Using acupoint-to-acupoint penetrative needling to treat post-stroke spastic paralysis: a clinical progress review

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Abstract

OBJECTIVE: To determine the characteristics and advantages of acupoint-to-acupoint penetrative needling (AAPN) treatment for post-stroke spastic paralysis (PSSP) to improve the clinical outcomes of this disease in the future.

METHODS: Randomized, controlled trials of PSSP patients receiving AAPN treatment were searched from MEDLINE, EMBASE, and China National Knowledge Infrastructure Database between January 2006 and June 2013. Key words included: clinic or clinical, acupuncture, needling, acupoint-to-acupoint, penetrative or penetration or penetrating, stroke or apoplexy or cerebral infarction or cerebral hemorrhage, spastic paralysis or spasticity or palsy, and hypermyotonia. Language was limited to English and Chinese. Case series reports, review articles, and animal studies were excluded.

RESULTS: AAPN showed better clinical results on PSSP than other acupuncture treatments, especially when combined with adjunct therapies such as electroacupuncture, bloodletting, and rehabilitation. The greatest benefit was achieved with rehabilitation combined with penetration from Yang-channel acupoints to Yin-channel acupoints in the upper limbs, and from Yin-channel acupoints to Yang-channel acupoints in the lower limbs with a reinforcing maneuver.

CONCLUSION: AAPN is an effective treatment for PSSP, and it can accelerate and enhance functional repair of PSSP patients.

Key words: Stroke; Quadriplegia; Muscle hypertonia; Needles; Electroacupuncture; Review

INTRODUCTION

Spastic paralysis is a common sequela of stroke patients. It occurs in up to 60% of apoplexy survivors with varying degrees of hypermyotonia, and seriously impacts a patient’s ability to meet their daily needs. Various measures, including medication, rehabilitation, and surgeries have been used to treat post-stroke spastic paralysis (PSSP), but the effectiveness of these treatments remains unsatisfactory. Meanwhile, the burden of spastic paralysis for patients, their caregivers, and society is enormous. It is reported that the mean lifetime cost of each ischemic stroke patient in the United States is approximately $140,048. Therefore, a simple and cost-effective method to treat post-stroke paralysis needs to be established for patients with spastic paralysis, especially in developing countries with shortages of health care.

Acupuncture for PSSP is commonly used in China and
other Eastern countries, and is gradually being accepted in the West because of its simplicity, convenience, and effectiveness. Acupuncture not only effectively alleviates muscle tension after stroke, but also improves limb motor function. Acupoint-to-acupoint penetrative needling (AAPN) is a method that a needle was punctured at a point with the direction of needle tip to another point. This method is a distinctive acupuncture technique, and has shown promising effects for treating PSSP. To better understand the characteristics and advantages of AAPN for PSSP, we searched the literature databases MEDLINE, EMBASE, and China National Knowledge Infrastructure Database between January 2006 and June 2013, with key words: clinic or clinical, acupuncture, needling, acupoint to acupoint, penetrative or penetration or penetrating, stroke or apoplexy or cerebral infarction or cerebral hemorrhage, spastic paralysis or spasticity or palsy, and hypermyotonia. Literature written in Chinese or English was considered.

We analyzed these clinical studies and reviewed the development of the AAPN technique. Based on these studies, we comment on the particular features of this strategy and suggest future directions, intending to improve the level of treatment using AAPN for PSSP. We will use "A to B" to express the direction of penetrative needling, where "A" is the acupoint punctured and "B" is the acupoint directed.

**PSSP TREATMENT WITH AAPN ALONE**

Shi treated 30 patients with spastic paralysis after stroke using 12 sets of AAPN, created by Professor Wang Leting. Thirty patients were placed in the control group. In the treatment group, the acupoints chosen were: from Jianyu (LI 15) to Qijiu (HT 1), Yefeng to Jiafeng (according to professor Wang Leting and Song of Yulong), these two points are not traditional, and do not have an international code; Yefeng is located at the posterior axillary fold, Jiafeng is located at the inferior angle of scapula), Quchi (LI 11) to Shaohui (HT 3), Waiguan (SJ 5) to Neiguan (PC 6), Yangchi (SJ 4) to Daling (PC 7), and Hegu (LI 4) to Laogong (PC 8) in the upper limbs of the affected side. Huantiao (GB 30) to Fengshi (GB 31), Ququan (LR 8) to Taixi (KI 3), Kunlun (BL 60), Ququan (LR 8), and Taixi (KI 3) on the affected side. The results showed that both AAPN and conventional acupuncture were effective for the recovery of neurological functions in patients with PSSP. However, AAPN was significantly more effective. The total effective rate in the AAPN group was 76.7%, and that of the control group was 50.0%.

Jie used Yang-channel-to-Yin-channel needling to treat 30 patients with spastic hemiplegia after apoplexy, while 30 patients served as a control group. Jianyu (LI 15) to Binao (LI 14), Waiguan (SJ 5) to Neiguan (PC 6), Houxi (SI 3) to Hegu (LI 4), Xuehai (SP 10) to Liangqiu (ST 34), Yanglingquan (GB 34) to Yinlingquan (SP 9), and Qiuqu (GB 40) to Zhaohai (KI 6) were selected in the affected side of treatment group. Ji (HT 1), Chize (LU 5), Daling (PC 7), Jianyu (LI 15), Shousanli (LI 10), Hegu (LI 4), Xuehai (SP 10), Zusani (ST 36), Sanyinjiao (SP 6), and Taichong (LR 3) were selected on the affected side of control group. The total effective rate was 90% in the treatment group, and 66.7% in the control group.

In a study using AAPN to treat lower limb spasticity in 60 patients, Shu et al. used penetration from Yanglingquan (GB 34) to Yinlingquan (SP 9) and had satisfactory results. The author emphasized that a quick lifting-thrusting-swirling-rotating maneuver was used following the needling sensation. After treatment for two months, the total effective rate of treated patients was 95%. Zhang et al. used AAPN to treat 50 patients with all-hand hypermyotonia after cerebral infarction, penetrating Hegu (LI 4) to Houxi (SI 3) and emphasized using a swirling-rotating maneuver for reducing. After acupuncture, the affected fingers of the treated patients could twitch and spread naturally. The needles were retained for 30 min, and the treatment was given once daily with one day off per week, 2 weeks constituting one therapeutic course. After two courses, the total effective rate was 94.0% in the AAPN group.

Elongated needles are often used in AAPN. Dong compared the therapeutic effects of elongated needle penetrative acupuncture along the Governing Vessel (30 patients) with conventional acupuncture (30 patients). In the treatment group, the main points were: Baihui (DU 20) to Naohu (DU 17), Dazhu (DU 14) to Zhiyang (DU 9), Jinsuo (DU 8) to Xuanshu (DU 5), and Yaoyangguan (DU 3) to Changqiang (DU 1); the adjunct points were: Jianliao (SJ 14) to Tianjing (SJ 10), Shousanli (LI 10) to Waiguan (SJ 5), Hegu (LI 4) to Houxi (SI 3), Juliao (GB 29) to Fengshi (GB 31), Yanglingquan (GB 34) to Xuanzhong (GB 39), and Qiuqu (GB 40) to Zhaohai (KI 6). The elongated needles used in the head were 5 cun (16.5 cm) in length, and the needles used on the body were 7 cun (23.3 cm). In the control group, the points used were: Fengshi (GB 20), Jianyu (LI 15), Jianliao (SJ 14), Quchi (LI 11), Chize (LU 5), Shousanli (LI 10), Waiguan (SJ 5), Hegu (LI 4), Fengshi (GB 31), Xuehai (SP 10), Zusani (ST 36), Yanglingquan (GB 34), Xuanzhong (GB...
39), Sanyinjiao (SP 6), Qixu (GB 40), and Taichong (LR 3). In the control group, 28-gauge filiform needles 1.5 cun in length were used. The needles were retained for 40 min in each treatment. After 20 treatments, there was a significant difference from before to after therapy in the treatment group (P<0.01), while no significant difference was observed in the control group (P>0.05).

The balance between Yin and Yang can be adjusted using AAPN to recover neurological functions from hypermyotonia after stroke. Wang et al.7 divided 31 resident patients randomly into two groups to observe the clinical effect of AAPN on hemorrhagic apoplexy with muscular tension dysfunction. The acupuncture group was treated with Yin-Yang balancing penetration acupuncture therapy. Four needles were punctured from Baihui (DU 20) to Taiyang (EX-HN 5) with a fast outputting-inputting-swirling-rotating and uniform reinforcing-reducing maneuver. The needles were rotated for 2 min at a frequency of 200 rpm once every 8 min, for a total of three times. Then, the following acu-points were stimulated: Jiquan (HT 1) straight, Chize (LU 5) straight, Quze (PC 3) straight, Neiguan (PC 6) to Waiguan (SJ 5), Daling (PC 7) straight, Hegu (LI 4) to Houxi (SI 3), Shangqiu (SP 5) to Qixu (GB 40), Taichong (LR 3) to Yongquan (KI 1), Yinlingquan (SP 9) to Yanglingquan (GB 34), Sanyinjiao (SP 6) to Juegu (GB 39), and Yingu (KI 10) to Xiyangguan (GB 33). The control group was treated with only rehabilitation training. After a 28-day treatment, the AAPN group had significantly better muscular tension of fingers compared to the control group (P<0.05).

**AAPN COMBINED WITH ELECTROACUPUNCTURE**

Combined AAPN and electroacupuncture has the advantages of each treatment, and studies indicate increased efficiency over the use of a single technique. Sun et al.10 performed AAPN plus electroacupuncture with stuck elongated penetrative needle in 43 patients with spasticity after stroke. Both the affected and the healthy sides were selected, and the points were: Jianyu (LI 15) to Binao (LI 14), Quchi (LI 11) to Shousanli (LI 10), Hugu (LI 4), Neiguan (PC 6), Waiguan (SJ 5), Zhongzhu (SJ 3), Baxie (EX-UE 9), Huantiao (GB 30), Chengfu (BL 36), Fengshi (GB 31), Yanglingquan (GB 34), Yinlingquan (SP 9), Qixu (GB 40), Xuehai (SP 10), Liangqiu (ST 34), Jiexi (ST 41), Zusani (ST 36), Xuanzhong (GB 39), Taichong (LR 3), and Bafeng (EX-LE 10). The electrical stimulation in the control group was applied as in the treatment group, following the needleling sensation. The total effective rate was 90.7% in the AAPN group and 62.3% in the control group. Pan11 randomly divided 128 patients with hypermyotonia after cerebral apoplexy into a treatment group and two control groups. For the treatment group (44 patients), Lieque (LU 7) to Yangxi (LI 5), Jiayu (LI 15) to Jiajue (HT 1), Quchi (LI 11) to Shaohai (HT 3), Waiguan (SJ 5) to Neiguan (PC 6), Futu (ST 32) to Yinmen (BL 37), Yinlingquan (SP 9) to Yanglingquan (GB 34), Xuanzhong (GB 39) to Sanyinjiao (SP 6), and Kunlun (BL 60) to Taixi (KI 3) were penetrated. Electroacupuncture with continuous waves was applied for 30 min following the needleling sensation. The treatment was given once daily for 1 month as a course. For control group one (42 patients), Xingnaokaiqiao therapy was used by needling Neiguan (PC 6), Shuigou (DU 26), Sanyinjiao (SP 6), Jiquan (HT 1), Chize (LU 5), Weizhong (BL 40), and Hegu (LI 4) with a lifting-thrusting maneuver for reducing. This therapy is recognized and was publiced in the textbook for TCM. For control group two, the course was the same as the treatment group, but 5 mg baclofen were also taken three times per day at the beginning, then 20 mg were taken three times daily at the end of the course. Baclofen is accepted for spasm in western medicine. So these two therapies were chosen as the control groups. The respective total effective rates were 97.7%, 78.5%, and 66.7% in the AAPN plus electroacupuncture, Xingnaokaiqiao therapy, and Baclofen groups, with significant differences among the groups (P<0.01).

**AAPN COMBINED WITH BLOODLETTING THERAPY**

Li12 used AAPN combined with bloodletting to treat 70 patients with hypermyotonia of the upper limbs after stroke. In the treatment group, elongated needles were used to puncture Jianyu (LI 15) to Binao (LI 14), Naohui (SJ 13) to Tianjing (SJ 10), Sidu (SJ 9) to Waiguan (SJ 5), and Yangxi (LI 5) to Wenliu (LI 7). The needles were retained for 30 min once daily, 5 days a week, for 4 weeks as a course. A three-edged needle was used for bloodletting at Sanjian (LI 3), Zhongzhu (SJ 3), and Houxi (SI 3) every other day, three times a week, with 4 weeks as a course. In the control group, patients only had rehabilitation training for 30 min, five times a week for 4 weeks. The Ashworth scale scores were obviously decreased in the AAPN group (P<0.01), and not in the control group (P>0.05).
AAPN COMBINED WITH REHABILITATION

Li\textsuperscript{13} used elongated needles to puncture the antagonistic muscles by needling Jianyu (LI 15) to Binao (LI 14), Naohui (SJ 13) to Tianjing (SJ 10), Sidu (SJ 9) to Waiguan (SJ 5), Yangxi (LI 5) to Pianli (LI 6), Yanglingquan (GB 34), Xuanzhong (GB 39), Ququan (LR 8) to Yinbai (LR 9), and Qixu (GB 40) to Zulinqi (GB 41). The needles were retained for 40 min during which a maneuver was used to make the muscles contract. This was repeated six times a week, with 4 weeks constituting one course. Facilitation and balance of dystrophia myotonica therapy was applied six times per week for 4 weeks as one treatment course. For the control group, conventional methods were used by selecting Jianyu (LI 15), Quchi (LI 11), Waiguan (SJ 5), Hegu (LI 4), Liangqiu (ST 34), Zusanli (ST 36), Weizhong (BL 40), Sanyinjiao (SP 6), Jieji (ST 41), and Taichong (LR 3), six times a week with 4 weeks constituting one course. The results indicated significantly better functional recovery in the AAPN group measured by degree of muscle spasticity, limb motor function, and Barthel index scores compared with the control group ($P<0.01$). Zhang \textit{et al.}\textsuperscript{14} divided 105 patients with spastic paralysis after cerebrovascular disorder into a rehabilitation group, an acupoint penetration group, and a body acupuncture group, with 35 patients in each group. All patients were treated with basic rehabilitation. The body acupuncture group was treated with body acupuncture, and the acupoint penetration group was treated with penetration acupuncture. For the body acupuncture group, the affected side was needled at Ji- quan (HT 1), Chize (LU 5), and Daling (PC 7) at the upper limb flexor muscles; Jianyu (LI 15), Tianjing (SJ 10), and Yangchi (SJ 4) at the upper limb extensor muscles; Chengfu (BL 36), Xuehai (SP 10), and Zhao- hai (KI 6) at the lower limb extensor muscles; and Big- quan (ST 31), Ququan (LR 8), and Shenmai (BL 62) at the lower limb flexor muscles. A reducing manipulation was applied in \textit{Yin} channels, and a reinforcing manipulation was applied in \textit{Yang} channels. For the acupoint penetration group, the affected side was needled with Jianyu (LI 15) to Binao (LI 14), Quchi (LI 11) to Shaobai (HT 3), Waiguan (SJ 5) to Neiguan (PC 6), Hegu (LI 4) to Houxi (SI 3), Huantiao (GB 30) to Zhibian (BL 54), Liangqiu (ST 34) to Xuehai (SP 10), Futu (ST 32) to Biguan (ST 31), Yinlingquan (SP 9) to Yanglingquan (GB 34), Sanyinjiao (SP 6) to Xuanzhong (GB 39), and Taichong (LR 3) to Yongquan (KI 1) with a strong lifting-thrusting-swirling-rotating maneuver. The therapeutic effects were observed twice every 15 days. There were significant differences in curative effect among the three groups ($P<0.05$), and acupoint penetration therapy was the best. Wang \textit{et al.}\textsuperscript{15} compared the therapeutic effects of conventional acupuncture (30 cases, control group) with elongated needle penetrating acupuncture along the Governing Ves- sel combined with a bio-stimulating feedback instrument (30 patients, treatment group). All patients were given routine rehabilitation. AAPN treatment showed better therapeutic efficiency from before to after treatment ($P<0.01$). Therapeutic efficiency was also better in the AAPN group than in the control group ($P<0.05$). Jiang \textit{et al.}\textsuperscript{16} compared the therapeutic effects of stuck elongated needle technique (36 cases), muscle region needling (31 cases), and standard rehabilitation (28 cases). The former two groups included the same rehabilitation as the last group. The stuck elongated needle technique selected Jianyu (LI 15) to Binao (LI 14), Quchi (LI 11) to Shaohai (HT 3), Neiguan (PC 6) to Waiguan (SJ 5), Hegu (LI 4) to Houxi (SI 3), Yanglingquan (GB 34) to Yinlingquan (SP 9), Zusanli (ST 36) to Chengshan (BL 57), Sanyinjiao (SP 6) to Juegu (GB 39), Kunlun (BL 60) to Houxi (SI 3), Qixu (GB 40) to Zhaohai (KI 6), and Taichong (LR 3) to Yongquan (KI 1). The needle handles were rotated one-way to make the needle stick with a small fast frequency tremble. The needles were retained for 30 min. The muscle region needling acupoints were chosen depending on the pain points on either side of the tendon around joints. The needle tip was inserted straight into the periosteum on the pain point, and then a lifting-thrusting-swirling-rotating motion was applied. Meanwhile, one needle was puncured before this one and one needle was punctured behind along the tendon. The needles were retained 30 min. The rehabilitation group was administered the Bobath facilitation technique ten times was one treatment course. According evaluation by the Brunstrom Approach, Stroke Impairment Assessment, and Ashworth score, the stuck elongated needle technique group with rehabilitation had the best therapeutic scheme for the spasticity of paralyzed limbs after stroke. Wang\textsuperscript{17} divided 60 hospitalized stroke patients with spastic paralysis randomly into a treatment group (31 cases) and a control group (29 cases). All patients were given standard rehabilitation. In the treatment group, scalp acupuncture was performed on the anterior oblique line of vertex-temporal [MS6, the line from the front Sishencong (EX-HN 1) to Xuanli (GB 6)] and the posterior oblique line of vertex-temporal [MS7, the line from Baihui (DU 20) to Qubin (GB 7)] on the contralateral side of effected limb. The needles were retained for 4 h, and every 30 min the needles were twisted once. The acupoints of the Yangming and Jueyin channels were selected as the main points on the spastic limb. The upper limb from the \textit{Yang} to \textit{Yin} channel was punctured, and the lower limb from \textit{Yin} to \textit{Yang} was punctured. The needles were retained for 30 min, and every 5-10 min the needles were twisted once. For the control group, the scalp acupuncture was the same as in the treatment group. The body acupuncture used normal methods with the needles retained for 30 min. After 1 month, the limb muscle tension of the treatment group was significantly lower than before treatment, and the spasticity was alle-
viated. And the therapeutic effect of the treatment group for spasm was better than the control group \((P<0.05)\). The total effective rate in the treatment group was 96.77\%, and that of the control group was 82.76\%. The curative effect of the treatment group for lower limb motor function was better than the control group too \((P<0.05)\). Jiao et al.\(^{18}\) divided 94 patients with hypermyotonia after cerebral infarction randomly into three groups, an acupuncture group, an acupuncture and rehabilitation group, and a rehabilitation group. Yin-Yang balancing penetration acupuncture therapy was used in the acupuncture groups. After a 28-day course, the total effective rates were 81.81\%, 90.32\%, and 80\%, respectively. Dong et al.\(^{19}\) performed a multi-center large sample randomized comparison of clinical advantages by Yin-Yang balancing penetration acupuncture therapy, acupuncture combined with rehabilitation, or rehabilitation alone in patients with hemiplegia after ischemic stroke, according to the principles of evidence-based medicine. The results showed that the Yin-Yang balancing penetration acupuncture therapy was suitable for acute and convalescent patients, and especially for improving the symptoms of neurological deficit in ischemic stroke hemiplegia when combined with rehabilitation.

**DISCUSSION**

AAPN treatment has a definitive therapeutic effect on PSSP, compared with Western Medicine, conventional acupuncture strategies, and rehabilitation. Furthermore, penetrative acupuncture can achieve better clinical results when administered in combination with some adjuvant therapies, such as electroacupuncture, bloodletting, and rehabilitation. The main methods of penetrative needling are: penetrative needling from Yang-channel acupoints to Yin-channel acupoints; penetrative needling from Yin-channel acupoints to Yang-channel acupoints; penetrative needling the upper limbs from Yang-channel acupoints to Yin-channel acupoints and the lower limbs from Yin-channel acupoints to Yang-channel acupoints; needling paralyzed side muscles with channel acupuncture penetration; and penetrative needling at Du channel acupoints.

According to Traditional Chinese Medicine (TCM), a stroke is an imbalance between Yin and Yang, which causes the Qi and blood to attack the brain and produce a blockage or bleeding from the cerebral artery. PSSP is caused by an imbalance between Yin channels and Yang channels. Based on the Application Anatomical Atlas of The Whole Body Acupoints,\(^{10}\) the Yin-channel acupoints are in the flexor muscles, which are agonist muscles in the upper limbs and antagonist muscles in the lower limbs. The Yang-channel acupoints are spread on opposing muscles. In a typical patient with apoplexy hemiparalysis, muscle tension is gradually restored, and then becomes excessively tense.

According to the Brunnstrom Approach for the recovery of hemiplegia,\(^11\) the flexor muscles of the upper limbs and the extensor muscles of the lower limbs recover first. That is, agonist muscles recover first. Therefore, the body shows common movement patterns of the upper limbs flexing and the lower limbs stretching during the spasm period.

According to traditional channel theory, the Yin Heel and Yang Heel Vessels govern the Yin and Yang of the body’s left and right, connecting the Qi of Yin and Yang, and adjusting the limb motor. The Classic on Medical Problems\(^{20}\) states that “when the Yin Heel Vessel is sick, the Yang is slow and the Yin is acute; when the Yang Heel Vessel is sick, the Yin is slow and the Yang is acute.” While there is phlegm-blood stasis in the Yin Heel Vessel, which goes along the inner surface of the body, spasms occur inside and atony occurs outside. Meanwhile, when the Yang Heel Vessel is blocked, which goes along the outer surface of the body, spasms occur outside and atony occurs inside. These theories correspond to hemiplegic patients, in which there is spasticity of the upper limb flexor muscles and lower limb extensor muscles. Therefore, treatment should focus on reducing the Yin-channel acupoints (flexor muscles) and reinforcing the Yang-channel acupoints (extensor muscles) of upper limbs, and reducing the Yang-channel acupoints (extensor muscles) and reinforcing the Yin-channel acupoints (flexor muscles) of the lower limbs.

For penetrative needling from Yang-channel acupoints to Yin-channel acupoints or vice versa, AAPN can be applied with suitable maneuvers according to the positions punctured to connect the Qi of Yin and Yang channels, adjust the balance of Yin and Yang, and relieve spasticity. For needling paralyzed side muscles with channel acupoint penetration, and penetrative needling at Du channel acupoints, same-channel acupoints are needled, which can increase acupuncture strength, allow for the needle sense to easily follow the channel, and significantly promote reinforcing and reducing. Needling the paralyzed side muscles with channel acupoint penetration is used to improve the excitability of the antagonist muscles to promote balance and relieve spastic muscle tension. Penetrative needling at Du (Governing Vessel) channel acupoints impacts the excitability of the cerebral cortex and corticospinal tracts to promote motor regulation probably because of the uniformity of the Governing Vessel and corticospinal tracts.

The mechanism of PSSP remains unclear in Western Medicine.\(^{11}\) It is generally accepted that the damaged central nervous system causes an abnormal spinal stretch reflex, which leads to PSSP. Research shows that there is a receptor in skeletal muscle tissues, and that the receptor causes a stretch reflex when stimulated.\(^{10,12,13}\) Acupuncture stimulates type I -IV nerves that are involved in the neural transmission of information into the spinal cord, causing muscle contraction of par-
alytic muscles that reaches a new balance with antagonist muscles (spastic muscles). Muscle spindles are stimulated and produce afferent impulses into the spinal cord, directly exciting α-motor neurons that dominate the same muscle. This subsequently stimulates muscle excitation-contraction and inhibits corresponding antagonist activity. The re-establishment of a new balance therefore improves the functional recovery of spastic limbs. Conversely, afferent impulses may also be transmitted through the afferent sensory pathway into the related brain area to activate the damaged brain cells and promote repair of brain tissue, and finally improve the recovery of paralyzed limbs. Furthermore, acupuncture stimulation has been identified to accelerate free radical scavenging, repair brain cell function, and reorganize the function of representative areas of cerebral cortex. It has been also shown to promote the establishment of collateral circulation, dilate vessels, prevent platelet aggregation, improve cerebral blood flow, and improve movement disorders. Therefore, penetrative acupuncture on the paralyzed muscles may garner better clinical results than traditional acupuncture.

Based on a literature review, an effective treatment for PSSP is penetrative needling of the upper limbs from Yang-channel acupoints to Yin-channel acupoints and the lower limbs from Yin-channel acupoints to Yang-channel acupoints with a reinforcing maneuver combined with rehabilitation.

However, there are still several problems among these studies. Most studies have not considered the stroke syndrome differentiation in TCM, the location and size of infarction, or the location of hemorrhage and bleeding volume. Each of these factors may impact curative effects. Moreover, there are many ways to select acupoints, choose penetrative needling directions, or combine acupuncture with cupping, electro-acupuncture, and rehabilitation. The experimental designs are not rigorous, lack blank controls, sham acupuncture controls, and are not double-blind. Therefore, we need to adopt multi-center, randomized, controlled trials with a large number of patients to formulate a standard treatment, and to provide evidence for AAPN in the treatment of PSSP.

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