Original Article
Early treatment of acute ischemic stroke by integrated traditional and Western medicine

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Abstract: Objective: To observe the clinical efficacy of integrated traditional and Western medicine in the treatment of early stage acute ischemic stroke (AIS). Methods: Seventy-six patients with acute cerebral infarction were selected and randomly divided into the experimental group and the control group. The motor function and activity of daily life of the patients in both groups were evaluated by Fug + Meyer Assessment (FMA) and Modified Barthel Index (MBI) before and after the treatment. In addition, neurologic impairment in both groups was also evaluated. The patients in the control group were treated by a basic drug therapy in conjunction with exercises using basic rehabilitation methods. In addition to the treatment applied in the control group, the patients in the experimental group were also treated with traditional medicine rehabilitation. All patients have completed four weeks of basic rehabilitation training as well as rehabilitation training based on a Chinese medicine therapy. Results: After 4 weeks of rehabilitation, FMA and MBI scores as well as neurologic impairment of the patients with acute ischemic stroke were evaluated. The results showed that the experimental group had better outcomes than the control group in all evaluations (P<0.05), and the difference was statistically significant. The total effective rates in the experimental group and control group were 89.5% and 78.9%, respectively. The clinical efficacy in the experimental group was significantly better than that in the control group, and the difference was statistically significant (P<0.05). Conclusion: The rehabilitation therapy based on integrated Chinese and Western medicine proved to be effective. It can promote the recovery of motor functions and the activity of daily living in patients of AIS. In addition, it can improve neurologic impairment and lead to good clinical outcomes, therefore is worthwhile to be promoted in clinical applications.

Keywords: Acute ischemic stroke, early rehabilitation, rehabilitation therapy based on integrated Chinese and Western medicine, clinical observation

Introduction

Currently, stroke is one of the major diseases endangering the health of middle-aged and elderly people. Stroke is associated with high incidence, high mortality and morbidity rates, and a high recurrence rate. In the traditional Chinese medicine, stroke is described as fainting, hemiplegia, limb numbness and inability to speak.

The application of Chinese medicine rehabilitation in the treatment of stroke has a long history. Chinese medicine rehabilitation has made tremendous contributions to promote the health of Chinese people. Acupuncture and massage are important means of stroke treatment and rehabilitation. Through rehabilitation treatments, including those based on traditional Chinese medicine, people disabled by stroke can improve their activity of daily living and achieve functional rehabilitation, so as to regain their functions in the society. With the promotion of thrombolytic therapy and endovascular treatment in recent years, an increased number of stroke patients have been treated in the acute phase. Nevertheless, one of the urgent problems to be solved in clinical applications is how to use different rehabilitation therapies as soon as possible to reduce patient disability, to maximize their functional recovery and to increase their quality of life [1-3].

Stroke can be divided into hemorrhagic stroke and ischemic stroke. This article will focus on acute ischemic stroke (AIS). Few studies have

Table 1. Comparison of general statistics between the two groups

Group	Gender (male/female)	Mean age	Neurological deficit score before treatment
Experimental group	23/15	39.70±4.45	31.6±3.7
Control group	25/13	41.80±4.98	29.1±4.8
t/X^2	0.136	0.178	0.884
P	0.889	0.678	0.354

Table 2. Comparison of main clinical manifestations in the two groups of patients

Group	Experimental group	Control group	X^2	P
Case	38	38		
Aphasia	3	2	2.783	0.061
Facial paralysis	7	7		
Upper limb paralysis	4	5		
Lower limb paralysis	3	4		
Hemiparesis	13	14		
Partial sensory dysfunction	8	6		

focused on the treatment of early stroke using rehabilitation therapies based on traditional Chinese medicine, and the research progress has been slow [4-6]. In this study, 76 cases of AIS patients were treated by traditional Chinese medicine-based rehabilitation therapies within 1 week of their admission and after their vital signs have stabilized. The traditional Chinese medicine therapies employed in this study included bath in traditional Chinese medicine, acupuncture treatment and massage therapy, so as to explore the clinical efficacy of the traditional Chinese medicine-based rehabilitation therapy.

Materials and methods

General information

Seventy-six cases of hospitalized patients diagnosed with cerebral infarction at our hospital were selected and randomly divided into the control group and the experimental group, with 38 cases in each group. The possibility of cerebral hemorrhage was excluded by CT in all patients and the presence of cerebral infarction was confirmed by nuclear magnetic resonance. The experimental group had 23 males and 15 females, with a mean age of 39.70±4.45 years old. The control group had 25 males and 13 females, with a mean age of 41.80±4.98 years old. Using X^2 tests, it was confirmed that

the two groups had consistent distributions in terms of gender and age (P>0.05), and thus the two groups were comparable.

Diagnostic criteria

The diagnostic criteria of this study were in reference to the diagnostic criteria formulated and revised in the Second National Symposium on Cerebrovascular Diseases hosted in 1986, as well as the *Criteria for stroke diagnosis and efficacy evaluation* formulated by the Encephalopathy Professional Committee of Internal Medicine Branch in the Chinese Society of Traditional Chinese Medicine [7, 8]. The patients enrolled in this study were in line with Western diagnosis for cerebral infarction and the definition of stroke in Chinese medicine. All patients had disease duration shorter than 1 week.

Treatment

Basic treatment of Western medicine, including basic life support and general treatment such as the use of anticoagulants, improvement of blood supply, promotion of microcirculation, treatment of brain edema, and the use of brain cell protection agent was applied. For specific methods of Western medicine, please refer to the 2007 edition of *Guidelines for prevention and treatment of cerebrovascular diseases in China* [9].

The patients in the control group mainly received basic medicine treatment plus basic rehabilitation training: (1) emotional rehabilitation was utilized to stabilize the mood of patients and to establish their confidence in recovery; (2) massage of paralyzed limbs and plantar reflex zones (brain, forehead, cerebellum and brainstem reflex zones) was applied using the following practices: push, draw, rub, hammer, pull, point, press; (3) limb functional exercise was conducted by the patients during the bed rest period by maintaining the correct position of limb joints at the paralyzed side of

Table 3. Comparison of neurologic function scores in the two groups of stroke patients ($\bar{x}\pm$sd)

Group	Case	Motor function score		Daily living ability score		Neurological deficit score	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Experimental group	38	40.6±12.8	75.3±12.9*	32.9±9.2	66.5±11.7*	31.6±3.7	12.6±3.1*
Control group	38	39.3±14.5	60.7±12.4**	31.7±11.2	56.9±16.5**	29.1±4.8	18.1±4.3**
T		1.861	17.466	1.893	21.813	1.913	19.817
P		0.064	0.000	0.061	0.000	0.057	0.000

Note: *$P<0.01$ indicates during intra-group comparison in the experimental and control groups, before and after the treatment; **$P<0.05$ indicates during the comparison between the experimental and control groups after the treatment.

Table 4. Comparison of total effective rates in the two groups of patients ($\bar{x}\pm$sd)

Group	Case	Basic cure	Effective	Get better	Invalid	Total effective rate (%)
Experimental group	38	6	15	13	4	89.5%
Control group	38	3	10	17	8	78.9%
T						4.061
P						0.041

the body. For patients with a muscle strength of 0-I, passive activities such as lift, move, flexion, extension, anterior rotation, and posterior rotation were performed; for patients with a muscle strength of II-III without assistance and a muscle strength of IV-V with assistance, training of life skills was the primary objective, which included getting up, dressing, washing, eating, writing, and walking up and down steps, with each exercise lasting 40 min. Both the functional exercises and massages lasted 20 min each time. All exercises were performed twice a day [10].

In addition to the treatment given to the control group, the experimental group also received rehabilitation therapies based on traditional Chinese medicine. (1) Bath in Chinese medicine: The following main drug components were used in the bath: Angelica, Millettia, safflower, Salvia, papaya, frankincense and myrrh, red or white peony, and lignum et folium trachelospermi. After decoction, the medicine was used to dress limbs joints and to wash hands and feet. The treatment was given once every night before the bedtime and lasted for a total of 4 weeks, which consisted of different stages. (2) Acupuncture treatment: body acupuncture at the following locations was used: the acupoints for upper limbs were Qu Chi, Jian Yu, He Gu and Wai Guan; the acupoints for lower limbs were Huan Tiao, Yang Lingquan, Zu Sanli, Jie Xi and Kun Lun. The procedure of acupuncture was as

the following: Routine disinfection was carried out before the needles were inserted by direct prick. After the needles were inserted, they were kept at their locations for 30 min and twisted once every 10 min. Acupuncture intervention was carried out according to the following timing: for cerebral infarction patients, the acupuncture intervention was carried out within 1 week of admission but after their vital signs have become stable. (3) Massage therapy: Practices such as swinging, friction, squeezing, tapping, vibrating and joint movement were used to relax the muscles and to release the joints at the paralyzed side of the body. The massage therapy was given with acupuncture treatment at the same time [11].

Course of treatment: All patients completed 4 weeks of basic rehabilitation training and Chinese medicine rehabilitation therapy. After admission to the hospital, the patients took bath in traditional Chinese medicine once every night for a total of 4 weeks; after the vital signs of the patients have become stable, they were also given acupuncture treatment within 1 week of admission. The acupoints and practices of the acupuncture treatment were shown above, and the treatment lasted for a total of 4 weeks; similarly, massage therapy was also given to patients with AIS within 1 week of admission but after their vital signs have become stable. The massage therapy also lasted for a total of 4 weeks.

Observational index

The total effective rate in the two groups of patients was observed: the total effective rate = (number of patients showing significant effi-

cacy + number of patients showing certain efficacy)/total number of patients *100%.

Evaluation criteria

Before and after the treatment, the movement ability and activity of daily living of the patients in both groups were evaluated by Fug + Meyer Assessment (FMA) and Modified Barthel Index (MBI). Simplified Fugl-Meyer assessment: For upper limbs, there were a total of 33 evaluation items, including the presence of reflex activity, flexor synergistic movement, extensor synergistic movement, activities accompanied with synergistic movement, activities disengaged from synergistic movement, hyperreflexia, wrist stability, and the coordination ability of fingers at 30° shoulder forward flexion. Each of the above items had a total of 2 points, with a total score of 66 points for upper limbs. For lower limbs, there were a total of 17 evaluation items, including the presence of reflex activity in a supine position, flexor synergistic movement in a supine position, extensor synergistic movement in a supine position, activities accompanied with synergistic movement, activities disengaged from synergistic movement in a standing position, hyperreflexia in a sitting position, the coordination ability in a supine position, and speed. Each of these items also had a total of 2 points, with a total score of 34 points for lower limbs. Subsequently, both scores for upper and lower limbs were combined to get a total score that was correlated to the movement ability, i.e., a higher total score represented better movement ability. The assessment of MBI mainly reflects the activity of daily life and can be divided into five levels (5 points), with different levels representing different degrees of independent activity. The lowest level is level 1, whereas the highest level is level 5. A higher level of MBI index indicated higher independent activity.

In addition, the neurologic impairment in both groups was also evaluated [12, 13]. The degree of clinical neurological deficit in stroke patients was evaluated in terms of consciousness, horizontal gaze function, facial paralysis, speech, upper limb muscle strength, hand muscle strength, lower limb muscle strength, and walking ability, respectively. The total score ranged from 0 to 45 and a higher score indicated a more serious deficit in neurological functions.

The score of neurologic impairment was given and evaluated based on the method developed on the 4th Symposium of Cerebrovascular Diseases [14].

Efficacy evaluation criteria

Full recovery: Patients with muscle strength of V and easily understandable language that could take care of themselves. In addition, the symptoms and body signs of the disease in the patients have almost disappeared. Significant efficacy: patients with muscle strength increased by 2 levels as well as significantly improved symptoms and body signs. Improvement: patients with muscle strength increased by 1 level as well as partially improved symptoms and body signs. Ineffective treatment: patients with no change in symptoms and body signs. Total efficiency (%) = the number of patients with (full recovery + significant efficacy + improvement)/total number of cases.

Statistical index

All data were analyzed using the SPSS18.0 software. The measurement data were compared using t tests, whereas the count data were compared using X^2 test. When the neurological score assessment involved data obtained from the same patient at two different time points, the analysis of variance for the repeated measurements was carried out. For intra-group comparison of two time points before and after the treatment, paired t tests were used. $P<0.05$ was considered statistically significant.

Results

General statistics of two groups of patients

Thirty-eight patients in each group were diagnosed with middle cerebral artery infarction by imaging data. Specifically, the experimental group had 23 males and 15 females, with a mean age of 39.70±4.45 years old. The control group had 25 males and 13 females, with a mean age of 41.80±4.98 years old. Using X^2 tests, it was confirmed that the two groups had consistent distributions in terms of gender, age and pre-treatment neurological scores ($P>0.05$), and hence the results between the two groups were comparable. See **Table 1**.

The main clinical manifestations of two groups of patients

The main symptoms in the two groups of ischemic stroke patients included hemiparesis, partial sensory dysfunction, facial paralysis, paralysis of the upper and lower limbs, and aphasia. Using X^2 test, it was confirmed that the two groups had consistent distributions in terms of gender and age (P>0.05), and hence their results could be compared with each other. See **Table 2**.

Comparison of clinical efficacy between the experimental and control groups

After the patients with AIS underwent 4 weeks of rehabilitation therapy, the scores of FMA, MBI and neurological deficit in the experimental group were all better than those in the control group (P<0.05), and the differences were statistically significant. The total efficacies in the experimental group and control group were 89.5% and 78.9%, respectively. The clinical efficacy in the experimental group was significantly better than that in the control group, and the difference was statistically significant (P<0.05). See **Tables 3** and **4**.

Discussion

Stroke is a common disease associated with high incidence, high mortality and high morbidity. After recovery, more than half of stroke patients still suffer from varying degrees of dysfunction. The incidence of stroke in China ranks second in the world, with 1.3-1.5 million new cases developed annually. In addition, about 60% to 80% of the survivors still suffer from varying degrees of dysfunction after recovery, of which 10%-15% lost their ability of self-care, thus bringing heavy burdens to their families and the society. Therefore, it is of important clinical and practical significance to study the timing of rehabilitation and different methods of rehabilitation.

A number of foreign studies have shown that the appropriate early rehabilitation treatment not only can effectively prevent the occurrence of disabling syndrome in patients, i.e., joint contracture, muscle atrophy, orthostatic hypotension and flaccidity of foot due to the lack of exercise, but also can effectively prevent shoulder joint inflammation and muscle damages caused by inappropriate exercises [15, 16]. In

terms of best timing for the recovery of stroke patients, modern medicine has all agreed that on the basis of vital sign stability, rehabilitation of stroke hemiplegia should be started as soon as possible. For patients of cerebral infarction, they can start rehabilitation therapy on the day of disease onset. In addition, massage therapy is suitable to treat hemiplegia during the stroke recovery period. The exercise for stroke patients should start as soon as possible, mainly to prevent limb contracture and deformation, infection and bedsores. Therefore, during the bed rest period after the onset of disease, care should be taken to maintain the functional position of the limbs and to strengthen passive exercises so as to prevent muscle atrophy [17, 18].

Traditional Chinese medicine-based rehabilitation is featured by an overall concept and dialectical treatment. The Chinese medicine rehabilitation methods developed on such a basis include traditional Chinese medicine, acupuncture, massage, fumigation, Qi Gong, and guided therapy, which can also be used as a supplement to modern medicine. Chinese medicine rehabilitation methods have some clinical advantages, as they can be used to clear the meridians, to reconcile Qi and blood, to remove stasis and swelling, to stop pain and spasm, to relieve paralysis and to reinforce the body. In terms of rehabilitation programs for stroke, Chinese medicine rehabilitation has actively absorbed the theory of modern medicine and no longer focuses on the changes in muscle strength alone. Instead, Chinese medicine rehabilitation also includes the restoration for the normal patterns of physical movement. In addition, in terms of the rehabilitation of hemiplegia, Chinese medicine rehabilitation has also changed from focusing only on relaxation and spasm to a staged treatment regimen based on the status of the stroke [19, 20].

In this study, 76 patients with acute cerebral infarction were selected and randomly divided into the experimental group and the control group. The movement ability and activity of daily living of the patients in both groups were evaluated by FMA and MBI before and after the treatment. In addition, neurologic impairment in both groups was also evaluated. The patients in the control group were treated by a basic drug therapy in conjunction with exercises using basic rehabilitation methods. In contrary,

the patients in the experimental group were also treated with Chinese medicine rehabilitation on top of the treatments similar to those given to the patients in the control group. After admission to the hospital, the patients took bath in traditional Chinese medicine once every night for a total of 4 weeks; for patients of AIS, they were also given acupuncture treatment within 1 week of admission but after their vital signs have become stable. The acupoints and practices of the acupuncture treatment were shown above, and the treatment lasted a total of 4 weeks; similarly, massage therapy was also given to patients with AIS within 1 week of admission but after their vital signs have become stable. The massage therapy also lasted a total of 4 weeks. All patients have completed four weeks of basic rehabilitation training as well as rehabilitation training based on a Chinese medicine therapy. The results showed that although no difference was observed between the experimental and the control groups before the treatment (P>0.05), the patients in the experimental group had significantly lower scores for neurologic impairment and morbidity than those in the control group. The difference between the two groups was extremely significant (P<0.01). In addition, the total effective rates in the experimental group and control group were 89.5% and 78.9%, respectively and the clinical efficacy in the experimental group was significantly better than that in the control group (P<0.05). Based on the existing clinical data, it can be seen that the effective use of advantages offered by integrated traditional and Western medicine is conducive to the treatment of stroke patients by combining the means of modern medicine rehabilitation with improved programs of Chinese medicine rehabilitation. In this way, the recovery of neurologic impairment in stroke patients can be maximized, so that they can return to the society as soon as possible and hence reduce the economic and psychological burdens on their families and the society.

In summary, by combining the advantages of Chinese medicine rehabilitation with the means of modern medicine rehabilitation, the early intervention of AIS has achieved adequate clinical results. Therefore, it is worthwhile to further promote such practices in clinical applications. In addition, the mechanism and clinical significance of integrated traditional and Western medicine-based rehabilitation therapies in the treatment of hemorrhagic stroke need to be further studied.

Disclosure of conflict of interest

None.

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