

Table 1. Kind of implemented interventions confirming eclectic backbone of the therapy. Capital letters – key elements of the eclectic approach to intervention

Kind of implemented interventions	1 st month of the therapy	Goal of implemented interventions	Kind of implemented interventions	2 nd month of the therapy	Goal of implemented interventions
METHOD	NDT-Bobath	Therapy 24/7	METHOD	NDT-Bobath	Therapy 24/7
Exercises	Supported exercises (right upper limb)	Muscle strength	Exercises	Supported exercises (right upper foot)	Muscle strength
Exercises	Supported exercises (right lower limb)	Muscle strength	HYDRO-THERAPY	Bath (with continuously changing water temperature and with increased water pressure)	Sensation improvement
Exercises	Supported exercises (trunk)	Muscle strength	HYDRO-THERAPY	Bath (rotational, right upper limb)	Sensation improvement Muscle tone normalisation
Exercises	Active exercises with body-weight support systems (abdominal oblique muscles)	Muscle strength	HYDRO-THERAPY	Bath (rotational, right lower limb)	Sensation improvement Muscle tone normalisation
Exercises	Active synergistic exercises (rectus abdominis muscle)	Muscle strength	Exercises	Active exercises (trunk)	Muscle strength
Exercises	Active synergistic exercises (quadriceps femoris of right lower limb)	Muscle strength	Exercises	Active exercises with resistance (lower limbs)	Muscle strength
Exercises	Active exercises (quadriceps femoris muscles)	Muscle strength	Exercises	Active exercises using body-weight support systems (elbow extensors and flexors)	Muscle strength
Exercises	Active exercises (gluteus maximus muscles)	Muscle strength	Exercises	Active exercises with resistance (oblique abdominis muscles)	Muscle strength
Exercises	Exercises using body-weight support systems (ischiocrural muscles)	Muscle strength	Exercises	Exercises using body-weight support systems with resistance (gluteus maximus muscles)	Muscle strength
Exercises	Exercises using body-weight support systems (gluteus maximus muscles)	Muscle strength	Exercises	Exercises using body-weight support systems with resistance (gluteus medial muscles)	Muscle strength
Exercises	Exercises using body-weight support systems (gluteus medial muscles)	Muscle strength	Exercises	Exercises using body-weight support systems with resistance (quadriceps femoris muscles)	Muscle strength
Exercises	Exercises using body-weight support systems (deltoid muscle, medial part)	Muscle strength	Exercises	Exercises using body-weight support systems with resistance (ischiocrural muscles)	Muscle strength
Exercises	Exercises using body-weight support systems (elbow extensors and flexors)	Muscle strength	METHOD	Kinesiology taping (fibular muscles, tibialis anterior muscles)	Muscle strength (24/7)

Table 1. Cont.

Kind of implemented interventions	1 st month of the therapy	Goal of implemented interventions	Kind of implemented interventions	2 nd month of the therapy	Goal of implemented interventions
GRADUAL VERTICALISATION	Adaptation to standing using climbing frame with assistance of the therapist	Recovery to standing	TRADITIONAL PHYSIO-THERAPY TECHNIQUES	Electrotherapy (fibular muscles)	Muscle strength
GRADUAL VERTICALISATION	Adaptation to active standing	Recovery to standing	TRADITIONAL PHYSIO-THERAPY TECHNIQUES	Electrotherapy (extensor carpi muscles, fingers extensors)	Muscle strength
METHOD	Kinesiology taping (fibular muscles)	Muscle strength (24/7)	TRADITIONAL PHYSIO-THERAPY TECHNIQUES	Electrotherapy (elbow extensors)	Muscle strength
TRADITIONAL PHYSIO-THERAPY TECHNIQUES	Electrotherapy (fibular muscle of right lower limb)	Muscle strength	MASSAGE	Massage (dry) (right upper limb)	Muscle tone normalisation
TRADITIONAL PHYSIO-THERAPY TECHNIQUES	Electrotherapy (quadriceps femoris muscles of right lower limb)	Muscle strength	METHOD	Gait re-education without aids according to the NDT-Bobath method rules	Gait re-education
TRADITIONAL PHYSIO-THERAPY TECHNIQUES	Electrotherapy (extensor carpi muscles, fingers extensors of right upper limb)	Muscle strength			
MASSAGE (DRY)	Massage (dry) (right lower limb)	Muscle tone normalisation			
MASSAGE (DRY)	Massage (dry) (right upper limb)	Muscle tone normalisation			
GAIT RE-EDUCATION	Exercises: preparation to weight-bearing (right lower limb)	Gait re-education			
GAIT RE-EDUCATION	Exercises: weight-bearing (right lower limb)	Gait re-education			
GAIT RE-EDUCATION	Gait re-education using table as support surface with assistance of the therapist	Gait re-education			
GAIT RE-EDUCATION	Gait re-education using bars with assistance of the therapist	Gait re-education			
GAIT RE-EDUCATION	Gait re-education using cane with assistance of the therapist	Gait re-education			

Table 2. Abilities achieved by the patient as a result of eclectic therapy

No.	Ability	Before therapy	After 2 months of eclectic therapy
1	Transfer from lying to sitting	+	+
2	Sitting with support	+	+
3	Sitting without support	+	+
4	Standing: passive	–	+
5	Standing: active-passive	–	+
6	Standing: active	–	+
7	Strength of rectus abdominis muscles*	3+	5
8	Strength of oblique abdominis muscles*	2+	5
9	Strength of gluteus maximus muscles*	2+	5
10	Strength of gluteus medius muscles*	2+	5
11	Strength of erector spinae muscle*	3–	5
12	Strength of latissimus dorsi muscle*	2+	5
13	Strength of ischiocrural muscles*	2+	3
14	Strength of quadriceps femoris muscles*	3–	4
15	Strength of plantar flexor of foot*	1	3+
16	Strength of elbow flexors*	2	3+
17	Strength of triceps brachii muscles*	2	3+
18	Strength of deltoid muscles*	2	4–
19	Strength of extensor muscles of wrist*	2	3+
20	Toilet	–	+
21	Shower	–	+
22	Dressing	–	+
23	Rolling over from supine to prone (in bed)	–	+
24	Transfer from bed to wheelchair	–	+
25	Transfer from wheelchair to bed	–	+
26	Adaptation to wheelchair	–	+
27	Independent drinking	+	+
28	Independent eating	+	+
29	Inside activities (hospital, hall, home)	–	+
30	Moving outside (pavement, street, etc.)	–	+
31	Walking with aids	–	+
32	Independent walking (without aids)	–	+
33	Car driving	–	–

*Using Lovett scale.

cacy of the eclectic approach. Nevertheless, the eclectic approach stimulates the need for the development of new, advanced tools in the design and evaluation of experimental research studies. Moreover, advanced measurement theory and advanced methods of data analysis (data mining, computational neuroscience,

artificial intelligence) will be useful as far as understanding qualitative data analysis is concerned.

Conflict of interest

The author declares no conflict of interest.

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Address for correspondence:

Emilia Mikołajewska

Chair of Physiotherapy

Ludwik Rydygier Collegium Medicum in Bydgoszcz

Nicolaus Copernicus University in Torun

ul. M. Skłodowskiej-Curie 9, 85-094 Bydgoszcz, Poland

Phone: +48 607 889 909

E-mail: e.mikolajewska@wp.pl