

The relation between ability of putting on and taking off trousers and voluntary movement of lower extremity, sitting balance on hemiplegic patients

Shinichiro Bishago Munehiro Ikuta Teruko Iwasaki
Keiko Ojiri* Kazumi Hoshiba*

KEY WORDS

hemiplegia, dressing activity, sitting balance, voluntary movement

INTRODUCTION

It is said that clothes-changing motion is difficult activity to be independent next to walking and bath taking among Activities of Daily Living (ADL) of hemiplegic patients^{1)~4)}. Especially when they put on and take off their trousers, even if they can sit on a stool, in many cases their sitting balance leans and falls forward or to their affected side. In order to specify the causes affecting the independence of putting on and taking off trousers, the relation between an extent of independence and various functions was analyzed at the 34th Congress of Japanese Association of Occupational Therapists⁵⁾. As a result, it was found that the factors affecting the independence were Brunnstrom Recovery Stage (Br-stage) of lower extremity and the sway length of the center of gravity in sitting posture on a stool. Their contributory rates to the independence were 38.9% and 45.0% respectively. From this result, it was estimated that the independent level would rise if the functional voluntary of the movement and the ability of sitting balance in a stationary state were improved. However, it was not clear that how much improvement of Br-stage of lower extremity and the sitting balance ability in a stationary state was necessary for the total independence of the motion of putting on or taking off trousers.

The purpose of this study was to specify the extent of Br-stage of lower extremity and the sway length of the center of gravity in sitting posture on a stool for hemiplegic patient's independence of putting on and taking off their trousers.

SUBJECTS

The subjects are twenty hemiplegic patients who are hospitalized at or going for treatment to Suzu City Hospital. These subjects were selected under the standard that there was no obvious range of motion limitation of the joint at their lower extremity and they could sit on a stool and could understand instructions of the investigators. The subjects were divided into two categories according to the content of the examination of their lower-half clothes changing in the Functional Independent Measure (FIM). Those who got more than 6 point were categorized as independent group, and those who got less than 5 point as dependent group.

The details of the subjects are shown in the table 1. Their average age is 61.4 ± 9.6 years old in the independent group and 69.5 ± 9.6 years old in the dependent group. Their average period from the attack of the disease is 23.1 ± 20.7 months in the former group and 24.4 ± 56.8 months in the latter one. No significant difference is seen both in the age and the

Department of Occupational Therapy, School of Health Sciences, Faculty of Medicine, Kanazawa University

* Suzu City Hospital

Table 1. Subjects

Independent group

Age	Gender	Diagnosis	Affect side	Period from the attack of disease(months)	The score of lower-half clothes of FIM	Mobility	Higher cortical function
74	female	cerebral infarction	left	1	7	gait with aids	n.p.
59	male	cerebral infarction	left	1	7	free hand gait	n.p.
57	male	intracerebral hemorrhage	right	17	7	free hand gait	n.p.
60	male	intracerebral hemorrhage	left	14	7	free hand gait	n.p.
70	male	cerebral infarction	left	46	7	free hand gait	n.p.
63	male	cerebral infarction	left	34	7	free hand gait	n.p.
58	male	cerebral infarction	right	46	7	free hand gait	n.p.
50	male	cerebral infarction	right	14	7	free hand gait	n.p.
76	male	cerebral infarction	right	2	6	gait with aids	n.p.
47	male	cerebral infarction	right	56	6	gait with aids	n.p.

Dependent group

75	female	cerebral infarction	right	5	5	w/c self drive	n.p.
68	female	cerebral infarction	left	3	5	gait with assistant	USN
79	female	intracerebral hemorrhage	left	4	4	gait with supervision	USN
63	female	intracerebral hemorrhage	left	1	4	w/c drive with assistant	n.p.
74	female	cerebral infarction	left	6	3	w/c self drive	n.p.
79	female	cerebral infarction	left	32	2	w/c self drive	n.p.
70	male	intracerebral hemorrhage	left	2	1	w/c drive with assistant	n.p.
70	female	cerebral infarction	left	184	1	gait with assistant	n.p.
71	male	cerebral infarction	left	6	1	w/c drive with assistant	USN
46	male	cerebral infarction	left	1	1	w/c drive with assistant	USN

period from the attack of the disease. Three patients in the independent group could walk by themselves with aids for walking such as a cane and a leg brace, and the others in the group walk by themselves with no aid. All the cases in the assistant group were less than with supervision level in walking or were using wheelchairs. Of the dependent group patients, four patients had Unilateral Spatial Neglect (USN).

METHODS

A tester measured each subject's Br-stage of lower extremity and the sway length of the center of gravity in sitting posture on a stool. To measure the sway length of the center of gravity, force plates consist of four sheets (ECG1010G of Kyowa Electronic Instruments Co. Ltd.) was used. The subjects were told that they sit on the right and left force plates which were placed on two stands of 35-centimeters high from the floor and they were asked to put together their greater trochanter at the point of 20-centimeters backward from the edge of the force plates. The subjects were also told to put their legs on the other two force plates placed on the floor having 20 centimeters distance between their right and

left leg. Then the investigators directed them to fix their eyes on a mark on a white board at 150 centimeters ahead, and waited for the posture to be stable for ten seconds, then measured for 20 seconds. The sway length of the center of gravity was done for three times and the average of the sway length of the center of gravity was calculated by a computer (Figure 1).

Beforehand Experimental protocol was explained to all the subjects and they all agreed. For the analysis of the difference between Br-stage of lower extremity of the independent group and the dependent group, Mann-Whitney Test was adopted and for that of the difference of the average of sway length of the center of gravity, t-test was adopted. Significant level was set at $p < 0.01$.

RESULTS

Br-stage of lower extremity of nine patients of ten in the independent group was more than 4th level. That of the other one patient was 3rd level and was independent with lower limb equipment on. Br-stage of lower extremity of nine patients out of ten in the dependent group was less than 3rd level. That of the

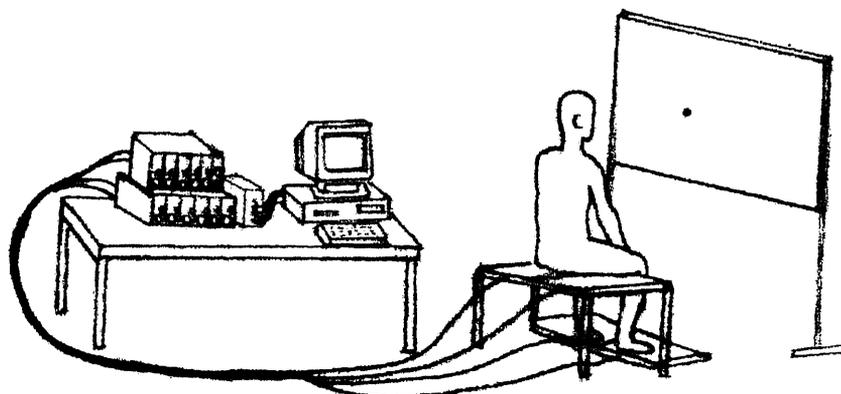


Figure 1. Experimental set-up

Table 2. The relation between ability of putting on trousers and voluntary movement of lower extremity

ability \ Br-stage	I	II	III	IV	V	VI
independent	0	0	1	5	3	1
dependent	2	3	4	0	1	0

] $p < 0.01$

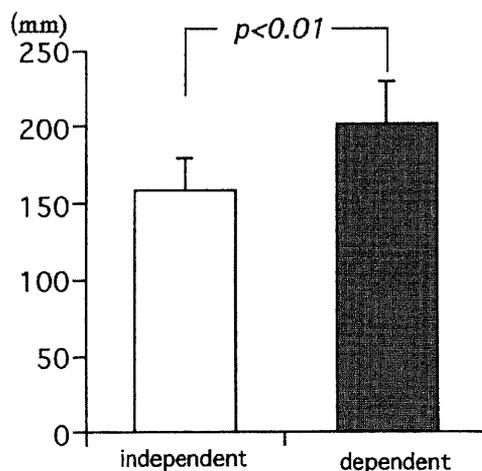


Figure 2. The sway length of the center of gravity

other one patient was 5th level, USN was complicated with, and supervision of selfcare was in need. Significant difference ($p < 0.01$) between the two groups was recognized (Table 2).

The sway length of the center of gravity in sitting posture on a stool was 158.5 ± 21.1 millimeters in the independent group and was 201.3 ± 28.2 millimeters in the dependent group, and significant difference ($p < 0.01$) was recognized (Figure 2).

DISCUSSION

1. On Br-stage of lower extremity

The finding from this research suggests that probability of independence is likely to be high in putting on and taking off his trousers when he has more than 4th level in Br-stage of lower extremity. It was also suggested that some assistance was necessary when it was less than 3rd level. Because flexion of hip joint and knee joint and dorsal flexion of ankle joint are possible with 4th level in Br-stage of lower extremity,

it can be estimated that the patients can get their legs through their trousers holding their affected lower limb in the air in a sitting posture without lifting the lower limb by the un-affected upper limb. Moreover, since the supportive function of the affected lower limb in standing posture increases, it can be considered that raising up and down the trousers at the waist would also get more stable.

On the other hand, there was one case which was independent even with 3rd level in Br-stage of lower extremity. This patient was wearing lower limb equipment and he leaned against the wall in standing posture. This case suggests that even if Br-stage of lower extremity is less than 4th level, independence can be improved with some compensatory method, and this suggestion is important as an approach of acquiring ADL.

On the contrary, there was one case which needed assistance with 5th level in Br-stage of lower extremity. This case complicated with USN and took time to change clothes, and help was needed on the spot. About the effect of USN on ADL, unilateral body agnosia significantly increases necessity of help in walking motion, excretion motion, and grooming activity, and that the same thing can be said in synthetic evaluation by Matsuoka et al.⁶⁾. Unilateral special neglect is the most problematic hampering factor in implementation of rehabilitation and that its effect on ADL is also big by Shigeno et al.⁷⁾. It seems that the case above follows this interpretation. However, USN does not affect independent level very much by Ozawa et al.⁸⁾. In another report, even though apraxia and agnosia is reported to be the hampering factor of returning home, this research has proved that there are cases which can go back home if adjustment training is repeatedly done in living scenes and improvement is recognized by Hama et al.⁹⁾. So, further detailed study on the effect of USN on ADL is necessary.

2. On the sway length of the center of gravity in sitting posture on a stool

Every subjects in this research could sit on a stool. Even in the same looking sitting posture, however, difference of the sway length of the center of gravity was recognized. The numerical values given as a result of this research would probably become one

standard in judging independent level on clinic, though the interpretation would be difficult since there is no data of normal people.

It seems that collecting data of sway length of the center of gravity of normal people as a standard and applying them to cases are necessary next time.

CONCLUSION

1. Br-stage of lower extremity and the sway length of the center of gravity in a sitting posture of hemiplegic patients were analyzed for the independence of their activity of putting on and taking off their trousers.
2. In most cases of independent putting on and taking off trousers, Br-stage of lower extremity was more than 4th level, and the sway length of the center of gravity was 158.5 ± 21.1 millimeters.
3. There was a case in which independent level improved with some compensatory methods even if Br-stage of lower extremity was low level.
4. There was a case which needed help for USN even though the physical functions were good.
5. The future task is to do detailed study on the effect of USN on ADL and to collect data of sway length of the center of gravity in sitting posture of normal people.

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脳血管障害患者のスボン着脱動作能力と下肢随意性，坐位バランスとの関連

鴻 真一郎，生田 宗博，岩崎テル子
尾尻 恵子，干場 和美