Effect of rehabilitation on Parkinson's disease with truncal Dystonia

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Abstract

For patients with Parkinson's disease with truncal abnormal posture caused by dystonia, the effectiveness of a program of rehabilitation for original Parkinson's disease was examined. The subjects were 17 patients with Parkinson's disease who also had abnormal posture. The evaluation scale after five weeks was compared with that before the rehabilitation began. As a result, a significant improvement was obtained for the item of mentation of the UPDRS, behavior and the feeling, abnormal posture, and walking ability five weeks later. The rehabilitation program for patients suffering PD with dystonia was effective not only for the parkinsonism but also for mental status and dystonia.

Keywords : Parkinson's disease, abnormal posture, dystonia, UPDRS, behavior, feeling

Introduction

In Parkinson's disease (PD), it is known that neck and truncal abnormal posture often merge with the aggravation of disease. The abnormal posture is thought to be caused by dystonia and rigidity of the truncal line. In addition to medical therapy and intramuscular injection of botulinal toxin, the deep brain stimulation technique (Deep Brain Stimulation, DBS) has been introduced. However, the effects of these therapies have not been satisfactory [1,2]. On the other hand, there have been few reports on the effectiveness of rehabilitation for PD. Notably, the rehabilitation for Parkinson's disease with dystonia has not yet been examined. For these patients, an original short-term rehabilitation program was performed intensively, and we analyzed the effects.

Subjects and Methods

The subjects were 17 patients with PD who had been admitted to our hospital for rehabilitation. All patients presented with abnormal posture with truncal anteflexion and the lateral fold. The abnormal posture was defined as a posture due to anteflexion or lateroflexion against from truncal midline rank. The patients included four men and thirteen women. The mean age was 73.1±5.5 (±SE) y. The Hoehn & Yahr stage was an average of 3.0±0.4. In our hospital, a rehabilitation program course specializing in PD in the cranial nerve line rehabilitation center of Tokushima National Hospital established from April, 2009 was performed. The program has a stress-relieving menu, offering activities such as sports, dance, and video games, in addition to the basic menu

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which is commonly carried out, including a range of motion exercises or the muscle strengthening exercises. The stress-relieving menu is based mainly on activities which can be performed happily while relieving stress. It was designed to avoid a feeling of obligation to exercise and painful feelings. The training frequency is one hour every day, five days a week, and the length of stay is five weeks. The breakdown of the training time was: basic menu approximately 20 minutes, and stress-relieving menu 40 minutes. Evaluation was conducted on admission at the start of the rehabilitation, and five weeks later. A paired t test was used for statistical analysis. The evaluation checked the following three items: UPDRS, static posture, and gait. The static posture was estimated as a sagittal section using a digital camera by photographing the standing position posture of the coronal plane. In the sagittal section, the anteversion anteflexion angle is defined as a line and the angle with the perpendicular line to the floor links the greater trochanter to the acromial process. In the coronal plane, the lateroversion angle is defined as the angle that the line which linked the middle point of the right and left crest of the ilium to the seventh cervical vertebrae processus spinalis and the perpendicular line to the floor did. Regarding walking, walk time and steps were counted as patients walked in a straight line for 10m at their own pace. The walking speed, a step, steps were calculated from a measured value.

Results

UPDRS is shown in figure 1. UPDRS Part I regarding mentation, behavior and the feeling showed a significantly low value by a discharge as compared with the start of rehabilitation (p=0.014221). In Part II, regarding activities of daily living, there was no significant difference (p=0.048). Part III, regarding the motor function, showed a significantly low value at a discharge (p=0.023512). In Part IV, regarding complications of the treatment, there was no significant difference. From the results of the UPDRS, a significant improvement was shown in the item about mentation, behavior, feelings, and the motor function.

A static posture evaluation is shown in figure 2. The truncal lateral fold angle tended to decrease at a discharge, but there was not a clear significant difference (p=0.066572). The camptospasm angle showed a small but significant value at discharge (p=0.043166) (Figure 2a). The walking speed became significantly quicker at discharge (p=0.002534). The step length increased significantly (p=0.001426). Regarding steps, there was no significant difference. From gait evaluation, a significant improvement was shown in walking speed and a step.

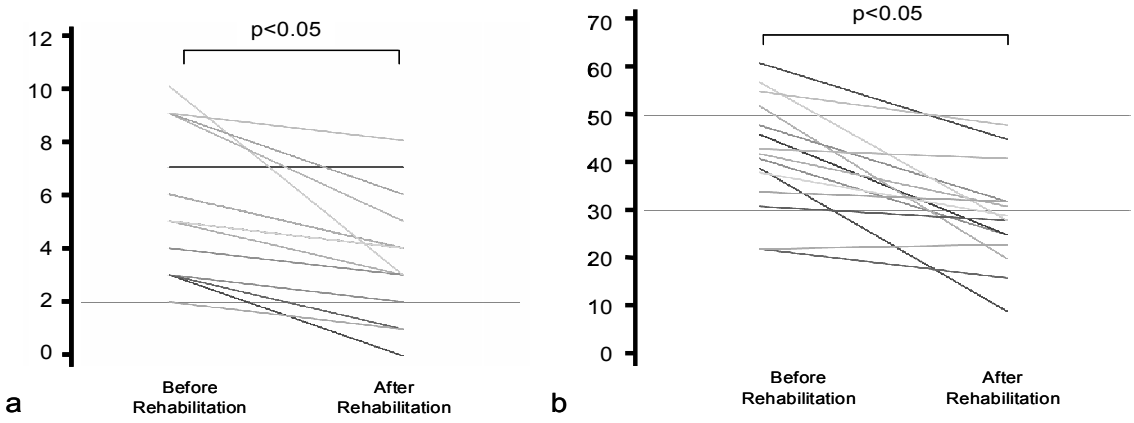

Figure 1. Changes in DPDRS part 1 (a) and part 3 (b) before and after rehabilitation.

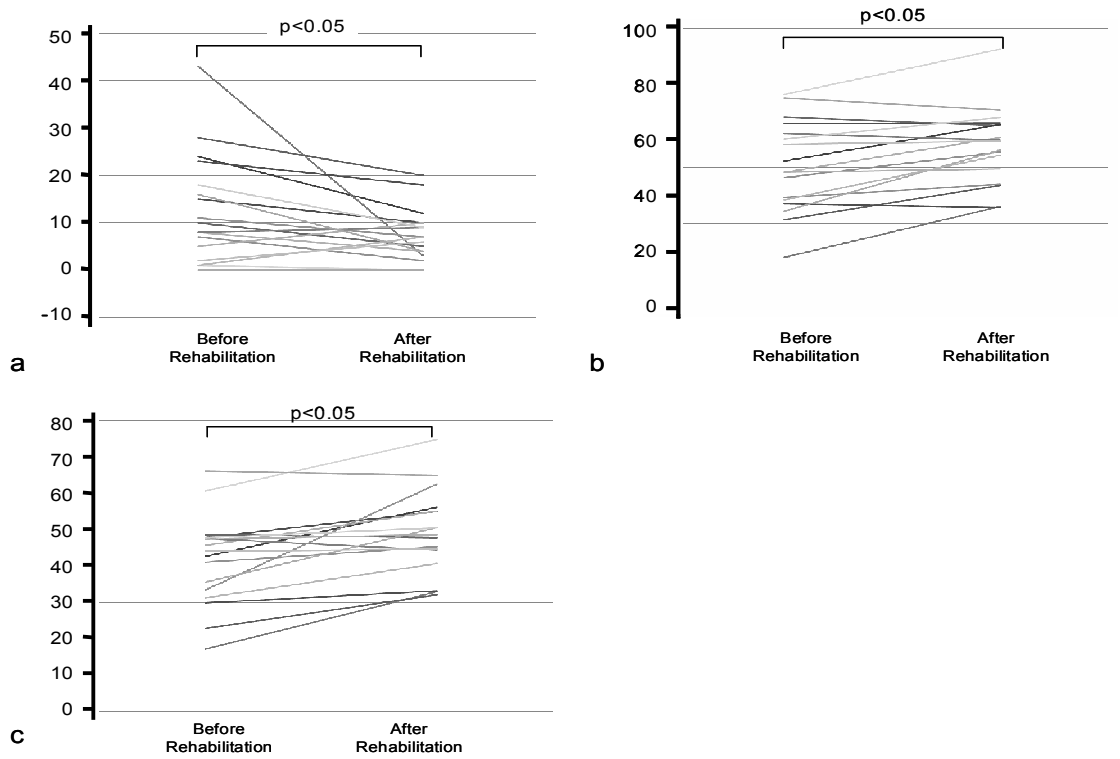

Figure 2. A static posture evaluation before and after rehabilitation. a, the camptospasm (degree). b, the walking speed (m/min). c, the step width (cm).

Discussion

Dystonia is sometimes found in patients with idiopathic Parkinson's disease (PD). Even though dystonia in PD was described in patients before the introduction of levodopa or functional neurosurgery, currently most cases are linked to treatment, both medical and surgical. Occasionally, fixed and painless contractures, mainly affecting the hands and toes, are encountered in PD patients [3]. The interval between onset of dystonia and parkinsonism ranged from one year to 25, but in the majority of cases, a diagnosis of PD was made within 10 years after onset of dystonia. The response to levodopa therapy was irregular, as it was to dopamine receptor agonists (DA), sometimes resulting in worsening, improvement, or no change in the condition in other cases [4,5]. Among patients receiving levodopa or dopamine agonist therapy, dystonia is, along with dyskinesias, one of the main motor complications related to chronic therapy. It usually occurs as an off period phenomenon (off-period dystonia) but can present as peak dose dystonia, or diphasic dystonia. The most frequent site for off-dystonia is the foot, whereas in peak dose dystonia the neck and face are more commonly involved [6]. The practical approach to coping with dystonia includes different strategies. Many drugs for symptomatic management of dystonia have also been reported. Among them, benzodiazepines, bachlophen, botulinum toxin, and lithium [6,7], are commonly used. Functional neurosurgery is another effective treatment for off-dystonia, as it eliminates motor fluctuations [8]. Reduction of off-dystonia in up to 90% of patients treated with deep brain stimulation of the subthalamic nucleus has been also reported [9].

For the dystonia complicated by Parkinson's disease, various kinds of therapy that narrow down the focus to dystonia have been tried,

as described in the above. However, a gold standard therapy has not yet been found. Furthermore, levodopa given for Parkinson's disease may be harmful or effective in dystonia. It is frequently difficult for parkinsonism and dystonia to be treated together. Psychological stress may become a factor in the worsening of dystonia since PD patients often suffer the complication of depression. We reviewed a conventional rehabilitation program of physical exercise which had the principal objective of improvement of the motor function. We developed a program aiming at reduction of psychological stress. The basic physical exercise menu was kept to a minimum, and the emphasis was on following the stress-relieving menu. It was set so that the patients received rehabilitation, at the same time, during a 5-week period of hospitalization. As a result, through our hospital rehabilitation program, improvement was obtained for not only in abnormal posture caused by dystonia but also an exercise symptom as the parkinsonism. Also, the mentation was significantly improved. Therefore, our view is that our rehabilitation system for reduction of psychological stress was shown to be effective for all these disorders. This study was a preliminary examination that tested 5-week short-term effects. A long-term effect will be made in future. Also, measures to continue the effects will be studied.

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