

Examination of the freezing of gait in patients with Parkinson's disease

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Abstract

The relationship of freezing of gait to the standing center of gravity balance, ability to walk, and changes in the muscular strength were analyzed. Subjects included 109 PD patients who were classified into two groups according to the presence or absence of freezing of gait. The freezing of gait group comprised 16 men, and eight women. The center of gravity balance biased the rear in the PD patients without freezing of gait. On the other hand, in the freezing of gait group, backward ectopia of the center of gravity balance disappeared. It may be effective in freezing of gait to bias the center of gravity balance backward.

Keywords: freezing, muscular strength, center of gravity balance, PD

Introduction

Freezing of gait in patients with Parkinson's disease (PD) merges than 20% of advanced PD patients [1]. It is thought that a secondary disorder related to various kinds of ADL results in freezing of gait. A fall, in particular, is the cause that freezing of gait is important [2]. This is regarded as a risk factor controlling ADL, the quality of life of the patients, and convalescence greatly. An effective therapy has not been established by rehabilitation for the freezing of gait of PD patients. Rehabilitation using cues of sight and hearing has been validated [3]. We studied the freezing of gait of PD patients. The relationship of freezing of gait to the standing center of gravity balance, ability to

walk, and changes in muscular strength were analyzed.

Materials and methods

The subjects included 109 PD patients who were classified into two groups according to the presence or absence of freezing of gait. The freezing of gait group comprised 16 men, and eight women. The age was 69.8±7.8 years old (mean ±SD). Disease duration was 7.1±6.3 years. The mean disease severity (Hoehn and Yahr stage) was 3.27±0.42. The group without the freezing of gait comprised 24 men, and 61 women. The age was 72.5±7.1 years. Disease duration was 4.4±2.7 years. The disease severity was 3.09±0.42. As an equilibrium usability test, the center of

gravity position was measured. The patients stood for 30 seconds on apparatus designed for an equilibrium function test. The sole pressure center (the distance from the original medium rank to the center of gravity) was measured. In the walk usability test, the patients walked 10m, and this was repeated three times. The step distance and the mean of the walking speed were calculated. The lower limbs' muscular strength was measured in quadriceps femoris muscle. This was repeated four times.

Results

The front/back balance of the sole is shown in Figure 1. Before the rehabilitation started, the group without the freezing of gait had a significant backward load (p=0.000). In the group with the freezing of gait, the backward load disappeared (p=0.626). After

rehabilitation, the group with the freezing of gait had the backward load, too (p=0.033) (Figure 2a). The group without the freezing of gait showed a significant backward shift before rehabilitation about the sole pressure center (p=0.024). After the rehabilitation, the group with the freezing of gait showed the backward shift too (p=0.129) (Figure 2b). Regarding the walk function, there was no significant difference in the presence or absence of freezing of gait by the step. After the rehabilitation, the step increased in both groups, with or without freezing of gait (p=0.040 vs p=0.000) (Figure 2c). There was no significant difference in the presence or absence of freezing of gait at walking speed. After the rehabilitation, the walking speed increased (Figure 2d). In regard to muscular strength, there was no significant difference in either group. The muscular strength increased after the rehabilitation (Figure 2e).

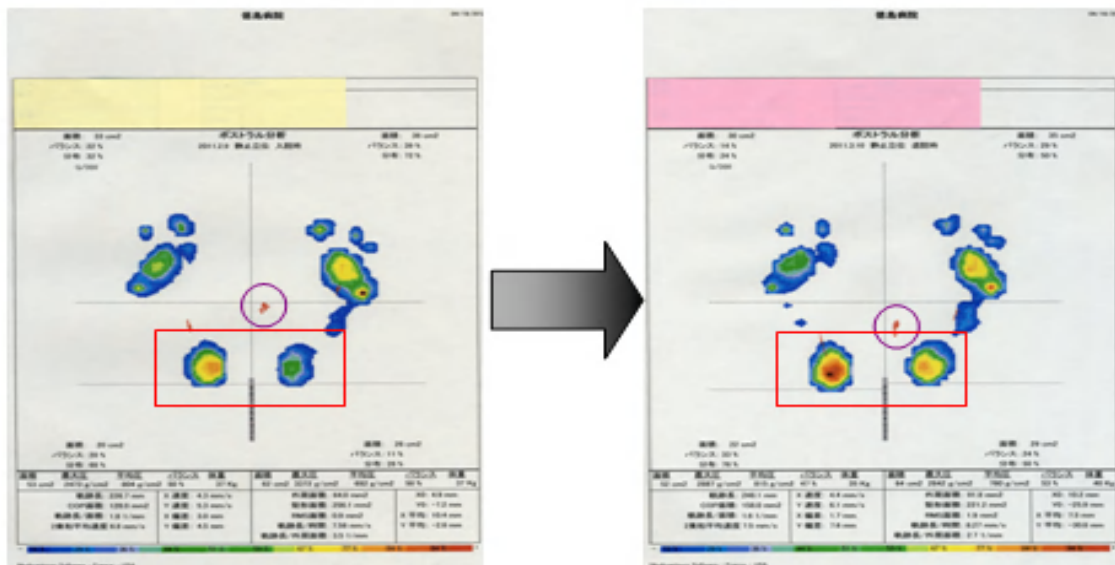


Figure 1. Sole front and back balance and the sole pressure center in patients with Parkinson's disease.

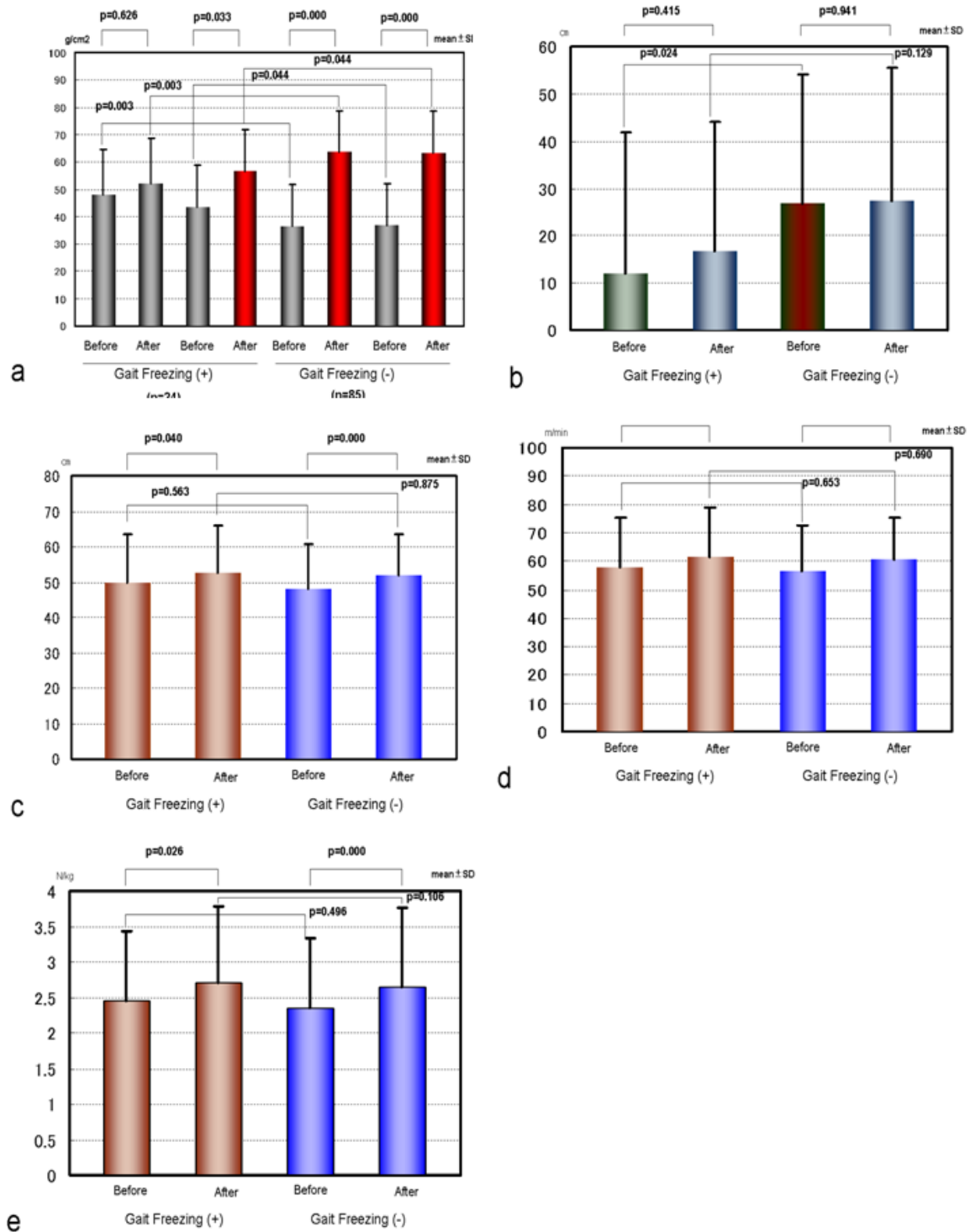


Figure 2. The change between two presence or absence of freezing of gait in patients with Parkinson's disease a. The balance before and after the sole part. b. The sole pressure center. c. Step distance. d. Walking speed. e. Muscular strength of quadriceps femorii.

Discussion

The center of gravity balance biased the rear in the PD patients without freezing of gait. On the other hand, in the group with the freezing of gait, backward ectopia of the center of gravity balance disappeared. That rehabilitation for freezing of gait used cues of sight and hearing was validated. We receive original rehabilitation for the purpose of providing stress-relief to PD patients. The step, the walking speed, and the muscular strength were thereby improved. To improve freezing of gait it may be effective to bias center of gravity balance backward.

References

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