

Analysis and Discussion on the Effect of Early Rehabilitation on Motor Dysfunction in Patients with Acute Cerebral Infarction

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Abstract: *Objective:* To analyze the effect of early rehabilitation on motor dysfunction in patients with acute cerebral infarction. *Methods:* A total of 70 patients with acute cerebral infarction admitted to Suqian Zhongwu Hospital (our hospital) from January 2020 to December 2021 were selected as research subjects. The participants were divided into two groups through envelopes. The patients of the reference group ($n = 35$) received conventional treatment whereas the observation group underwent early rehabilitation and conventional treatment ($n = 35$). The scores of limb motor function (Fugl-Meyer Assessment [FMA]), functional independence (Barthel Scale), and Motor Assessment Scale (MAS) of the two groups were compared. *Results:* There was no significant difference between the scores of the two groups before treatment ($P > 0.05$); after early rehabilitation, the FMA and Barthel scale scores of the observation group were higher than those of the reference group, and the MAS scores of the observation group were also better than the reference group ($P < 0.05$). *Conclusion:* Early rehabilitation treatment on the basis of conventional treatment for patients with acute cerebral infarction can promote the recovery of motor function and improve the ability to perform daily activities of patients, thus it should be popularized.

Keywords: Early rehabilitation therapy; Acute stage of cerebral infarction; Motor dysfunction

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1. Introduction

The lifestyles of Chinese residents changed drastically in recent decades, leading to a trend of diseases that were originally more common in the elderly appearing among youngsters. Cerebral infarction is a type of ischemic cerebrovascular disease. The acute stage of cerebral infarction is characterized by rapid onset and disease progression and poor prognosis, with a high risk of disability or death. In addition, the disease also has a high risk of recurrence, with a rate of recurrence as high as 40% or more ^[1]. In the acute stage of cerebral infarction, the aorta supplying blood to the brain often has atherosclerosis or is accompanied by thrombus. When the blood supply to the local brain tissue is suddenly interrupted, the patient will experience dizziness, headache, nausea, vomiting, hemiplegia, aphasia, coma, etc. ^[2]. Even after symptomatic treatment, patients are prone to sequelae, the most common of which is limb motor dysfunction. Rehabilitation medicine believes that rehabilitation therapy can be carried out in the initial stage of the disease ^[3]. In this study, 70 patients with cerebral infarction admitted to our hospital (January 2020–December 2021) were selected as research subjects, and the 70 patients were grouped and compared to study the effect of early rehabilitation therapy on improving motor dysfunction in patients.

2. Materials and methods

2.1. General information

The study began in January 2020 and ended in December 2021. A total of 70 subjects were included in the study, all of whom were patients with acute cerebral infarction who were diagnosed and treated in our hospital within this time frame, and they were separated into a reference group and an observation by the envelope method. The patients in the reference group (35 patients) received conventional treatment, and the patients in the observation group (35 patients) underwent early rehabilitation on the basis of conventional treatment. The patients in the reference group were 44–68 years old, with an average of 56.29 ± 5.47 years old, and there were 18 male and 17 female patients; the patients in the observation group were 45–70 years old, with an average of 56.94 ± 5.52 years old, and there were 19 male and 16 female patients. There was no significant difference between the baseline data of the two groups ($P > 0.05$). This study was approved by the ethics committee.

Inclusion criteria: (i) Patients who were diagnosed with cerebral infarction based on the Chinese Expert Consensus on Emergency and First Aid of Acute Ischemic Stroke by the Emergency Medicine Branch of the Chinese Geriatrics Society (2018 edition) ^[4], with an onset of not more than 3 days; (ii) patients who are stable, conscious, and can communicate normally; (iii) patients with muscle strength of the affected side lower than level 4; (iv) Voluntary participation in this research, sign the consent form.

Exclusion criteria: (i) Patients with malignant tumors; (ii) patients with other organ failures; (iii) patients with motor dysfunction before the onset of cerebral infarction; (iv) patients with mental illness.

2.2. Methods

Both groups received routine treatment, mainly brain protection treatment, anticoagulant treatment, plaque stabilization, and blood vessel expansion. Patients in the observation group underwent early rehabilitation on the basis of conventional treatment. (i) An early rehabilitation treatment team was established, which consisted of experienced doctors and nurses. A targeted early rehabilitation plan was formulated for each patient based on their condition. (ii) Active and passive rehabilitation exercises were performed by the patients on the bed, and the nurses assisted the patients in passive rehabilitation exercises. The main exercises included knee flexion, elbow exercises, ankle joint exercises, shoulder joint exercises, sitting and standing exercises, etc. If the patient was unable to move on his/her own, it was necessary to regularly turn over the patient, move the joints, and massage the muscles; when the patient could move, the patient in performed posture exercises such as kneeling on the bed and four-point kneeling with assistance, and then gradually transitioned to sitting on the bed, standing by the bed, walking, etc. (iii) Acupuncture and moxibustion, rood therapy and other treatments was used to stimulate the recovery of nerve function according to condition of the patient. To avoid muscle stiffness or muscle spasm during treatment, a special muscle relaxation massage was performed on the patient by the nurses. (iv) The patients were protected when they changed position. For example, when the patient took a sitting position, a cushion was used to support the affected side to prevent him/her from slipping to the side. Besides, it can also avoid joint deformation of the patient due to improper position; when the patient had just started standing training, he/she could use the electric upright bed for assistance. (v) When the patient could get out of bed, he/she was required to practice daily activities such as standing, walking, dressing, washing, and so on with the company of the nursing staff. (vi) A scientific diet was formulated for each patient based on his/her condition. The patient's diet was comprehensive in nutrition and easy to digest, with lesser oil, salt, sugar, and low fat. (vii) The intensity of the exercise progressed from low to high based on the ability of the patient, so that it will be tolerable for the patient and avoid straining them. (viii) The patients were affirmed of their progress so that they could be more confident. Patients with slow recovery were also encouraged, and they were comforted so that they felt better.

2.3. Observation indicators

2.3.1. Limb movement function scores

The Fugel-Meyer (FMA) Rating Scale [5] was used to evaluate the limb motor function of the patients. Two dimensions of upper limbs and lower limbs were included. There were 10 items in the upper limb dimension, with a score range of 0–66 points; and 7 items in the lower limb dimension, with a score range of 0–34 points. The higher the score, the better the patient's limb motor function.

2.3.2. Functional independence

Before and after the intervention, the functional independence [5] of the patients were evaluated using the Barthel Scale. The scale ranges from 0 to 100 points. The higher the score, the better the patient's functional independence.

2.3.3. Motor Assessment Scale (MAS)

MAS was used to evaluate the occurrence time and strength of the resistance of the passively moving joints to stretch the spastic muscles [5]. No increase in muscle tone was classified as grade 0, mild increase in muscle tone was classified as grade 1 and grade 1+, markedly increased muscle tension was classified as grade 2, significantly increased muscle tone and difficulty in passive movement was classified grade 3, and stiffness when flexing or extending the affected part was classified as grade 4.

2.4. Statistical methods

The data obtained in the research were sorted out by Microsoft Excel and processed by SPSS 24.0. The count data were described as n (%), and the measurement data were described as mean \pm standard deviation (SD). The differences between groups were analyzed by a t -test and χ^2 -test, where a difference with $P < 0.05$ was considered significant.

3. Results

3.1. Limb movement function scores

There was no significant difference between the motor function scores of the upper and lower limbs in the FMA scale of the two groups before treatment ($P > 0.05$). After treatment, the motor function scores of the upper and lower limbs in the FMA scale of the observation group were higher than those of the reference group ($P < 0.05$), as shown in **Table 1**.

Table 1. Comparison of limb movement function scores between the two groups [(mean \pm SD), points]

Group	Number of patients	Upper body		Lower body	
		Before treatment	After treatment	Before treatment	After treatment
Reference group	35	42.08 \pm 2.45	53.37 \pm 3.26 Δ	24.75 \pm 1.32	27.36 \pm 2.15 Δ
Observation group	35	41.79 \pm 2.36	61.84 \pm 3.56 Δ	24.54 \pm 1.27	30.39 \pm 1.43 Δ
t		0.504	10.453	0.678	6.942
P		0.615	< 0.001	0.499	< 0.001

Note: Δ means there is a significant difference between the score before and after treatment ($P < 0.05$).

3.2. Functional independence

Before treatment, there was no significant difference between the scores of the Barthel scale of the two groups ($P > 0.05$). After treatment, the scores of the observation group were higher than those of the

reference group ($P < 0.05$), as shown in **Table 2**.

Table 2. Comparison of activities of daily living between the two groups of patients [(mean \pm SD), points]

Group	Number of patients	Before treatment	After treatment	<i>t</i>	<i>P</i>
Reference group	35	66.24 \pm 3.61	72.56 \pm 4.15	6.797	< 0.001
Observation group	35	65.69 \pm 3.53	84.78 \pm 3.59	22.431	< 0.001
<i>t</i>		0.644	13.174	--	--
<i>P</i>		0.521	< 0.001	--	--

3.3. Motor Assessment Scale (MAS)

Before treatment, there was no significant difference between MAS score of the two groups ($P > 0.05$). After treatment, the MAS score of the observation group was significantly better than that of the reference group ($P < 0.05$), as shown in **Table 3**.

Table 3. Comparison of MAS score between the two groups

Group	Number of patients	Period	Grade 1	Grade 1+	Grade 2	Grade 3
Reference group	35	Before treatment	5	10	13	7
		After treatment	6	11	12	6
Observation group	35	Before treatment	3	10	14	8
		After treatment	8	15	9	3

4. Discussion

In recent years, the number of cerebral infarction patients in our country has increased significantly. On one hand, this is due to the continuous acceleration of aging in our country; on the other hand, it is also related to the development trend of the disease in younger age. Atherosclerosis is a major cause of this disease. After cerebral infarction, the blood supply and oxygen supply to the brain tissue of the patient becomes insufficient, which in turn causes the corresponding nerve function to be damaged to varying degrees. As a result, the nervous tissues of the brain are destroyed, while the motor nerves remain normal. The conduction of impulse is impaired, which leads to the impairment of limb motor function [6]. With the continuous advancement of medical technology, the mortality rate of this disease has declined, but there is still a high disability rate. Some researchers believe that the degree of recovery of brain function in patients with acute cerebral infarction is closely related to the time of medical intervention [7]. Therefore, early rehabilitation can be performed based on the theory of brain function reorganization and plasticity, in which the nerves motor pathway can be stimulated accordingly through passive and active rehabilitation exercises, and the damaged nerves' function can be restored [8]. Moreover, the excitability of the nerves can also be regulated, which will be helpful in improving limb dysfunction and restoring muscle contractility [9].

For early rehabilitation of patients with acute cerebral infarction, moderate exercise and other therapies can improve the enthusiasm of patients [10]. When performing motor function exercises, various rehabilitation techniques can be used to improve the muscle spasm of the affected limb as soon as possible. However, the purpose of rehabilitation should not only be to improve muscle strength, but also to improve the patient's functional independence. Through diversified rehabilitation exercises, patients can return to their normal lives as soon as possible [11]. Patients should be reminded to maintain a correct posture during bed rest to reduce the risk of joint deformation, while passive and active training can promote blood circulation to maintain the basic functions of articular cartilage and traction and massage of muscles can

prevent muscle atrophy and degeneration. In addition, early rehabilitation also focuses on the reconstruction of brain tissue function. Repeated exercises can restore the lost motor function of the patient and help the patient return to normal lives. The results of this study showed their limb motor function and the functional independence of the patients in the observation group, who underwent rehabilitation on the basis of conventional treatment, were significantly improved. Moreover, the observation group also showed a greater improvement in all parameters compared to the reference group. These results are consistent with Zhang's research results in the article "Early Rehabilitation Therapy for Patients with Motor Dysfunction in the Acute Stage of Cerebral Infarction"^[12], further confirming that the effectiveness and feasibility of early rehabilitation for patients with acute cerebral infarction on the basis of conventional treatment.

5. Conclusion

In conclusion, it can be seen that early rehabilitation for patients with acute cerebral infarction is conducive to promoting the recovery of lost motor function as soon as possible and is conducive to improving functional independence of patients.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Gulnur S, Aysel K, 2020, The Clinical Effectiveness of Early Rehabilitation in Patients with Motor Dysfunction in the Acute Stage of Cerebral Infarction. *Friends of Health*, 2020(9): 44.
- [2] Wang C, 2018, Effect of Early Rehabilitation Therapy on Motor Dysfunction in Patients with Acute Cerebral Infarction. *Chinese Medicine Guide*, 16(29): 115–116.
- [3] Ding Z, 2018, Effects of Early Neurorehabilitation Therapy on Curative Effect, Neurological Function and Motor Function in Patients with Acute Cerebral Infarction. *Medical Theory and Practice*, 31(15): 2256–2258.
- [4] Fang B, Li Z, Li Y, et al., 2018, Chinese Expert Consensus on Emergency and First Aid of Acute Ischemic Stroke (2018 Edition). *Chinese Emergency Medicine Journal*, 27(7): 721–728.
- [5] Yang N, 2018, Analysis of the Impact of Early Rehabilitation Treatment on Clinical Efficacy, Motor Function and Activities of Daily Living in Patients with Acute Cerebral Infarction. *Frontiers of Medicine*, 8(11): 151.
- [6] Chen W, Li Y, Feng K, 2018, Study on the Effect of Early Rehabilitation Therapy on Patients with Swallowing Dysfunction After Cerebral Infarction. *Chinese Medical Science*, 8(3): 231–233.
- [7] Chen G, Liu J, Liang W, 2018, Analysis of the Value of Early Rehabilitation Treatment for Patients with Acute Cerebral Infarction on the Improvement of Upper Limb Motor Function. *Innovation in Chinese Medicine*, 15(16): 114–116.
- [8] Wu C, Li X, Xu H, et al., 2019, Analysis of the Effect of Staged Rehabilitation Nursing on Patients with Cerebral Infarction. *China Continuing Medical Education*, 11(6): 181–182.
- [9] Chen Y, 2021, Effect of Early Neurorehabilitation on Brain Function Remodeling and Motor Function in Patients with Acute Cerebral Infarction. *Systematic Medicine*, 6(24): 61–63 + 68.
- [10] Guo Y, Feng X, He C, 2020, Analysis of the Improvement of Early Rehabilitation Treatment on Patients with Swallowing Dysfunction After Cerebral Infarction. *Heilongjiang Medical Science*, 43(5): 128–129.

- [11] Yu N, 2018, Discussion on the Effect of Early Rehabilitation Therapy on Motor Dysfunction in Patients with Acute Cerebral Infarction. *Chinese Journal of Rehabilitation Medicine*, 27(2): 148–149.
- [12] Zhang X, 2022, Observation on the Curative Effect of Early Rehabilitation in Patients with Motor Dysfunction in the Acute Stage of Cerebral Infarction. *China Practical Medicine*, 17(13): 168–170.

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