Effect of lower limb exercise on orthostatic hypotension in patients with Parkinson's disease

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Abstract

The patients with Parkinson's disease frequently have orthostatic hypotension because of autonomic disorders. For patients with Parkinson's disease with orthostatic hypotension, we determined the effect of lower limb exercise. We studied seven patients with Parkinson's disease suffering the complication of orthostatic hypotension. They were independent in everyday life, and did not take blood pressure medicine. The method was to conduct lower limb exercise for three weeks. We measured before and three weeks after the intervention.

The evaluation battery included a Schellong test, symptom score, CS -30 test and thermography of both culf. From the results of the Schellong test, orthostatic hypotension in five people of the seven was improved. On the CS -30 test, the number of starts of five of seven people increased. We think that the lower limb exercise led to improvement of orthostatic hypotension in these patients with Parkinson's disease. However, the improvement effect of symptoms such as dizziness or the drift was not clear.

Keywords

Parkinson's disease, orthostatic hypotension, lower limb exercise

Introduction

In Parkinson's disease, vascular reaction on rising is insufficient due to vasomotor sympathetic denaturation, a side effect of dopaminergic drugs and muscle weakness. Therefore, a normal blood pressure adjustment is not possible, and orthostatic hypotension is easily caused. In patients with Parkinson's disease hospitalized in Tokushima National Hospital, there are many troubled with orthostatic hypotension. They may have physical injury because of losing consciousness. We instruct the patients with orthostatic hypotension to wear elastic stockings and to work slowly. The exercise of tiptoeing is effective in the prevention of orthostatic hypotension for patients who had orthostatic hypotension for diabetes [1]. We examined whether lower limb exercise improved the orthostatic hypotension in patients with Parkinson's disease.

Subjects and Methods

The subjects were seven inpatients with Parkinson's disease, undergoing rehabilitation. They met the two following criteria; 1) Orthostatic hypotension had been diagnosed. 2) They were independent in everyday life. The lower limb exercise works on tiptoeing in training methods on the advice of a physical therapist. They continued exercising for three weeks. After having stood on tiptoe for 2-3 seconds, they resumed a normal standing position for 2-3 seconds. This procedure was repeated ten times, and was repeated another ten times after a short break. The exercise was carried out at the bedside. They touched the bed

fence during the exercise and a nurse stood close to them. We measured the blood pressure five times in the Schellong test: 1) in the dorsal position, 2) just after adopting the standing position, 3) one minute after adopting the standing position, 4) minutes after standing position, 5) five minutes after adopting the standing position. The interview about symptoms included questions on the symptom of dizziness and the drift. Thermography was used to measure skin temperature of the legs at 25 ℃ with an Infraeye 2000 (Nihon Kohden, Tokyo, Japan). The CS -30 test is the number of starts from a chair in 30 seconds. The above-mentioned evaluation was done before and after the exercise. This study received the approval of the Ethical Review Board of the Tokushima National Hospital. We gave a summary of the study to the subjects in a document and obtained their signed consent.

Results

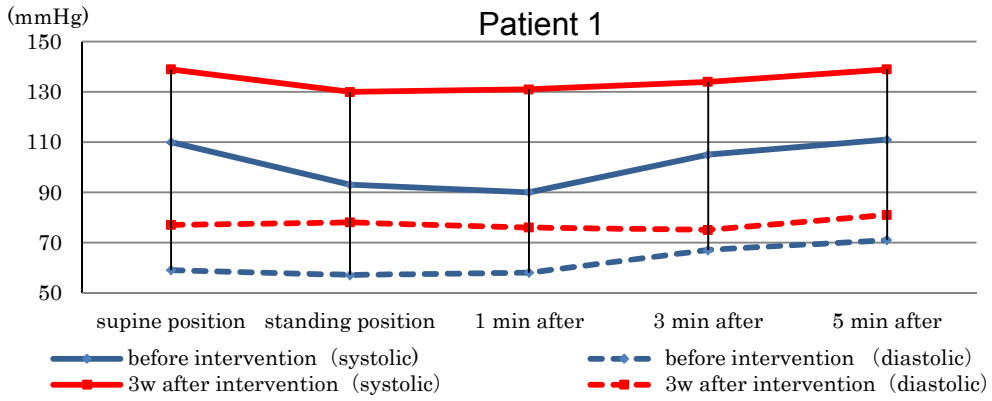
The subjects were seven patients male. Four were male (patients 1-4) and three were female patients (patients 5-7). The age was 65 +-6.04 (mean+-SD) years old. We show the results of the Schellong test of the seven patients in Figure 1. We compared the results three weeks after the exercise intervention to those before the exercise intervention. Three patients had orthostatic hypotension before the exercise program, but were improved three weeks after the exercise program. Two patients were present in orthostatic hypotension, but the degree decreased. Two patients did not have any clear improvement of orthostatic hypotension. The results of thermography demonstrated that the leg temperature hardly changed with exercise. The results of the CS -30 test demonstrated that the number of times increased after exercise in five patients. The results of interview on symptoms demonstrated that four patients had dizziness and drift on admission. These symptoms improved in two patients after the intervention (Figure 1).

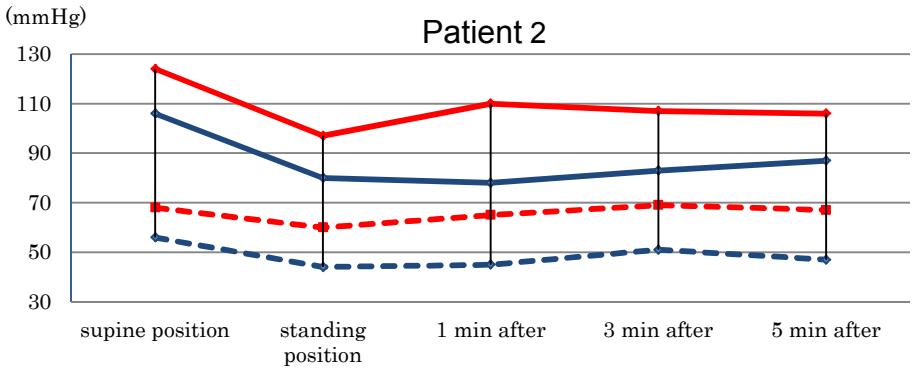
Discussion

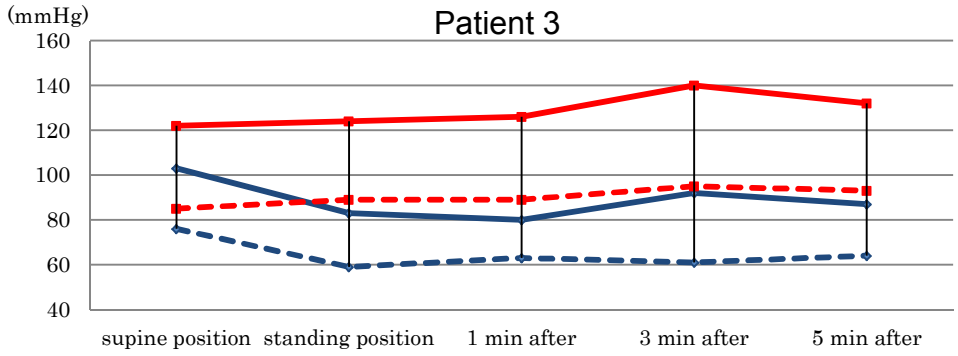
The tiptoeing exercise of this study is equivalent to momentum of 2 - 3Mets. Five of the seven patients improved as regards the motor ability of the lower limbs. It will be necessary to review the content and the methods of the exercise to increase the muscle power of the lower limbs of all participants in future. Through the lower limb exercise of this study, the muscle power of the lower limbs increased, and improvement of orthostatic hypotension tended to be found. However, it did not seem that there was an association between skin temperature and lower limb muscular strength. Inamura described how muscles of the leg and the blood vessels repeatedly shrink and relax when walking and during reflux of blood to the heart. In other words, the lower limb muscles have a muscle pump effect. The lower limb exercise of this study activated a muscle pump effect through the improvement of the muscle power of the lower limb, and seemed to relieve orthostatic hypotension.

References

1. Watanabe T et al. Effect of the simple exercise on found patients with orthostatic hypotension. (in Japanese) Best nurse 24(10), 73-71, 2013-10.


Patient 1
(mmHg)
150
130
110
90
70
50
supine position
standing position
1 min after
3 min after
5 min after
before intervention (systolic)
3w after intervention (systolic)
before intervention (diastolic)
3w after intervention (diastolic)


Patient 2
(mmHg)
130
110
90
70
50
30
supine position
standing position
1 min after
3 min after
5 min after


Patient 3
(mmHg)
160
140
120
100
80
60
40
supine position
standing position
1 min after
3 min after
5 min after

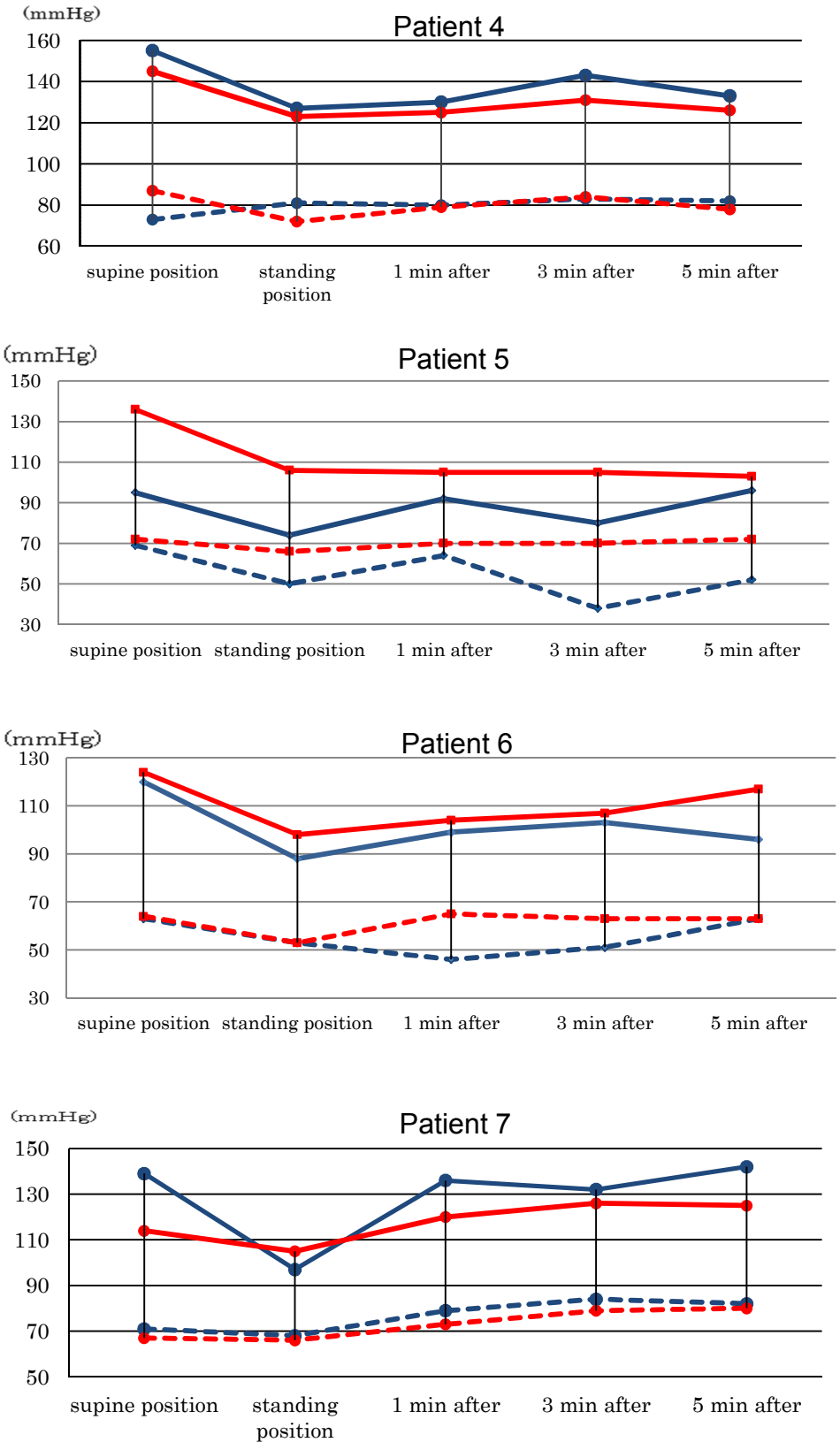


Figure 1. Changes of blood pressure in Schellong test