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Research Progress of Traditional Chinese Medicine in Treating Limb Movement Disorders after Stroke

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Abstract: Limb movement disorder after stroke is one of the main causes of disability, seriously affecting patients' quality of life. Although modern medical treatment can alleviate some symptoms, it has limitations. Traditional Chinese medicine, with an overall perspective and syndrome differentiation and treatment as its core, intervenes in the disease through various therapies, such as acupuncture, Chinese herbal medicine, Tuina massage, and traditional exercise, demonstrating unique advantages. This article reviews the understanding of the etiology and pathogenesis of limb movement disorders after stroke in traditional Chinese medicine, systematically summarizes the clinical application and research progress of main treatment methods such as acupuncture, Chinese herbal medicine, and Tuina massage, analyzes the problems existing in current research, and looks forward to future development directions, aiming to provide references for clinical treatment.

Keywords: Stroke; Limb movement disorder; Traditional Chinese medicine treatment; Acupuncture; Chinese herbal medicine; Tuina massage; Rehabilitation

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1. Introduction

Stroke is a neurological disease characterized by high incidence, high disability rate, and high recurrence rate [1]. Among them, ischemic stroke accounts for 70% to 80%. However, 70% to 80% of the surviving patients have limb movement disorders, mainly manifested as hemiplegia, muscle weakness, muscle spasms, coordination disorders, etc., which seriously affect the patients' self-care ability and also adversely affect the healthy development of their families and society [2]. Currently, clinical methods mainly include rehabilitation training (Bobath technique, Brunnstrom staging training), neurotrophic drugs (butylphthalide, citicoline), and surgical correction. However, these methods often have problems such as long rehabilitation periods, poor efficacy for some patients, and significant drug side effects [3]. Traditional Chinese medicine has a thousand-year-old tradition in treating stroke. Its

"holistic regulation, syndrome differentiation and treatment" philosophy and "multi-target" intervention approach have significant advantages in improving limb function and quality of life. In recent years, with the continuous deepening of research on the integration of traditional Chinese and Western medicine, traditional Chinese medicine therapies have been further developed and improved clinically, and their mechanisms of action have gradually been understood. This article aims to systematically review the research progress of traditional Chinese medicine in treating limb movement disorders after stroke, providing references for clinical practice and scientific research.

2. Understanding of limb movement disorder after stroke in traditional Chinese medicine

Although traditional Chinese medicine does not have a specific term for "stroke", based on its clinical manifestations, the disease falls under categories such as "stroke," "hemiplegia," and "paralysis syndrome". Traditional Chinese medicine's understanding of this disease can be traced back to the pre-Qin period, and over two thousand years of theoretical refinement and clinical practice have formed a systematic diagnosis and treatment system.

2.1. Origin of the disease name

The concept of "stroke" was first proposed in the "Yellow Emperor's Inner Canon". The "Plain Questions: Regulating the Menstrual Cycle" records: "When blood and Qi rise upward together, it causes great syncope. Syncope leads to sudden death. If Qi returns, the person revives; if not, the person dies." This describes the critical manifestations of stroke in the acute phase. The "Miraculous Pivot: Needling Jie and Eliminating Pathogenic Factors" mentions, "When Xie Qi attacks one side of the body, it penetrates deeply and resides in the Ying and Wei vessels. When the Ying and Wei vessels weaken, genuine Qi departs, and pathogenic Qi remains, causing hemiplegia." This clarifies that "hemiplegia" (limb paralysis) is the main sequelae of stroke. In the Eastern Han Dynasty, Zhang Zhongjing further elaborated in the "Synopsis of Golden Chamber: Classification and Treatment of Stroke and Arthralgia Syndrome" that "When wind causes disease, it often leads to hemiplegia, or sometimes only paralysis of the arm. This is called Bi syndrome. The pulse is weak and rapid, which is caused by stroke." This closely associates limb movement disorders with "wind pathogenic factors" [4].

2.2. Etiology and pathogenesis

Traditional Chinese medicine believes that the core pathogenesis of post-stroke limb movement disorders is "Qi and blood disorder, cerebral vessel obstruction or blood overflow in the cerebral vessels, damage to the brain and nerves, and malnutrition of the limbs". Specifically, it can be summarized as follows:

(1) The influence of wind: External wind invasion or internal wind (liver Yang transforming into wind, Yin deficiency, and wind movement) disturbance can lead to Qi and blood disorder and cerebral vessel imbalance [5].

(2) Interaction of phlegm and blood stasis: Improper diet can lead to endogenous phlegm dampness, or Qi deficiency and inability to move blood can lead to blood stasis blockage. Phlegm and blood stasis block cerebral vessels, causing malnutrition of the limbs.

(3) Deficiency of healthy Qi: Aging and long-term illness consume Qi. Qi deficiency leads to weakness in promotion, poor blood circulation, and ultimately "Qi deficiency and blood stasis". This is a common pathogenesis during the recovery phase.

(4) Liver and kidney deficiency: Liver and kidney Yin deficiency leads to Yin failing to control Yang, Yang hyperactivity transforming into wind, and at the same time, tendons and bones are malnourished, aggravating limb weakness [6].

2.3. Deepening understanding of modern traditional Chinese medicine

With the advancement of integrated traditional Chinese and Western medicine research, the understanding of traditional Chinese medicine (TCM) regarding certain diseases has gradually aligned with modern medicine. For example, through imaging observations, it has been found that patients with "Qi deficiency and blood stasis syndrome" in TCM often exhibit symptoms such as low cerebral perfusion and leukoaraiosis. The "wind-phlegm obstructing collaterals syndrome" is frequently associated with abnormalities in blood lipids and increased inflammatory factors (such as IL-6 and TNF-α). This combined approach of "syndrome differentiation and disease differentiation" provides a more precise theoretical basis for TCM treatment.

3. Main therapies

3.1. Acupuncture therapy

Acupuncture, by stimulating acupoints to regulate the Qi and blood of the meridians, promotes blood circulation in the brain and the normal operation of the nervous system. It is an important clinical treatment method in traditional Chinese medicine [7, 8].

3.1.1. Body acupuncture therapy

Body acupuncture focuses on the principle of "dredging meridians, activating collaterals, nourishing Qi, and promoting blood circulation". The selection of acupoints mainly focuses on the Yangming meridians of the hands and feet (because "treating flaccidity requires focusing on the Yangming meridians"), combined with the Governor Meridian and local acupoints [9]. Commonly used acupoints include Jianyu, Quchi, Shousanli, Waiguan, and Hegu for the upper limbs; Huantiao, Zusanli, Yanglingquan, Sanyinjiao, and Taichong for the lower limbs; and Baihui, Fengchi, Shuigou for the head and face. Modifications based on symptoms include adding Guanyuan and Qihai for Qi deficiency and blood stasis, and adding Fenglong and Fengfu for wind-phlegm obstructing the meridians.

Special acupuncture techniques include:

(1) Xingnaokaiqiao acupuncture (created by Academician Shi Xuemin): This technique uses Shuigou, Neiguan, and Sanyinjiao as the core acupoints, employing the techniques of "reducing Shuigou, reinforcing Neiguan, and reinforcing Sanyinjiao" to awaken the mind, open the orifices, and dredge the meridians [9].

(2) Balanced acupuncture: This method selects remote acupoints such as "shoulder pain point" and "knee pain point", and regulates limb function through nerve reflexes. It is suitable for patients in the spasticity phase and can reduce the Modified Ashworth Spasticity Scale (MAS) score.

(3) Tongdu Diaoshen acupuncture: This technique involves acupuncture at acupoints on the Governor Meridian such as Dazhui and Mingmen, regulating spinal nerve conduction and improving limb coordination [10].

3.1.2. Scalp acupuncture therapy

Scalp acupuncture is based on the theory of "correspondence between scalp stimulation areas and brain functional areas" and directly targets brain-derived movement disorders, featuring strong targeting.

Commonly used stimulation areas include the motor area (located in the projection area of the precentral gyrus), the sensory area (the projection area of the postcentral gyrus), and the balance area (the projection area of the cerebellum). Specifically, the upper 1/5 of the motor area is used to treat lower limb movement disorders, while the middle 2/5 is for upper limb movement disorders.

During the procedure, the needle is quickly advanced under the galea aponeurotica using the "air extraction method". The needle is twisted at a frequency of 200 times per minute, continuously applied for 1–2 minutes, and left in place for 30 minutes each time, with 2–3 sessions of needle manipulation. Scalp acupuncture is often combined with body acupuncture. Studies have shown that, compared to individual treatments, the combination can significantly improve FMA scores and increase intracerebral blood flow [11].

3.1.3. Other acupuncture-related therapies

(1) Electroacupuncture

Based on body acupuncture or scalp acupuncture, an electroacupuncture device is connected. The use of sparse-dense waves (2/100Hz) can alleviate muscle spasms, while continuous waves (50Hz) can enhance muscle strength, especially suitable for patients with muscle strength ≤ 3.

(2) Moxibustion

Warm acupuncture and moxibustion (placing moxa sticks at the end of the needle after acupuncture) or moxibustion at acupoints such as Zusanli and Guanyuan with ginger in between, mainly to warm Yang and nourish Qi, is suitable for treating Qi deficiency and blood stasis syndrome, and can effectively alleviate symptoms such as cold limbs and fatigue.

(3) Blood-letting puncture and cupping therapy

Pricking bloodletting at Jianjing and Weizhong points, followed by cupping therapy, can promote blood circulation, remove blood stasis, dredge meridians, and relieve pain, thus alleviating limb pain during spasms.

3.2. Traditional Chinese medicine therapy

Traditional Chinese medicine follows the basic principle of "syndrome differentiation and treatment", and achieves the goal of regulating the body's Qi and blood and accelerating the recovery of nerve function after injury through the compatibility of multiple medicinal herbs.

3.2.1. Oral administration of Chinese medicine

(1) Classical prescriptions

"Buyang Huanwu Decoction" (Astragalus, Angelica, Red Peony, Earthworm, etc.) has the effect of inhibiting platelet aggregation, reducing blood viscosity, and increasing the level of brain-derived neurotrophic factor (BDNF), thus accelerating nerve repair. This prescription is the preferred choice for patients with Qi deficiency and blood stasis syndrome. A multi-center clinical study has shown that this prescription, combined with rehabilitation training, can promote the rapid recovery of patients' limb movement ability and improve the damage of nerve function [12]. "Zhengan Xifeng Decoction" (Achyranthes Bidentata, Hematite, Dragon Bone, etc.) is suitable for patients with hyperactivity of liver-yang, which can lower blood pressure, reduce cerebral edema, and improve limb tremor and spasms; "Banxia Baizhu Tianma Decoction" (*Pinellia*, *Atractylodes*, *Gastrodia*, etc.) has the effects of reducing lipids and anti-inflammatory, which can improve symptoms such as heavy limbs and difficulty in moving.

This prescription is mainly targeted at wind-phlegm obstructing collaterals syndrome [13].

(2) Modern preparations

"Naoxintong Capsule" (*Astragalus*, *Salviae Miltiorrhizae*, Safflower, etc.) is commonly used in the recovery phase clinically, which can improve cerebral microcirculation and reduce the recurrence rate; "Tongxinluo Capsule" (Ginseng, Leech, Scorpion, etc.) can improve limb ischemia by protecting vascular endothelial function and promoting the establishment of collateral circulation [14].

3.2.2. External application of Chinese medicinal herbs

(1) Fumigation and washing therapy: Use herbs such as Shenjin Cao (Herba *Lycopodii*), Tougu Cao (*Speranskia tuberculata*), Hong Hua (*Flos Carthami*), and Ai Ye (*Folium Artemisiae Argyi*) to make a decoction for fumigating and washing the affected limb. Through the dual effects of warmth and medication, it can improve local circulation, relieve muscle adhesion, and is especially suitable for patients with shoulder-hand syndrome.

(2) Acupoint application: Make a plaster with herbs such as She Xiang (Moschus), Ru Xiang (Olibanum), and Mo Yao (Myrrha), and apply it to acupoints such as Quchi and Zusanli. This can promote blood circulation and dredge meridians through transdermal absorption [15].

(3) Chinese medicine iontophoresis: Use direct current to introduce medicinal liquids such as Dan Shen (Radix *Salviae Miltiorrhizae*) and Huang Qi (Radix *Astragali*) into the affected limb, which can increase local drug concentration and enhance the therapeutic effect.

3.3. Tuina and massage therapy

Tuina achieves the purpose of dredging meridians, relaxing muscles, and improving limb movement ability through manipulation on the body surface, especially suitable for patients with spasmodic seizures and convalescence [16]. Rubbing, pinching, and rolling techniques are used to relieve muscle spasms around joints such as shoulders, elbows, and knees; acupoint pressing methods (such as pressing and rubbing Quchi, Zusanli, etc.), passive joint activities (such as shoulder joint abduction, ankle dorsiflexion) promote the recovery of joint range of motion; for deformities such as foot drop and elbow flexion, use levering and stretching methods to adjust the force line. It should be noted that during the spasm phase, attention should be paid to the technique when performing Tuina, which should be gentle to avoid muscle spasms; during the recovery phase, the intensity can be increased, and active exercise should be performed at the same time.

3.4. Traditional exercise therapy

Traditional exercises, characterized by the integration of movement and stillness, improve physical coordination and balance through the adjustment of body posture, breathing, and mindset, making them suitable for long-term rehabilitation. Tai Chi, with its core principles of "slowness, continuity, and circularity," enhances lower limb balance through weight-shifting exercises. Studies have confirmed that practicing Tai Chi three times a week (30 minutes per session) can reduce the risk of falls for patients [17]. The Eight-Section Brocade, with movements such as "Lifting Hands to Regulate the Triple Warmer" and "Shooting Arrows Like an Archer," can strengthen shoulder and arm muscles and improve upper limb function [18]. Yi Jin Jing emphasizes "stretching the bones and muscles" and alleviates muscle adhesion and increases limb flexibility through movements like "Wei Tuo Offers the Pestle" and "Nine Demons Pull the Horse's Blade." Traditional exercises are often combined with modern rehabilitation

training to form an "integrative rehabilitation program of traditional Chinese and Western medicine." For instance, the integration of Tai Chi and Bobath techniques can significantly improve patients' walking ability [19].

4. Conclusion

Traditional Chinese Medicine (TCM) has demonstrated multiple advantages in treating post-stroke limb motor dysfunction, including diverse treatment methods, definite therapeutic effects, and minimal side effects. Its core mechanism involves multi-target interventions to improve cerebral circulation, promote neural repair, and regulate muscle function [20, 21]. Currently, therapies such as acupuncture and Buyang Huanwu Decoction have been included in various clinical guidelines and have become important approaches in integrated traditional Chinese and Western medicine rehabilitation. However, current research still has several shortcomings: first, most clinical studies are small-scale and single-center designs, lacking large-sample randomized controlled trials (RCTs) for validation; second, efficacy evaluations predominantly rely on scale scores and lack objective biological markers (such as neuroimaging or molecular biomarkers); third, treatment protocols lack standardization, including inconsistent selection of acupuncture points and varying intensities of manual therapies, which affects the comparability of results. Future research should focus on three aspects: first, conducting high-quality RCT studies to establish evidence-based support for TCM treatments; second, integrating molecular biology and neuroimaging technologies to elucidate the scientific connotation of TCM's "syndrome differentiation and treatment"; third, developing standardized treatment protocols to promote the standardization and internationalization of TCM rehabilitation. With further research, TCM is expected to play a more significant role in the treatment of post-stroke limb motor dysfunction, providing patients with better rehabilitation options.

Disclosure statement

The authors declare no conflict of interest.

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