Int J Clin Exp Med 2018;11(2):1141-1149
www.ijcem.com /ISSN:1940-5901/IJCEM0062340

Original Article

Jiaji acupoint injection of salvia miltiorrhiza-extract combined with SNB affect PHN

Langping Li[1*], Liang Shen[1*], Haibin Wang[2], Zhijun Lu[1]

[1]Department of Anesthesiology, Ruijin Hospital, Luwan Branch, Shanghai Jiaotong University School of Medicine, Shanghai 200020, China; [2]Department of Anesthesiology, North Branch of Ruijin Hospital, Shanghai Jiaotong University School of Medicine, Shanghai 201800, China. [*]Equal contributors.

Received April 26, 2017; Accepted December 26, 2017; Epub February 15, 2018; Published February 28, 2018

Abstract: Purpose: This study aims to investigate the effect of Jiaji-acupoint injection of Salvia Miltiorrhiza-extract combined with sympathetic nerve block in the treatment of Postherpetic Neuralgia (PHN). Methods: 80 patients with PHN were randomly divided into four groups: control group, nerve block group (NB), point injection group (PI), nerve block combined with point injection group (NB + PI), with 20 patients in each group. Patients NB + PI group received Jiaji-point injection of Salvia Miltiorrhiza-extract combined with sympathetic nerve block on the basis of medication. Results: Pain VAS significantly decreased at one week, three weeks and three months after treatment in all groups ($P < 0.01$). Compared with control group, Pain VAS in NB, PI, NB + PI group were significantly lower at one week, three weeks and three months after treatment ($P < 0.01$). However, the Pain VAS was significantly lower in NB + PI than that in the NB and PI group three months after treatment ($P < 0.05$). The effective rates were 80%, 95%, 95% and 100% in the control, NB, PI and NB + PI group three months after treatment, respectively. The effect in the NB + PI group was better than that in the control, NB and PI group ($P < 0.05$). CGRP decreased significantly three months after treatment in all groups ($P < 0.01$). CGRP in NB + PI group was the lowest among all the groups ($P < 0.05$). Conclusion: All those results indicate that Jiaji Acupoint injection of Salvia Miltiorrhiza-extract combined with SNB has the advantage of rapid onset, high effectiveness and best long-term effect in the treatment of PHN.

Keywords: Postherpetic neuralgia, sympathetic nerve block, jiaji acupoint, salvia miltiorrhiza-extract injection, calcitonin gene-related peptide (CGRP)

Introduction

Postherpetic neuralgia (PHN) is a constant chronic pain syndrome after herpes zoster lesions subside. It is the most common and the most difficult complication of herpes zoster to cure. It can exist for several months even more than ten years, and some may even last lifelong [1-4]. The main clinical feature is persistent spontaneous pain or pain caused by tender touching and/or paresthesia in the primary herpes area [5]. The pain is often severe and long-lasting, causing anxiety of patients [6].

PHN can impact quality of life, because many patients develop severe physical, occupational and social disabilities as a consequence of their chronic pain [7, 8]. About 20%-50% of patients with herpes zoster suffer from PHN, and its incidence increases with advanced age [9].

The pathogenesis of PHN was considered to be related to pathological changes of the peripheral and central nervous system caused by varicella-zoster virus, leading to the increase of peripheral sensory nerve fibers activity, ectopic impulses, central sensitization and spontaneous epileptic discharge of spinal cord neurons [10]. In addition, the sympathetic nervous activity also plays an important role in formation of pathological nervous pain [11]. A previous study indicated that the change in sympathetic nerves caused by its injury was more complex [12]. It affected not only the peripheral vascular resistance, but also chemical substances, thereby influencing the conduction of pain.

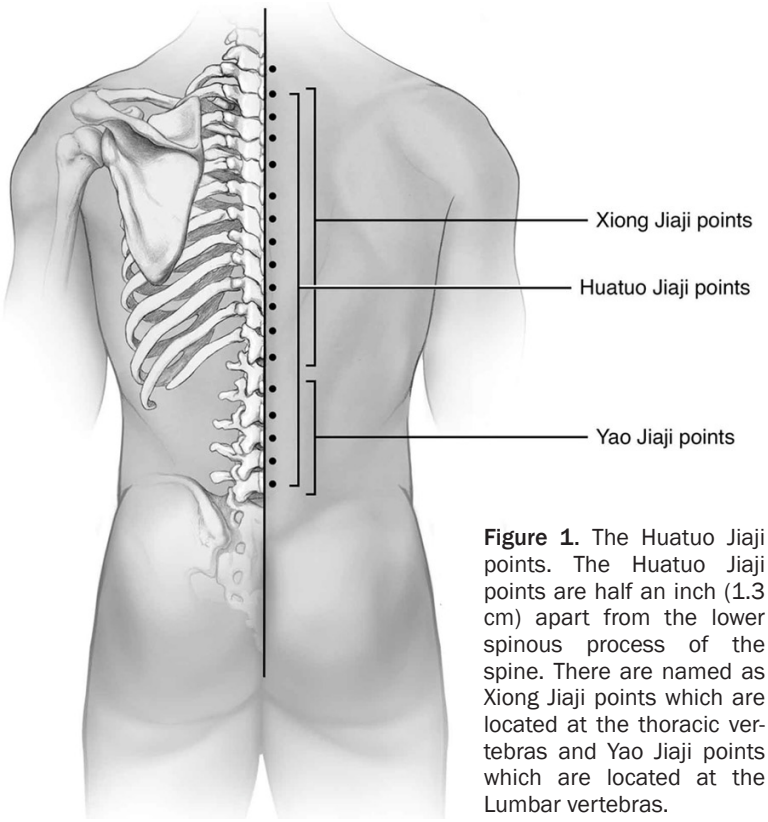

Figure 1. The Huatuo Jiaji points. The Huatuo Jiaji points are half an inch (1.3 cm) apart from the lower spinous process of the spine. There are named as Xiong Jiaji points which are located at the thoracic vertebras and Yao Jiaji points which are located at the Lumbar vertebras.

Treatment of PHN is widely studied in recent years. At present, treatments of PHN, such as medical therapy, nerve block, acupuncture, etc. have increasingly attracted attention in medical community [5]. However, cycle of PHN treatment is long, its burden is heavy costing the most in complications of herpes zoster [1, 3, 4]. An effective treatment of PHN remains a big challenge. So far, there is not any curative method to treat PHN effectively [13, 14]. The current treatments are purely symptomatic and can therefore only relieve pain and shorten the duration of constant pain [15].

Previous research has preliminarily validated the effectiveness of Jiaji Acupoint injection of Salvia Miltiorrhiza-extract in the treatment of PHN [16]. It has been recorded in *Bielu* that Salvia Miltiorrhiza-extract possesses the property of vasodilation, improving microcirculation, promoting blood circulation, removing blood stasis, calming nerves, relieving pain, and protecting nerve cells [17]. It can relieve pain caused by blocking due to air stagnation and blood stasis, as well as pain caused by weakness due to injury of Qi, blood, Yin and Yang.

In this study, the clinical curative effect of Jiaji Acupoint injection of Salvia Miltiorrhiza-extract combined with sympathetic nerve block was compared among four groups with different methods in the treatment of PHN. By observing the change of pain visual analogue scale (VAS), improvement of clinical symptoms and serum calcitonin gene-related peptide (CGRP), the proposed treatment was assessed to provide a safe and effective clinical treatment of PHN.

Material and methods

Subjects and grouping

This study has been approved by the Ethics Committee of Ruijin Hospital, Luwan Branch. PHN patients receiving clinical treatment from January to December 2013 were enrolled. Inclusion criteria were as follows: (1) duration ≥ 1 month; (2) Pain VAS ≥ 6; (3) pathological changes in the trunk and limbs; (4) no treatment or ended other treatment for more than one week. Exclusion criteria: (1) facial herpes; (2) combined with severe heart, lung, or renal insufficiency; (3) combined with blood coagulation dysfunction; (4) combined with disorder of intelligence; (5) female patients in pregnancy or lactation or preparing for pregnancy. At the first visit of pain clinic, after analyzing the medical history and going through clinical examination, the study procedures (injections and follow-up) was explained to the patient and then written, informed consent was signed by the patient. Patients were randomly divided into four groups according to the medical order by using a computer-generated random number (Supplementary Data). The injection and medication distribution were done by a fixed group of pain physicians who did not participate in the study or data collection.

Treatment

Control group (n = 20): medicine therapy alone. 300 mg gabapentin was orally administrated

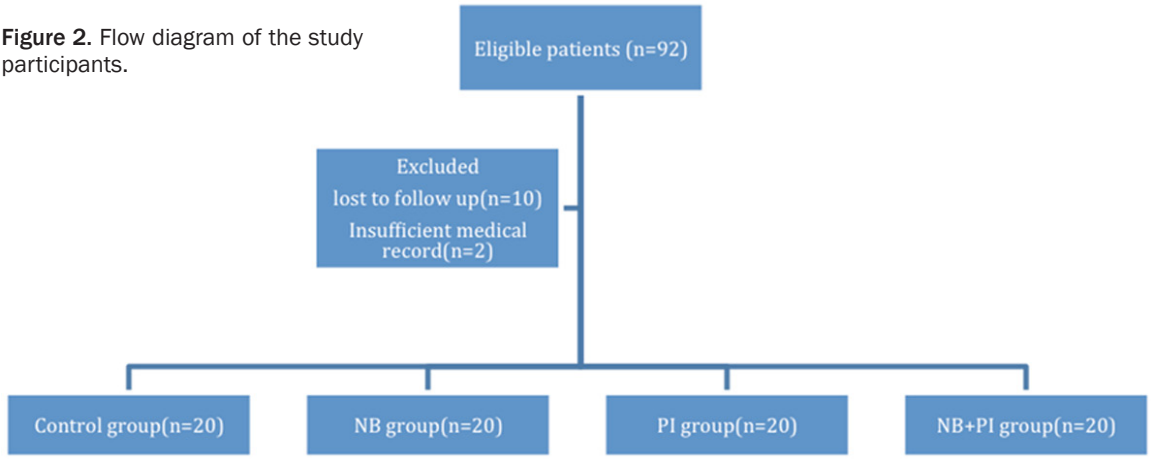

Figure 2. Flow diagram of the study participants.

on the first day. The dose increased day by day, up to 900 mg on the third day. The dosage can be gradually increased to 1800 mg/d, three times a day according to the pain relief needs of the patients. Once a patient reported mild pain (VAS ≤ 3), a trail for reducing the Gabapentin dose was done by reducing 300 mg every other day. At the same time, tramadol 50 to 100 mg/12 h was orally administrated. If the pain was relieved, the medicine was withdrawal.

NB group (n = 20): sympathetic nerve block on the basis of medication. Patients received sympathetic nerve block therapy in the nerve distribution which was corresponding to the lesion area, in accordance with the Pain Fascicle of Clinical Technical Operation Specification (PFCTOS). The operation was under the guidance of a C-arm machine. According to the lesions of spinal segments, two or three corresponding sympathetic ganglions were selected. They were treated with a 2.5 ml lidocaine hydrochloride injection and injection of 20 mg triamcinolone acetonide acetate, which was diluted with 0.9% NaCl to 20 mL, with a total volume of no more than 20 ml. The treatment was once every day for 5-7 days.

PI group (n = 20): Jiaji Acupoint injection (**Figure 1**) of Salvia Miltiorrhiza-extract on the basis of medication. Jiaji Acupoint on the lesion side was selected, which was 0.5 inch from the midline by the spine. No. 7 puncture needle was pierced vertically from skin until the needlepoint reached lamina. Medicine was injected, which was 4 ml Salvia Miltiorrhiza-extract diluted to 20 ml with normal saline. 1-3 ml was injected at each point with a total of no more than 20 ml. The treatment was once every 5-7 days.

NB + PI group (n = 20): Jiaji Acupoint injection of Salvia Miltiorrhiza-extract combined with sympathetic nerve block on the basis of medication. Sympathetic nerve block treatment was guided by C arm machine, meanwhile Salvia Miltiorrhiza-extract was injected into the corresponding Jiaji Acupoint. Specific operation details were the same with above.

Evaluation of therapeutic effect

Pain VAS: Patients evaluated the degree of pain by Pain VAS before treatment, one week after treatment, three weeks after treatment and three months after treatment. 0 was no pain, 3 or less was mild pain, 4 to 6 was moderate pain, 7 or higher was severe pain, 10 was the severest.

Oral drug administration: The amount of oral drug was calculated at every evaluation. Once the pain was mild (Pain VAS was 3 or less), the oral medicine dose was reduced. The disappearing time of pain was recorded.

Symptom improvement: Numbness of pathological area, hyperalgesia, hypersensitivity, sleep disorders, anxiety and other symptoms were recorded three months after treatment. Patients can be divided into 4 classes according to the subjective feeling before and after the treatment: the best: most basic symptoms disappeared or improved (> 50%); good: symptoms partly improved (20%-50%); general: symptoms did not improve significantly (< 20%); poor: no change or even worsening. Total effec-

Table 1. General data comparison of four groups (mean ± SD)

Group	n	Sex (male/female)	Age (y)	Course (y)	Pain VAS (min)
Control	20	9/11	67 ± 14	5.8 ± 3.7	7.7 ± 0.98
NB	20	9/11	63 ± 17	5.4 ± 3.8	7.8 ± 0.83
PI	20	10/10	66 ± 10	5.7 ± 4.0	7.9 ± 0.81
NB + PI	20	7/13	63 ± 13	5.3 ± 4.3	7.9 ± 1.20
F			0.680	0.080	0.105
P			0.567	0.971	0.957
Chi		0.965			
P		0.810			

Notes: NB, nerve block group; PI, point injection group; NB + PI, nerve block combined with point injection group.

Table 2. Pain VAS before and after treatment of four groups (x + S, score)

Group	n	Basal	1 week	3 weeks	3 months
Control	20	7.7 ± 0.98	4.5 ± 1.28$^{*,\#}$	3.0 ± 0.69$^{*,\#}$	2.8 ± 1.12$^{*,\#}$
NB	20	7.8 ± 0.83	3.2 ± 1.35$^{*,\#,\Delta}$	2.4 ± 0.81$^{*,\#,\Delta}$	1.4 ± 1.14$^{*,\#,\Delta}$
PI	20	7.9 ± 0.81	3.1 ± 0.76$^{*,\#,\Delta}$	2.4 ± 0.59$^{*,\#,\Delta}$	1.6 ± 1.19$^{*,\#,\Delta}$
NB + PI	20	7.9 ± 1.22	2.8 ± 0.41$^{*,\Delta}$	1.9 ± 0.75$^{*,\Delta}$	0.5 ± 0.15$^{*,\Delta}$
F		0.105	17.294	7.381	16.672
P		0.957	0.000	0.000	0.000

Notes: compared with that before treatment (the basal data) $^{*}P < 0.01$; compared with NB + PI group, $^{\#}P < 0.05$; compared with control group, $^{\Delta}P < 0.01$. NB, nerve block group; PI, point injection group; NB + PI, nerve block combined with point injection group.

tive rate = (best + good + general)/total number of cases [18].

CGRP levels: CGRP in the peripheral blood was determined before treatment and three months after treatment. The amount of CGRP was measured using the CGPR EIA Kit (Cayman Chemical Item Number 589001) following the manufacturer's instructions. Briefly, CGRP was determined by CGRP chemiluminescent EIA developed by Inaba et al. [19], and the chemiluminescent light emission of the reaction product was measured.

Statistical processing

SPSS16.0 statistical software was applied. P = 0.05 was the measurement standard. Measurement data were statistically described using chi-square test. Enumeration data were expressed as rate and compared using chi-square test. Measured data were expressed as mean ± SD and analyzed using variance analysis. After insuring the difference of data in variance analysis, S-N-K method was used for comparison between two groups. Non-normal distribution data were analyzed using non-parametric statistics or analysis of variance through the log transformation. Rate was compared using chi-square test.

Results

General information

A total of 92 patients with PHN were recruited during the enrollment period. Among them, 12 patients were excluded for various reasons, leaving 80 patients for the final analysis (**Figure 2**). There was no statistically significant difference of gender, age, duration of the disease and preoperative pain grading among four groups (P > 0.05). Subjects were in line with the equilibrium experiment principle (**Table 1**).

Pain VAS assessment

Pain VAS significantly decreased at one week, three weeks and three months after treatment in all groups (P < 0.01). Compared with control group, Pain VAS in NB, PI, NB + PI group were significantly lower at one week, three weeks and three months after treatment (P < 0.01). However, the Pain VAS in NB + PI group was significantly lower than that in NB and PI group three months after treatment (P < 0.05; **Table 2**).

According to the level of pain intensity, all patients (100%) in NB + PI group were only with mild pain or were pain-free three weeks after treatment; pain disappeared in 12 patients (60%), while the other eight were with mild pain (40%) three months after treatment. 20 (100%) patients in PI group were with mild pain three weeks after treatment; pain disappeared in five patients (25%), while the other 15 patients (75%) remained with mild pain three months after treatment. Pain disappeared completely in one patient (5%) in NB group, while the other 19 patients (95%) were only with mild pain three weeks after treatment; Pain disappeared in six patients (30%), while the other 14 patients

Table 3. Cases of pain severity of each treatment stage of four groups (percentage)

Group	Severity	Basal (%)	1 week (%)	3 weeks (%)	3 months (%)
Control (n = 20)	No pain	-	-	-	-
	Mild	-	6 (30)	17 (85)	18 (90)
	Moderate	3 (15)	14 (70)	3 (15)	2 (10)
	Severe	17 (85)	-	-	-
NB (n = 20)	No pain	-	-	1 (5)	6 (30)
	Mild	-	13 (65)	19 (95)	14 (70)
	Moderate	2 (10)	7 (35)	-	-
	Severe	18 (90)	-	-	-
PI (n = 20)	No pain	-	-	-	5 (25)
	Mild	-	14 (70)	20 (100)	15 (75)
	Moderate	2 (10)	6 (30)	-	-
	Severe	18 (90)	-	-	-
NB + PI (n = 20)	No pain	-	-	2 (10)	12 (60)
	Mild	-	20 (100)	18 (90)	8 (40)
	Moderate	3 (15)	-	-	-
	Severe	17 (85)	-	-	-

Notes: NB, nerve block group; PI, point injection group; NB + PI, nerve block combined with point injection group.

Table 4. Oral dosage of gabapentin weekly (mg/week)

Group	n	1 week	3 weeks	3 months
Control	20	5400 ± 0	3645 ± 1236$^{*,\#}$	2310 ± 646$^{*,\#}$
NB	20	5400 ± 0	2205 ± 469$^{*,\#,\Delta}$	1050 ± 1077$^{*,\#,\Delta}$
PI	20	5400± 0	2175 ± 33$^{*,\#,\Delta}$	945 ± 1072$^{*,\#,\Delta}$
NB + PI	20	5400 ± 0	1960 ± 287$^{*,\Delta}$	0 ± 0$^{*,\Delta}$
F			24.633	26.384
P			0.000	0.000

Notes: compared with that before treatment, $^{*}P = 0.000 < 0.01$; Compared with NB + PI group, $^{\#}P < 0.05$; Compared with control group, $^{\Delta}P = 0.000 < 0.01$. NB, nerve block group; PI, point injection group; NB + PI, nerve block combined with point injection group.

(70%) remained with mild pain three months after treatment. In the control group, there were 17 patients (85%) consciously with mild pain, while the other three patients (15%) still suffered from moderate pain three weeks after treatment; there were still two patients (10%) with moderate pain, and other 18 patients (90%) were with mild pain three months after treatment (**Table 3**).

Oral drug administration

Oral gabapentin and tramadol dose gradually reduced in all groups weekly, with the greatest reduction in NB + PI group ($P < 0.05$; **Tables 4** and **5**).

Symptom improvement

At three months after treatment, symptoms such as numbness, hyperalgesia, hypersensitivity, sleep disorders, anxiety, etc. were improved in all groups. At three months after treatment, there was statistically significant in symptoms improvement among four groups ($P < 0.05$). The effective rate was 80%, 95%, 95%, 100% in control, NB, PI, and NB + PI group at three months after treatment, respectively. The effect in NB + PI group was better than that in control, NB, and PI group ($P < 0.05$; **Table 6**).

CGRP level

There was no statistical significance in CGRP level among all groups before treatment ($P > 0.05$). CGRP decreased significantly at three months after treatment in all groups ($P < 0.01$). CGRP in NB + PI group was the lowest among all the groups ($P < 0.05$; **Table 7**).

Discussion

Pain is the main symptom in patients with PHN, which is always sustainable. Mostly, it is persistent spontaneous pain, intermittent sharp pain, shooting pain, and allodynia. 80%-90% of patients are with paralgesia in clinical, while some patients are even with unbearable itch [20].

It has been reported that both pathological changes of the peripheral and central nervous system [10] and the sympathetic nervous activity [11, 12] play important roles in the formation of PHN. In addition, the inflammatory mechanism is also confirmed playing an important role in the formation of PHN [21]. Axon membrane inflammatory injury can cause harmful discharge of nociceptors, which constantly stimulates the sensory neurons to release excitatory neurotransmitter to the spinal dorsal horn, leading to the sensitization in the spinal cord dorsal horn and brainstem neurons. This process is named the central sensitization. As a result, stubborn nervous pathological pain is induced. Therefore, the sympathetic

Table 5. Oral dosage of tramadol weekly (mg/week)

Group	n	1 week	3 weeks	3 months
Control	20	875 ± 310	805 ± 256$^{*,\#}$	595 ± 256$^{*,\#}$
NB	20	840 ± 287	175 ± 311$^{*,\#,\Delta}$	35 ± 156$^{*,\#,\Delta}$
PI	20	875 ± 310	210 ± 329$^{*,\#,\Delta}$	52 ± 128$^{*,\#,\Delta}$
NB + PI	20	840 ± 287	18 ± 78$^{\#,\Delta}$	0 ± 0$^{*,\Delta}$
F		0.091	34.527	60.368
P		0.965	0.000	0.000

Notes: compared with before treatment, $^{*}P < 0.05$; compared with NB + PI group, $^{\#}P < 0.05$; compared with Control group, $^{\Delta}P < 0.05$. NB, nerve block group; PI, point injection group; NB + PI, nerve block combined with point injection group.

Table 6. Therapeutic effect evaluation in 3 months follow-up of four groups (Rate, %)

Group	n	Best	Good	General	Poor	Total effective rate
Control	20	1	6	8	5	75%*
NB	20	9	8	2	1	95%*
PI	20	8	9	2	1	95%*
NB + PI	20	10	6	4	0	100%
Chi						9.237
P						0.026

Notes: compared with NB + PI group, $^{*}P < 0.05$. NB, nerve block group; PI, point injection group; NB + PI, nerve block combined with point injection group.

Table 7. Comparisons of peripheral blood levels of calcitonin gene-related peptide of 4 groups before and after treatment

Group	n	Basal	3 month
Control	20	169 ± 71.98	130 ± 59.55$^{*,\#}$
NB	20	174 ± 73.98	117 ± 42.20$^{*,\#}$
PI	20	175 ± 71.16	107 ± 43.38$^{*,\#}$
NB + PI	20	182 ± 69.27	76 ± 28.56*
F		0.124	5.327
P		0.946	0.002

Notes: compared with before treatment, $^{*}P < 0.01$; compared with NB + PI group, $^{\#}P < 0.05$. NB, nerve block group; PI, point injection group; NB + PI, nerve block combined with point injection group.

nerve block and anti-inflammatory therapy plays an important role in the treatment of PHN.

In the sympathetic nerve block treatment group, pain was significantly reduced, and sleep was improved one week after treatment. Pain VAS decreased significantly with a total effective rate at 95% three weeks after treatment. There were 13 patients (65%) characterized with mild pain, and 7 patients (35%) with moderate pain one week after treatment. At three weeks after treatment, pain in one patient (5%) disappeared completely, while the other 19 patients (95%) were only with mild pain; pain disappeared in 6 patients (30%), while the other 14 patients (70%) remained with mild pain three months after treatment. Oral dosage of gabapentin and tramadol also decreased magnificently. Results showed that the effect of sympathetic nerve block treatment of herpes zoster neuralgia was remarkable. It relieved pain obviously, and improved symptoms such as sleep disorders, anxiety and so on. Specific cellular immunity of varicella-zoster virus (ZVZ) was thought to be closely associated with the onset of HZ and PHN [22-25]. Many patients were with low immunity, and sympathetic nerve block could improve the immunity [26], so as to improve the clinical symptoms.

Jiaji Acupoint originated from the position and function of Huatuo Jiaji Acupoint of the traditional medicine [27]. From the point of main and collateral channels, Jiaji Acupoint is located in the position with the most abundant Yang. In modern anatomy, this area is thought to be near the spinal nerve and its concomitant arteriovenous, and its nerve fibers cover the area. Ganglions distribute in the vertebral spine on both sides. They joint together as sympathetic trunk with the interganglionic branches. Sympathetic nerve fibers associate with spinal nerves through communicating branches, and they distribute to the surrounding organs and viscera with the spinal nerve.

Widely distributed nerve endings, posterior branch of spinal nerve and sympathetic nerve trunk near vertebral in the tissues of the Jiaji Acupoint area constitute the neurophysiological basis of Jiaji Acupoint acupuncture effect [28]. Therefore, Jiaji Acupoint is able to cure the diseases in corresponding ganglion segment distribution area [29]. Experimental research has proved that Jiaji Acupoint acupuncture stimulates the sympathetic postganglionic fiber [30], which releases adrenaline

into the surrounding tissue and the target organ, and strongly inhibits the function of the sympathetic nervous system. Electrical stimulation of Jiaji Acupoint can restrain the incoming of pain signals directly in the spinal cord level. It can also adjust pain pathway above the spinal cord. Its influence on content of monoamines neurotransmitter shows that its analgesic effect is associated with inhibition of autonomic nervous system activity [31]. In recent years, it was observed in clinical that electrical acupuncture in Jiaji Acupoint could increase the content of serum beta-endorphin [32, 33].

Previous research [16] has preliminarily validated the effectiveness of Jiaji Acupoint injection of Salvia Miltiorrhiza-extract. It was also found that it has better curative effects for sleep disorders and anxiety etc. than medication alone, while no obvious adverse reactions were observed. This may be consistent with the compendium of *Diannan Bencao*, that Salvia Miltiorrhiza possesses the function of calming nerves and nursing heart. Salvia Miltiorrhiza can also remove the agitated mind, insomnia and anxiety disorders.

In this experiment, pain VAS in the Jiaji Acupoint injection of Salvia Miltiorrhiza-extract group decreased dramatically at one week and three weeks after treatment, with a total effective rate at 95%. At one week after treatment, 14 patients (70%) characterized with mild pain, while 6 patients (30%) was with moderate pain; all patients were with mild pain three weeks after treatment; pain disappeared in 5 patients (25%), while the other 15 patients (75%) remained with mild pain three months after treatment. Oral dosage of gabapentin also decreased from the original 5400 ± 0 to 945 ± 1072 mg/week, and oral dose of tramadol decreased from 875 ± 310 to 52 ± 128 mg/week. These results showed that the Jiaji Acupoint was effective in relieving pain in the treatment of PHN. Its curative effect was equivalent with that in the sympathetic nerve block group. Jiaji Acupoint injection of Salvia Miltiorrhiza-extract is more suitable for diabetes patients that can not bear hormonal medications.

In this experiment, the Pain VAS in the combination treatment group decreased from 7.9 ± 1.22 to 2.8 ± 0.41 in one week after treatment. There was significant difference compared with the control group. And there was statistically significant difference in Pain VAS three months after treatment compared with that in sympathetic nerve block group and Jiaji Acupoint injection of Salvia Miltiorrhiza-extract group. The difference in clinical symptoms improvement was also statistically significant three months after treatment, so was the decrease of oral dosage of gabapentin and tramadol. And the latter showed that all patients in the combination treatment group no longer needed to rely on oral medication after three weeks. Compared with the other three groups, the combination treatment of sympathetic nerve block with Jiaji Acupoint injection of Salvia Miltiorrhiza-extract possesses the advantage of rapid onset, high effectiveness and best long-term effect. The change of another index in the study, the peripheral blood levels of CGRP before and after treatment also confirmed this conclusion.

CGRP is one of the main neural active substances in peripheral pain signals. It widely exists in the various parts of the body including the central and peripheral nervous system. Fu et al. [34] found that the substance P and CGRP expression in dorsal root ganglion significantly increased with sciatic nerve injury in mice. These neuropeptides were considered to be the evaluation index of peripheral nerve injury. These findings suggested that the combination of Jiaji Acupoint injection of Salvia Miltiorrhiza-extract with sympathetic nerve block could significantly reduce the pain and improve the hyperalgesia in PHN patients. This may involve the reduction of the dorsal root ganglion CGRP releasing to central, leading to the decrease of the synthesis of CGRP in the spinal cord dorsal horn.

However, there are still some limitations in this study. For example, the sample size is not large enough, and the objective evaluation index of pain used is only CGRP. Therefore, in further study, larger sample size and a more objective evaluation index is required to confirm the proposal.

It has been confirmed that nerve-endocrine-immune network is an important part in the mechanism of acupuncture, and the nervous system especially plays a leading role, while endocrine and immune system participate in

adjustment. Modern research has proved that the main and collateral channels possess sensing function, which is similar to the nerve conduction function, indicating nervous system and the main and collateral channels system have a close relationship. Therefore, the Jiaji Acupoint cannot be simply viewed as a singular Acupoint, it should be studied with the overall concept of the nervous system and the main and collateral channels. In this research, Jiaji Acupoint injection was efficiently combined with nerve block, improving the clinical treatment effect of PHN through nerve stimulation and nerve-endocrine-immune network.

Combination treatment method also minimized the dosage of triamcinolone acetonide at the same time. Studies have shown that this dosage was in the normal range of physiological hormone, and it did not produce side effects, thus reducing the resistance to hormone. But the operation should be conducted by experienced doctors. The medicine should be suctioned repeatedly, making sure there is no blood or cerebrospinal fluid before administration.

Conclusion

In conclusion, all these results indicate that Jiaji Acupoint injection of Salvia Miltiorrhiza-extract combined with SNB has advantages of rapid onset, high effectiveness, and best long-term effect in treatment of PHN.

Acknowledgements

This work was financially supported by the Funding Project of Health and Family Planning Commission of Huangpu District, Shanghai (HKW201602001).

Disclosure of conflict interest

None.

Address correspondence to: Zhijun Lu, Department of Anesthesiology, Ruijin Hospital, Luwan Branch, Shanghai Jiaotong University School of Medicine, No. 149 Chongqing South Road, Shanghai 200020, China. Tel: +86-021-68383204; Fax: +86-021-63730455; E-mail: luzhijun_rj@163.com; Haibin Wang, Department of Anesthesiology, North Branch of Ruijin Hospital, Shanghai Jiaotong University School of Medicine, No.845 Lingshan Road, Shanghai 201800, China. Tel: +86-021-20284500; Fax: +86-021-58394262; E-mail: wanghaibinrj@126.com

References

[1] Harpaz R, Nagel MA, Schmader K, Tyring SK and Yawn BP. Roundtable on postherpetic neuralgia--what, why, how long, and what's next? Popul Health Manag 2012; 15: 385-390.

[2] Reda H, Greene K, Rice FL, Rowbotham MC and Petersen KL. Natural history of herpes zoster: late follow-up of 3.9 years (n = 43) and 7.7 years (n = 10). Pain 2013; 154: 2227-2233.

[3] Tontodonati M, Ursini T, Polilli E, Vadini F, Di Masi F, Volpone D and Parruti G. Post-herpetic neuralgia. Int J Gen Med 2012; 5: 861-871.

[4] Watson P. Postherpetic neuralgia. Am Fam Physician 2011; 84: 690-692.

[5] Massengill JS and Kittredge JL. Practical considerations in the pharmacological treatment of postherpetic neuralgia for the primary care provider. J Pain Res 2014; 7: 125-132.

[6] Fashner J and Bell AL. Herpes zoster and postherpetic neuralgia: prevention and management. Am Fam Physician 2011; 83: 1432-1437.

[7] Drolet M, Brisson M, Levin MJ, Schmader KE, Oxman MN, Johnson RW, Camden S and Mansi JA. A prospective study of the herpes zoster severity of illness. Clin J Pain 2010; 26: 656-666.

[8] Pickering G and Leplege A. Herpes zoster pain, postherpetic neuralgia, and quality of life in the elderly. Pain Pract 2011; 11: 397-402.

[9] Argoff CE. Review of current guidelines on the care of postherpetic neuralgia. Postgrad Med 2011; 123: 134-142.

[10] Kanbayashi Y, Matsumoto Y, Kuroda J, Kobayashi T, Horiike S, Hosokawa T and Taniwaki M. Predicting risk factors for varicella zoster virus infection and postherpetic neuralgia after hematopoietic cell transplantation using ordered logistic regression analysis. Ann Hematol 2017; 96: 311-315.

[11] Lovick TA. Autonomic control of sensory responsiveness. Proc Finn Dent Soc 1989; 85: 415-419.

[12] Sato J and Perl ER. Adrenergic excitation of cutaneous pain receptors induced by peripheral nerve injury. Science 1991; 251: 1608-1610.

[13] Klompas M, Kulldorff M, Vilk Y, Bialek SR and Harpaz R. Herpes zoster and postherpetic neuralgia surveillance using structured electronic data. Mayo Clin Proc 2011; 86: 1146-1153.

[14] Sacks GM. Unmet need in the treatment of postherpetic neuralgia. Am J Manag Care 2013; 19: S207-213.

[15] Dworkin RH, O'Connor AB, Kent J, Mackey SC, Raja SN, Stacey BR, Levy RM, Backonja M, Baron R, Harke H, Loeser JD, Treede RD, Turk DC and Wells CD. Interventional management of neuropathic pain: NeuPSIG recommendations. Pain 2013; 154: 2249-2261.

[16] Li LP, Zhu C and Ding XY. Curative effect observation of acupuncture injection treatment of post herpes zoster neuralgia. J Shanghai Acup Mag 2013; 32: 903-905.
[17] Fugh-Berman A. Herb-drug interactions. Lancet 2000; 355: 134-138.
[18] Wu BS and Ni JX. Therapeutic effect of neurotropin by continuous edipural injection inthe treatm ent of posti-ierpetic neuralgia. Chin J Pain Med 2008; 14: 141-144.
[19] Inaba N, Shibata M, Onodera S, Tanaka M, Suzuki T, Kase N and Yamaura T. Capsaicin-induced calcitonin gene-related peptide release from isolated rat stomach measured with a new chemiluminescent enzyme immunoassay. Jpn J Pharmacol 1996; 72: 223-229.
[20] Oaklander AL. Mechanisms of pain and itch caused by herpes zoster (shingles). J Pain 2008; 9: S10-18.
[21] Bennett GJ and Watson CP. Herpes zoster and postherpetic neuralgia: past, present and future. Pain Res Manag 2009; 14: 275-282.
[22] Malavige GN, Jones L, Black AP and Ogg GS. Rapid effector function of varicella-zoster virus glycoprotein I-specific CD4+ T cells many decades after primary infection. J Infect Dis 2007; 195: 660-664.
[23] Oxman MN. Herpes zoster pathogenesis and cell-mediated immunity and immunosenescence. J Am Osteopath Assoc 2009; 109: S13-17.
[24] Sanford M and Keating GM. Zoster vaccine (Zostavax): a review of its use in preventing herpes zoster and postherpetic neuralgia in older adults. Drugs Aging 2010; 27: 159-176.
[25] van der Heiden PL, de Boer R, van der Steen DM, Kester MG, van der Hoorn MW, Haarman WM, Barnby-Porritt HE, Fry JW, Napper CE, Marijt EW, Willemze R, Falkenburg JH and Heemskerk MH. Identification of varicella-zoster virus-specific CD8 T cells in patients after T-cell-depleted allogeneic stem cell transplantation. J Virol 2009; 83: 7361-7364.
[26] Xie HH and Wen N. Clinical observation of reinforcing and reducing technique at Jiaji and ashi points for post-herpetic neuralgia. Beijing J Tradit Chin Med 2013; 1: 008.
[27] Liu Y, Xu M, Che X, He J, Guo D, Zhao G, Zhang G, Zhang S, Kang K, Zhang C, Wang Y, Li S, Zhang Q, Xu L, Zhang M, Han B, Jing Y and Zhang N. Effect of direct current pulse stimulating acupoints of jiaJi (T10-13) and ciliao (BL 32) with Han's acupoint nerve stimulator on labour pain in women: a randomized controlled clinical study. J Tradit Chin Med 2015; 35: 620-625.
[28] Li LP, Gu MH, Gu WD and Zhang FJ. The sympathetic nerve block treatment of post herpes zoster neuralgia. Shanghai Med J 2013; 36: 517-519.
[29] Ni XL. Treatment of 48 cases of herpes zoster by puncturing nerve stem. J Acupunc Tuina Sci 2008; 6: 368-369.
[30] Jiang G, Jia C and Lin M. Effect of bloodletting therapy at local myofascial trigger points and acupuncture at Jiaji (EX-B 2) points on upper back myofascial pain syndrome: a randomized controlled trial. J Tradit Chin Med 2016; 36: 26-31.
[31] Liu RF and Jiang YM. Acupuncture analgesia mechanism discussion of Huatuo Jiaji acupoint. Trad Chin Med Based Med J 2008; 14: 943-947.
[32] Peng LH, Chen JM and Wang Y. Correlation analysis of effect of warm acupuncture at Jiaji acupoint in the treatment of lumbar intervertebral disc protrusion and beta-endorphin level. Vis Doc Seek Med 2013; 11: 122-124.
[33] Zhang H, Wang J and Chen XY. Analgesic effect of electricity on adjuvant arthritis rats and the effects of endorphins. J Qingdao Univ School Med 2010; 46: 390-392.
[34] Fu C, Yin Z, Yu D and Yang Z. Substance P and calcitonin gene-related peptide expression in dorsal root ganglia in sciatic nerve injury rats. Neural Regen Res 2013; 8: 3124-3130.