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## Clinical Research Progress on Acupuncture Treatment for Spastic Paralysis after Stroke

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**Abstract:** Stroke, also known as stroke, is a neurological disease with a high disability rate. Post stroke spasms are one of the common complications in stroke rehabilitation patients, often manifested clinically as limb movement disorders, sensory system disorders, increased muscle tone, muscle atrophy, and decreased muscle strength. Therefore, early detection and treatment have become the primary principle for the clinical diagnosis and treatment of spastic paralysis after stroke. As early as over two thousand years ago, acupuncture therapy had a relatively wide range of applications, and different acupuncture sites, methods, and timing can all have an impact on the therapeutic effect of acupuncture. This article reviews the literature on acupuncture treatment for spastic paralysis after stroke in recent years, in order to explore patterns, expand ideas, and improve the clinical efficacy of acupuncture treatment for this disease.

**Keywords:** spasmodic paralysis after stroke; traditional Chinese medicine; acupuncture treatment; research progress; neurological disorders

In recent years, the incidence rate of stroke in China has been rising. The sequelae of stroke can lead to a continuous decline in the quality of life of patients and increase their economic burden. Post stroke spasmodic paralysis is one of the sequelae of stroke, characterized by muscle spasms in the upper limb flexor and lower limb extensor muscles. Spastic paralysis is one of the manifestations of upper motor neuron damage, and it is also a phenomenon of increased muscle tone caused by the loss of high-level central system regulation of lower motor neurons. Traditional Chinese medicine categorizes spasmodic paralysis after stroke into the categories of "tendon disease" and "spasmodic syndrome", believing that it is caused by the imbalance of yin and yang and phlegm stasis obstruction. In recent years, acupuncture has continuously diversified in the field of treating spastic paralysis after stroke, providing new ideas and methods for the treatment of this disease.

### 1 The etiology and pathogenesis of spastic paralysis after stroke

The etiology and pathogenesis of spasms after stroke have been differently understood by medical professionals throughout history. Stroke can be traced back to the book "Huangdi Neijing", during which there were many records of the disease. As stated in the "Ling Shu: The True Evil of the Sting Section": "The virtual evil is ubiquitous in the body, and it enters deeply. It resides in the camp guard, and if the camp guard weakens slightly, the true energy will go, and the evil energy will remain alone, resulting in withering." [1]. Before the Tang and Song dynasties, the etiology and development of spasms after stroke were mainly based on the theory of "external wind" [2]. For example, "treating wind pathogenic factors in organs, contracting muscles and meridians, contracting limbs, and using the Baihua Snake Pill formula". Another example is the explanation of spasms after stroke in the Sui Dynasty's Chaoyuan Formula in the "Treatise on the Origins and Stages of Various Diseases", which states: "This is caused by the deficiency of the body, and the wind pathogenic factors lie in the tendons." [3]

After the Tang and Song dynasties, the causes of spasms after stroke were mainly based on the theory of "internal wind", with a hundred schools of thought competing. Many medical experts proposed their own theories on the etiology and pathogenesis of spasms after stroke. This period also became the peak of research on the causes of spasms after stroke. Ming Dynasty physician Zhang Jingyue believed that limb spasms did not occur immediately after a stroke, but rather went through a period of soft paralysis, followed by an increase in muscle tone and a gradual transition to the spastic phase. Zhang Jingyue proposed in his "Complete Works of Jingyue" that post stroke paralysis is mostly due to qi deficiency, while post stroke spasms are mostly due to blood deficiency. For example, "if there is no qi in the blood, the disease is longitudinal relaxation and weakness... If it cannot be calm, it cannot be relaxed. Therefore, if the tendons are weak, it should be blamed for lack of qi; if the tendons are urgent, it should be blamed for lack of blood [4-5]." At the same time, the pathogenic factors of cold and heat can cause post stroke limb

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spasms. Ming Dynasty physician Shen Ting believed that cold, heat, and blood deficiency were all the causes of spasms. For example, "in cases of urgency, it is mostly due to cold, and there are also cases of heat, resulting in blood deficiency." In addition, phlegm evil is endogenous, blocking the meridians, leading to the loss of nourishment of muscles and meridians, and can also cause limb spasms after a stroke. As the medical expert Wan Quan of the Ming Dynasty wrote in "The Biography of the Wan Family to Protect Lives: Stroke", "Paralysis is always a disease of blood exhaustion, covered by phlegm and mud meridians, so qi and blood cannot nourish its tendons. [6]" From the above, it can be seen that spasmodic paralysis after stroke combines wind, dampness, phlegm, and blood stasis, which can aggravate spasms and cause the disease to persist and be difficult to recover. Therefore, the key pathogenesis of spastic paralysis after stroke is the imbalance of qi and the loss of nourishment of organs.

## **2 Acupuncture treatment for spastic paralysis after stroke**

### **2.1 Traditional acupuncture methods**

Acupuncture and moxibustion treatment is applicable to all periods of stroke, which can warm the meridians and unblock the pulse, regulate qi, blood, yin and yang, and relieve spasm. The nerves should belong to the meridians, and acupuncture on the nerve trunk can promote neuronal repair, achieving the goal of regulating the meridians and unblocking the circulation of qi and blood.

#### **2.1.1 Xingnao Kaiqiao Acupuncture**

Academician Shi Xuemin, on the basis of inheriting the theories of various ancient schools and combining them with modern medical theory, clearly proposed that the fundamental cause and mechanism of stroke is "closed orifices and hidden minds, and the mind does not guide qi" [7], further revealing the essence of stroke. Academician Shi Xuemin also established the Xingnao Kaiqiao acupuncture method by using the Yin Qiao and Yang Qiao meridians to treat spasms after stroke. For patients with upper limb flexor hyperfunction and lower limb extensor hyperfunction, Wu Lianzhong proposed that treatment should focus on "awakening the mind and opening the orifices, diverting yang from yin, and supporting yang to suppress yin" [8], paying attention to the qi that patients should reach, and in treatment, paying attention to the qi under the doctor's needle and the sensation of the patient's needle. The main acupuncture points are Shangxing, Baihui, and Yintang. Auxiliary acupoints: Upper limb Yunmen Pass through Zhongfu, Lower Jiquan, Quchi, Shousanli, Upper Baxie, Lower limb Blood Sea, Liangqiu, Siqiang, Zusanli, Fenglong, Tengyue.

#### **2.1.2 Huiyang nine needle acupoint method**

The Huiyang Nine Needle Acupoint is composed of nine points: Yamen, Laogong, Sanyinjiao, Yongquan, Taixi, Zhongwan, Huantiao, Zusanli, and Hegu. It can release heat, open and close, regulate yin and yang, and use the technique of tonifying, tonifying, and purging to achieve the effects of tonifying qi, strengthening yang, and harmonizing yin and yang. Wang Wenxia et al. [9] selected 100 patients with spasmodic sequelae of stroke and studied the effects of acupuncture at Huiyang Jiuzhen acupoint on cognitive function and serum levels of endothelin (ET), nitric oxide (NO), and endothelial derived hyperpolarizing factor (EDHF) in patients with spasmodic sequelae of stroke. The results showed that the cognitive function, social function, and emotional function scores of both groups of patients increased after treatment, and the experimental group was higher than the control group, Prove that acupuncture at Huiyang Jiuzhen acupoint can effectively improve the clinical symptoms of stroke spasmodic sequelae patients and delay the progression of the disease. This is consistent with the research conclusion of Wang Yu et al. [10].

#### **2.1.3 Acupuncture method for purging yin and tonifying yang**

In the "Ling Shu", it is mentioned that "the key to using needles is to know how to regulate yin and yang. Adjusting yin and yang, the essence and qi are light, combining form and qi, and making the spirit hidden inside." Choosing the relative acupoints of yin and yang meridians can harmonize yin and yang, promote the circulation of qi and blood, and effectively relieve muscle spasms. After a stroke, spasms in the lower limbs manifest as urgency

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of yin and relaxation of yang. According to the basic theory of traditional Chinese medicine, constriction belongs to reality, while relaxation belongs to deficiency. Therefore, treatment should focus on purging excess and supplementing deficiency, that is, purging yin and supplementing yang, in order to harmonize yin and yang and ultimately achieve a balance of yin and yang [10]. Wang Xuefei and Wang Shuguo [11] selected acupoints such as Taixi, Kunlun, Zhaohai, Shenmai, Yinlingquan, Sanyinjiao, Zusanli, Xuehai, Liangqiu, etc. to treat patients with poor left lower limb mobility, grade 3 left lower limb muscle strength with increased muscle tone, and hyperreflexes of the left lower limb knee and Achilles tendon. This study focuses on selecting acupoints that are pairwise and evenly distributed near the knee and ankle joints. These acupoints belong to the Yin Yang meridian and can effectively connect the meridians of the limbs. At the same time, the qi and blood flow are unobstructed, the brain orifices are opened, the meridians are stimulated, and the tendons are nourished, thereby promoting the recovery of limb function in patients.

#### **2.1.4 Fire needle therapy**

Stimulating acupoints and meridians with fire needles can have effects such as increasing yang, nourishing qi, and unblocking meridians. Hong Ying's research found that the advantages of fire needle therapy mainly lie in the following aspects: supplementing deficiency and relieving excess, reducing nerve excitability and reshaping neural pathways through strong local stimulation, which can directly eliminate tissue adhesion and contraction; At the same time, it can provide richer nutrition for local muscles, tendons, and ligaments, which is beneficial for repairing damaged tissues and regulating immune inflammatory responses. The study by Liu Jun et al. [13] found that using filiform needle acupuncture at Jiaji acupoint to treat spastic paralysis after stroke can significantly improve the patient's neurological and motor functions. Du Xin et al. [14] used He's fire needle therapy to treat spastic hemiplegia after cerebral infarction, and the results showed that the effect of fire needle combined with rehabilitation treatment was significantly better than that of simple rehabilitation treatment.

#### **2.2 Acupuncture combined with traditional Chinese medicine treatment**

At present, for limb spasms after stroke, Western medicine mainly focuses on physical therapy and drug intervention. Physical therapy mainly uses exercise therapy and physical factor therapy, but often takes effect slowly and has a short duration of action. The treatment of limb spasticity in traditional Chinese medicine is often based on acupuncture and moxibustion, massage and traditional Chinese medicine. The method is safe, simple and effective, but the effect of a single treatment is limited. Therefore, in clinical practice, several methods are often used for combined treatment [14]. Wang Yanan et al. [15] observed the effect of modified Shaoyao Gancao Tang combined with filiform needle acupuncture on the treatment of spastic paralysis in the upper limbs after stroke. The results showed that patients had a high acceptance of filiform needle acupuncture on the treatment of spastic paralysis in the upper limbs, and the modified Shaoyao Gancao Tang could inhibit the immune inflammatory response of the central and peripheral nervous systems after stroke, thereby improving limb swelling and pain. At the same time, it can also regulate and inhibit the release of neurotransmitters, reduce cell apoptosis, and effectively protect neurons. The research of Yang Weixia [16] shows that acupuncture and moxibustion combined with fumigation and washing of traditional Chinese medicine can effectively reduce the degree of pain and improve the lower limb function of patients with hemiplegia after stroke. Liu Yamin's research [17] found that the combination of Huatan Tongluo Tang (10g each for Banxia method, Chuanxiong, Orange Red, Fructus Aurantii, Polygala, Red Flower, and Acorus calamus, 15g each for Fushen, Danshen, and Codonopsis pilosula, and 10g each for licorice roasting) and Xingnao Kaiqiao Needle can effectively improve the neurological function of patients, restore limb function, enhance clinical efficacy, and have no serious adverse reactions. It is worth promoting. Zhang Jing [18] used a combination of Tongluo Fuzheng Tang and acupuncture to treat post-stroke hemiplegia patients, and the results showed that this therapy had a positive impact on the patient's motor function. Chen Xiaoge's [19] study explored the clinical efficacy of acupoint penetration acupuncture combined with traditional Chinese medicine

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fumigation and washing combined with conventional therapy in the treatment of stroke hemiplegia. It used acupoint penetration acupuncture at Waiguan point, Quchi point through Shaohai point, Hegu point through Laogong point, Huantiao point through Fengshi point, Yanglingquan point through Yinlingquan point, Qixu point through Zhaohai point, Taichong point through Yongquan point, and Kunlun point through Taixi point on the affected side, The combination of traditional Chinese medicine (safflower, ox knee, Angelica sinensis, papaya, osmanthus twig, Shenjincao, peony) fumigation and washing showed that the combination of acupoint penetration acupuncture and traditional Chinese medicine fumigation and washing combined with conventional therapy has a definite therapeutic effect on stroke hemiplegia. Zhao Jun 's research shows <sup>[20]</sup> that the efficacy of Xuefu Zhuyu Decoction combined with traditional acupuncture and moxibustion in treating patients with spastic paralysis after stroke is better than that of acupuncture and moxibustion alone. Traditional Chinese medicine fumigation and washing rehabilitation is a commonly used external treatment method in traditional Chinese medicine, which can accelerate blood circulation, improve metabolism, improve microcirculation and tissue nutrition supply; Accelerate the clearance of inflammatory factors and promote the absorption of local exudates; Reduce the tension of muscles and fibrous connective tissue, relieve spasms; Reduce the excitability of sensory nerves; Improve immune function. Chen Azhen and Yu Zhengzhou <sup>[21]</sup> used the traditional Chinese medicine fumigation of Gualou Guizhi Tang combined with giant needling method to treat spastic hemiplegia caused by stroke. After a comparative study, it was found that its effect was better than using acupuncture alone or external washing therapy with traditional Chinese medicine. The combination of two therapies is not a simple sum of therapeutic effects, but rather promotes each other and plays a role of internal and external coordination. The power of traditional Chinese medicine is slow and long-lasting, while the power of acupuncture is fast and short. When used in combination, the two complement each other, allowing the meridians to be unblocked, Qi and blood to flow smoothly, and relieving spasms in the body.

### **2.3 Acupuncture combined with rehabilitation therapy**

#### **2.3.1 Acupuncture combined with traditional Chinese medicine rehabilitation therapy**

After a stroke, the meridians are not smooth, yin and yang are imbalanced, the circulation of qi and blood is obstructed, and the tendons are lost for nourishment. This is manifested as half body cramps and poor mobility, and treatment mainly focuses on external treatment. The traditional Chinese medicine rehabilitation treatment method is simple and effective, with strong operability. It complements and promotes modern rehabilitation treatment methods, and can improve the rehabilitation effect. It is worthy of clinical application and promotion. Tang Lin <sup>[22]</sup> selected patients with spastic hemiplegia after stroke as the research object, and intervened with traditional Chinese medicine rehabilitation measures such as acupuncture, traditional Chinese medicine fumigation, and traditional Chinese medicine massage to explore the impact of traditional Chinese medicine rehabilitation treatment on the limb function of patients with spastic hemiplegia after stroke. The results showed that traditional Chinese medicine rehabilitation methods had a significant effect on the treatment of spastic hemiplegia after stroke, helping to promote the recovery of limb function and improve the rehabilitation effect. When multiple traditional Chinese medicine rehabilitation techniques are combined, they can effectively alleviate local spasms in the affected limb, promote blood and lymphatic circulation, and alleviate inflammation and edema. Traditional Chinese medicine nursing techniques are widely used in clinical practice, with the advantages of simplicity, effectiveness, ease, and affordability, especially in reducing the pain of patients with chronic diseases. Wang Ziqin et al. <sup>[23]</sup> found that using traditional Chinese medicine ironing therapy combined with acupoint application to treat stroke hemiplegia patients can help accelerate the relief of clinical symptoms and promote the improvement of limb function. Chen Yingling's research <sup>[24]</sup> shows that the combination of moxibustion and rehabilitation therapy has a significant effect on post-stroke spastic hemiplegia patients. It can improve patient symptoms, enhance their motor function, help improve patient prognosis, and is worthy of clinical promotion and use. Zhang Xia's research <sup>[25]</sup> found that

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traditional Chinese medicine comprehensive nursing interventions such as meridian scraping, cupping, moxibustion combined with traditional Chinese medicine application can promote the functional recovery of hemiplegic limbs in stroke recovery patients, reduce their level of functional disability, and improve their quality of life.

### **2.3.2 Acupuncture combined with modern rehabilitation therapy**

Rehabilitation therapy lies in dynamic therapy, which allows muscles, muscles, and bones to be reused by the body, and gradually achieves a balanced state of qi and blood circulation in the muscles. Cao Jianghong<sup>[26]</sup> divided post-stroke spastic paralysis patients into two groups. The control group received rehabilitation training based on Ashworth grading, while the experimental group received acupuncture treatment in addition to the control group. The results showed that the treatment effect of the experimental group was better than that of the control group, and the difference was statistically significant. Zhu Yangshi et al.<sup>[27]</sup> selected elderly stroke patients with hemiplegia as the research object to explore the clinical effect of acupuncture and moxibustion combined with rehabilitation treatment, and found that the combined treatment is helpful to improve the daily living ability and motor function of patients. Song Weihua and Liu Dan<sup>[28]</sup> also found that the clinical effect of acupuncture and moxibustion combined with rehabilitation training on spastic hemiplegia after stroke is better than that of single rehabilitation training treatment. This is consistent with the research findings of Du Peibing<sup>[29]</sup> and He Long<sup>[30]</sup>. The combination of acupuncture and modern rehabilitation therapy not only compensates for the shortcomings of a single treatment method, but also has a mutually reinforcing effect.

### **3 Conclusion and outlook**

Stroke is a common neurological disease in clinical practice, and spasmodic paralysis is one of the common complications during the recovery period of stroke patients, often manifested as limb motor dysfunction. It can be seen from the above contents of this article that acupuncture and moxibustion therapy has a significant effect on the treatment of spastic paralysis after stroke. The Yellow Emperor's Inner Canon emphasizes the importance of regulating yin and yang in acupuncture therapy, emphasizing the importance of using needles to regulate yin and yang. However, there are still many shortcomings in current related research, such as differences in effectiveness caused by different acupuncture practitioners. Therefore, in order to standardize the use of acupuncture therapy and improve its therapeutic effect, it is necessary to study its mechanism of action<sup>[31-33]</sup>. The mechanism of action of acupuncture therapy can be elaborated from various aspects such as traditional medicine and modern rehabilitation medicine, which is beneficial for clinical application and the promotion and use of acupuncture therapy.

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