Case Reports

Journal of INTERNATIONAL MEDICAL RESEARCH

Journal of International Medical Research
50(6) 1–6

DOI: 10.1177/03000605221102083
journals.sagepub.com/home/imr
SAGE

Rehabilitation in atypical neurological disease: a case report

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Abstract

The rehabilitative management of neurological diseases such as Parkinson's disease (PD) and multiple sclerosis (MS) is complex; drug treatment alone is generally insufficient. Multidisciplinary rehabilitation programs can fundamentally contribute to the management of neurological patients and have important positive repercussions on their quality of life. We describe the unusual case of a 70-year-old man with a diagnosis of both MS and PD, who presented with motor and cognitive impairments. He was admitted to our institute for a rehabilitation program. Motor, cognitive, and linguistic abilities were evaluated at admission and 60 days after the multidisciplinary rehabilitation, which included motor exercises, speech therapy, and cognitive interventions. The multidisciplinary rehabilitation improved the patient's functional status and exerted positive effects on his mood, autonomy in activities of daily life, perception of quality of life, cognitive performance, and speech skills. It is important to find new methods for treating neurological patients to better manage the social and economic implications of neurological disease, and to ensure a long course of treatment and rehabilitation.

Keywords

Multiple sclerosis, Parkinson's disease, cognitive rehabilitation, motor rehabilitation, neurological disease, quality of life, multidisciplinary rehabilitation

Date received: 26 November 2021; accepted: 3 May 2022

Introduction

Many neurodegenerative diseases, including Parkinson's disease (PD), are characterized by a neuroinflammatory state, which has different causes for each disease, and

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depends on the number, site, and type of damaged cells.[1]

Multiple sclerosis (MS) is an immune-mediated inflammatory disease of the central nervous system in which the myelin and axons degenerate to varying degrees. Neuropathological studies indicate that early and sustained neurodegeneration occurs in MS, which indicates that both inflammation and neurodegeneration contribute to MS development. However, it remains largely unknown how inflammation and neurodegeneration interplay over the disease course.[2] MS is mostly diagnosed between 20 and 40 years of age. Primary progressive MS is the least common type of MS, affecting just 15% of patients between 40 and 50 years of age;[3] it is characterized by a lack of initial relapsing disease. Primary progressive MS has a distinct clinical course because of the absence of exacerbation before clinical progression, and its differences respective to other MS forms are relative rather than absolute.[4] PD is a neurodegenerative disorder characterized by both motor and non-motor symptoms that are caused by a loss of dopaminergic neurons in the substantia nigra.[5] It occurs at similar proportions around the world, and has a variable onset age; it generally occurs after 60 years of age and is unusual in individuals under 40 years.

The rehabilitative management of neurological diseases is complex, and pharmacological treatment only is generally insufficient. Multidisciplinary rehabilitative treatments, including neuromotor, cognitive, occupational, and speech therapies, are recommended. In this kind of treatment, each professional on the rehabilitation team develops and implements an individualized program based on the patient's needs. Several studies have reported that multidisciplinary rehabilitation has greater and longer-lasting positive effects than pharmacological treatments in both MS and PD, as well as in other neurodegenerative diseases such as amyotrophic lateral sclerosis and other parkinsonian syndromes.[6,7] Furthermore, patients who undergo rehabilitation programs have improvements in specific cognitive functions as well as the functional reorganization of neural plasticity compared with controls. In particular, an increase in attention—related to higher cortical activity in the posterior cerebellar lobule and superior parietal lobule—has been reported in patients with MS and PD.[8,9] These findings suggest the usefulness of early rehabilitative treatment using a multidisciplinary approach.

The present case report highlights the efficacy of multidisciplinary rehabilitative treatment in the unusual case of a patient affected by both MS and PD. We place particular emphasis on the role of cognitive rehabilitation, which can fundamentally contribute to the management and rehabilitation of neurological patients and has important repercussions on their quality of life.

Case report

The patient was a 70-year-old man with a positive family history of neurological diseases. The reporting of this study conforms to the CARE guidelines (for CAse REports).[10] The patient signed his informed consent for treatment and to publish this case. He presented with primarily progressive MS, which started with diplopia symptoms at the age of 40 years. He had several relapses in the 3 years following his diagnosis and started drug therapy with cortisone. However, for approximately 20 years he has not undergone any disease-modifying therapies because the disease was secondarily progressive, which has few pharmacological indications. About 30 years after his MS diagnosis, he began to show extrapyramidal symptoms, characterized by motor slowing and dysarthria. Subsequently, difficulties in swallowing appeared. A diagnosis of PD

according to the UK Brain Bank criteria and dopamine transporter single-photon emission computed tomography was confirmed, and he began L-DOPA therapy.

The patient was hospitalized at our institute for a rehabilitation cycle. At the baseline evaluation, he was alert, cooperative, and well oriented in time parameters. However, cognitive deficits were observed (Table 1). Nystagmus was present in all eye directions. Dysarthria, dysphagia for solid foods, and pneumophonic incoordination were also detected. The clinical examination highlighted slight spastic hypertension in the lower limbs, dysmetria, and bilateral slowness in the finger-to-nose test. Motor evaluations revealed an upright position on an enlarged base and with bilateral support; there was front flexion of the trunk and of the head in anteposition. Walking short and medium distances was possible with the aid of a walker. The patient had a spastic paraparetic gait and had difficulty changing directions. Spastic hypertonus was present in the lower limbs, particularly in the ankles (left- > right). There were no gross deficits of strength in any of the four limbs. The patient was able to maintain the Mingazzini II position for a few seconds. Superficial sensitivity was present as hypoesthesia in the right lower limb. In cerebellar tests, the patient had bilateral tremor and dysmetria in the finger-to-nose test. He had painless, free articulation in the main joints as well as discrete control of the trunk when seated. He was able to independently perform all postural movements in bed with adjustments; from bed to chair and vice versa were possible with bilateral support. The patient needed modest assistance in performing activities of daily living. His Expanded Disability Status Scale score was 6.

The rehabilitation program for our patient aimed to prevent the onset of

Table 1. Neuropsychological assessments and clinical scales

		Score T1	Score T2
Neuropsychological Assessment	Cut-off	PC	PC
The Brief Repeatable Battery of Neuropsychological Tests (BRB)			
Selective Reminding Test, Long-Term Storage (SRT-LTS)	23.3	28.37	33.37
Selective Reminding Test, Consistent Long-Term Retrieval (SRT-CLTR)	15.5	15.41	18.41
Spatial Recall Test (SPART)	12.7	10.72	15.72
Symbol Digit Modalities Test (SDMT)	37.9	11.61	24.61
Paced Auditory Serial Addition Test (PASAT-3)	28.4	20.57	25.57
Paced Auditory Serial Addition Test (PASAT-2)	17.1	15.25	18.25
Delayed Recall of the Selective Reminding Test (SRT-D)	4.9	4.49	6.49
Delayed Recall of the Spatial Recall Test (SPART-D)	3.6	3.95	3.95
Word List Generation (WLG)	17.0	13.12	16.12
Clinical Scales			
Measure of Anxiety			
Hamilton Anxiety Rating Scale		18	10
Measure of Depression			
Beck's Depression Inventory 2 (BDI-II)		29	10
Measure of Quality of Life			
12-Item Short Form Survey (SF-12)		40	60

The cut-off refers to the threshold below which the examined neuropsychological function was considered deficient. PC, correct score; T1, baseline evaluation; T2, evaluation after the rehabilitation program.

secondary complications and improve mobility. The specific rehabilitation aims were as follows: treatment of cognitive deficits, reduction of hypertonia, improvement of postural stability, and improvement of swallowing and pneumophonic coordination. The patient underwent intensive multidisciplinary rehabilitation that included daily sessions of physiotherapy, speech therapy, neuropsychological rehabilitation, and psychotherapeutic treatment. The cognitive rehabilitation program was performed for 6 weeks, four times/week for a total of 24 sessions. Each rehabilitation session was divided into two phases on the same day. We used a combined cognitive rehabilitative training composed of psychoeducational interventions and psychotherapy.

The cognitive rehabilitation (50 minutes) focused on space–time orientation, attention, and memory exercises. Techniques included reality orientation therapy, attention training, vocal exercises, and paper-pen exercises. We also used internal and external aids such as clocks, city maps (for spatial orientation), diaries, notebooks, and calendars. Psychotherapeutic treatment aimed to improve the patient's problem-solving skills, self-perception, and emotional and behavioral self-regulation skills.

The second part of the rehabilitation program was organized according to a standard scheme: motor exercises (60 minutes) and language exercises (60 minutes). Physiotherapy promoted overall muscle strengthening, increased amplitude of movement, and muscle relaxation. The motor training was based on task-oriented exercises, transfers, balance, gait training to improve mobility, and robotic rehabilitation. Speech therapy was performed to treat speech disorders (dysarthria and dysphonia) and swallowing (dysphagia). This training included the intensive stimulation of speech intensity, exercises to improve verbal intelligibility, and the treatment of limitations to swallowing, choking, and slowness of chewing. Dysphagia can develop over time in Parkinson's disease, although the reported frequency is varied (from 30% to 82%, likely because of diverse investigation methods). Dysphagia is considered the main cause of death in patients lacking a cough reflex. Rehabilitative speech therapy is able to adapt food consistencies and postures to meals in various disease stages, which helps to delay complications.

In addition to the above-mentioned treatments, occupational therapy was performed three times/week for 2 months to improve functional independence, autonomy in daily living activities (e.g., dressing, washing, cooking), and social participation, which had positive repercussions on the patient's quality of life.

Our findings demonstrated that, with the use of specialized multidisciplinary rehabilitation programs, improvements in functional status are possible in patients. Our patient had improvements in postural stability, pneumophonic coordination, speech, and memory (Table 1). Moreover, psychological intervention led to an increase in appropriate cognitive and coping strategies.

Discussion

Both PD and MS are diseases that allow functional recovery if they are treated consistently over time in a non-advanced stage.[11] Patients with PD and MS are characterized by low levels of fitness and sedentary lifestyles.[12,13] There is extensive evidence to suggest that psychomotor activity acts on these factors and also has positive effects on mental health.[14–16] Here, we report the psychomotor and emotional recovery of our patient, who presented moderate cognitive dysfunction at his baseline evaluation. Rehabilitation programs for treating cognitive and emotional/motivational deficits are based on the concepts of brain plasticity and cognitive reserve.

Studies into brain plasticity have reported that cortical reorganization and adaptation can occur after intensive rehabilitative programs.[17] Rehabilitation methods aim to improve residual intellectual function and quality of life, and to reduce disability and social reintegration.

Our results are novel because of the perseverance of the rehabilitation treatment in a patient with MS and PD. Although the present study is limited to a single case, our findings indicate that multidisciplinary rehabilitation can lead to functional recovery and improvements in quality of life despite a long history of illness. Moreover, a double diagnosis can be discouraging for patients and their families. Neurorehabilitation is an important approach for improving cognitive function. Furthermore, it is important to find new methods for treating these patients and their families to better manage social and economic implications, and to ensure long-term care and rehabilitation.

Ethics statement

Ethics committee approval was not required because of the nature of this study (case report). The patient signed his informed consent for treatment and to publish this case.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was supported by Current Research Funds 2022, Ministry of Health, Italy.

Author contributions

Conceptualization, V. L. B.; methodology, F. C.; data curation, C. R.; writing—original draft preparation, F. C.; writing—review and editing, V. L. B.; supervision, C. R. All authors have read and agreed to the published version of the manuscript.

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