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Long-Term Follow-Up of Jiao's Scalp Acupuncture in Cervical Spinal Cord Injury: A Case Report on Sustained Motor Recovery and Spasticity Management

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ABSTRACT

Objective: *To report the long-term follow-up outcomes of Jiao's scalp acupuncture in a patient with cervical spinal cord injury, with emphasis on spasticity control and sustained functional recovery following an initial phase of improvement.*

Methods: *This case represents a continuation of a previously reported patient with traumatic cervical spinal cord injury who underwent integrative acupuncture therapy. In the present follow-up phase, the treatment strategy was refined to emphasize scalp acupuncture targeting the Motor Area and Tremor Control Area, combined with auricular and body acupuncture. Treatments were administered once weekly over a six-month period.*

Results: *During this follow-up phase, progressive neurological and functional improvements were observed. Involuntary limb spasms decreased after 2–3 sessions. By sessions 6–8, the patient regained ambulation without assistive devices, and by session 12, independent walking under supervision was achieved. Within two months, improvements in muscle tone, joint range of motion, and functional mobility were noted. Muscle strength improved from 1/5 to 4/5 on the Medical Research Council (MRC) scale.*

Conclusion: *This follow-up report suggests that Jiao's scalp acupuncture may contribute not only to initial neurological recovery but also to long-term maintenance and modulation of motor function in patients with chronic cervical spinal cord injury. Further studies are warranted to investigate its role in sustained neurorehabilitation.*

Keywords

Jiao's Scalp Acupuncture, Cervical spinal cord injury, Paralysis, Quadriplegia, Neurological rehabilitation.

Case History

A male patient in his late 40s sustained a traumatic cervical spinal cord injury following head trauma, resulting in quadriplegia. After several years of conventional medical management, including surgical intervention and rehabilitation therapy, the prognosis for independent ambulation remained poor.

Following the previously reported initial acupuncture treatment phase at the teaching clinic of the New York College of Traditional Chinese Medicine. The patient regained partial motor function and

was able to ambulate with assistive devices. However, persistent involuntary muscle spasms involving all four extremities continued to interfere with coordinated movement and functional mobility.

History of Present Illness

At the time of evaluation, the patient was diagnosed with American Spinal Injury Association (ASIA) Impairment Scale level C cervical spinal cord injury [1], accompanied by persistent muscle spasms and post-injury quadriplegia. Additional medical conditions included pneumonia sequelae, diaphragm dysfunction, neuromuscular bladder dysfunction, difficulty walking, and generalized muscle weakness. Neurological examination showed cranial nerves II–XII grossly intact, with the patient awake, alert, and oriented to person, time, and place. Cardiovascular examination revealed regular S1 and S2 heart sounds with normal rate and rhythm. The neck was supple with the trachea in the midline and no pathological reflexes observed.

Normocephalic and atraumatic. Pupils equal, round, and reactive to light and accommodation. No septal deviation. No gingival swelling or bleeding.

Motor examination demonstrated antigravity strength in both hips and upper extremity strength graded at 2–3/5, with hyperreflexia throughout. The patient required maximal assistance for activities of daily living (ADL) and wheelchair mobility. Sensory testing revealed that most bilateral dermatomes were within normal limits except for the **r**ight L5 and S1 dermatomes, where abnormalities were detected. There was unilateral loss of temperature sensation on the right side, while sensation remained normal on the left. No clubbing, cyanosis, or edema was noted. Based on Western medical evaluation, the prognosis indicated that the patient would **remain** wheelchair-dependent and was unlikely to regain independent ambulation.

Past Western Medical Treatment

Prior to initiating acupuncture therapy, the patient received conventional Western rehabilitation management, including physical therapy and occupational therapy, focusing on activities of daily living (ADL) training and gait rehabilitation.

TCM Assessment

Chief Complaint

Quadriplegia following cervical spinal cord injury for 5 years. The patient presents with immobility of all four limbs accompanied by dull, pervasive pain. Persistent contraction of the hand muscles previously resulted in a fist-like posture that prevented object grasping; however, after the first phase of treatment, the patient regained the ability to open the hands. Frequent spasms occur in both the upper and lower extremities and are exacerbated by vigorous stretching attempts.

Tongue

Pale-red tongue with a thin white coating. The bilateral areas corresponding to the Liver and Gallbladder regions appear slightly depressed, and the tongue body is thin.

Pulse

Slippery and weak bilaterally.

TCM Diagnosis

Wei-Flaccid Syndrome

TCM Pattern Differentiation

Qi and Blood deficiency with channel obstruction secondary to traumatic injury.

Treatment Plan

During the **c**urrent phase of treatment, the patient has been undergoing Jiao's Scalp Acupuncture therapy for six months, with treatment primarily targeting the Motor Zone and Tremor Control Zone to address persistent involuntary spasms affecting all four extremities. Auricular stimulation and traditional body acupuncture were incorporated as adjunctive therapies. Treatments were administered once weekly, with each session lasting approximately 50 minutes.

Throughout the treatment course, changes in muscle tone, mobility, and range of motion were carefully monitored.

The protocol incorporated precise needle manipulation coordinated with limb movements and assisted walking exercises**,** aiming to reduce limb stiffness and muscle spasms while promoting neuromuscular activation. The treatment strategy was individualized according to the patient's clinical presentation, with the therapeutic goal of promoting the circulation of Qi and Blood and addressing Wei Syndrome.

Acupuncture point selection integrated Jiao's scalp acupuncture, auricular acupuncture, and traditional body acupuncture. This combined approach was designed to facilitate neurological recovery and functional rehabilitation.

Overall, the targeted treatment plan aimed to address the underlying pathophysiological mechanisms of cervical spinal cord injury, improve motor function, reduce spasticity, and ultimately enhance the patient's ability to walk independently.

Treatment

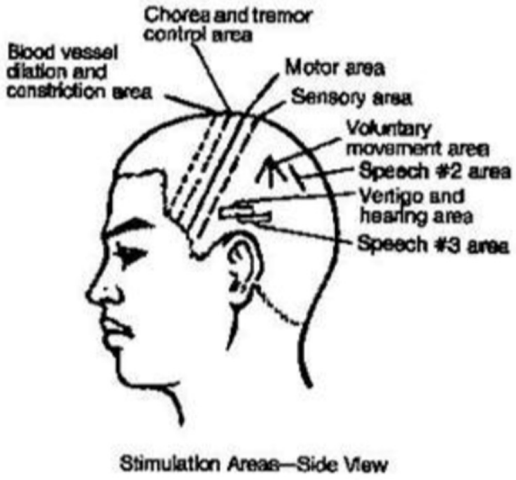
Jiao's Scalp Acupuncture

In this case, treatment primarily targeted the Motor Zone, Sensory Zone, Foot Motor-Sensory Zone and Chorea-Tremor Control Zone. These areas were selected to improve motor function, sensory perception while reducing spasm in both upper and lower limbs.

Location And Indication Of Stimulation Zone

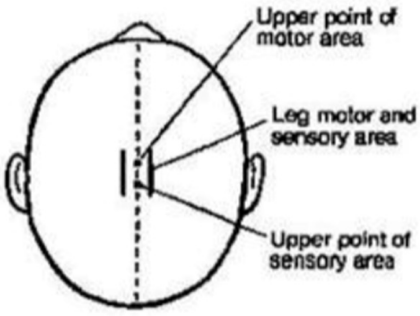
The location of the Sensory Zone, Motor Zone, Chorea-Tremor Control Zone, and Foot Motor-Sensory Zone, (see Figures 1-3).

Figure 1



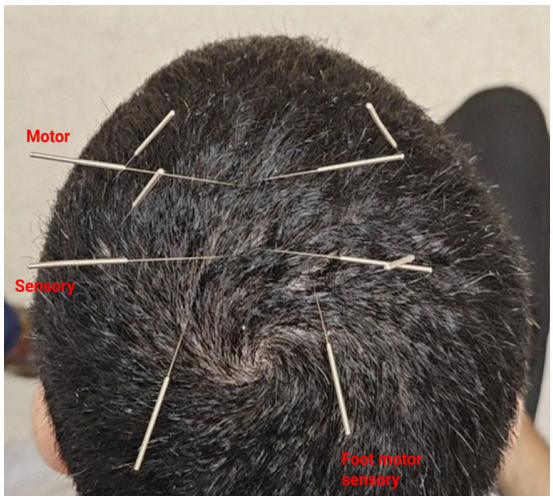
Stimulation Areas—Side View

Figure 2



Stimulation Areas—Top View

Figure 3



Traditional Acupuncture Points Used

The treatment protocol began with either the Four Gates (Hegu LI 4 and Taichong LR 3) or activation of the Governor Vessel using Houxi (SI 3) and Shenmai (BL 62) [2]. This was followed by tonification of Qi and Blood through the use of Zusanli (ST 36), Sanyinjiao (SP 6), Yinlingquan (SP 9), and Xuehai (SP 10), Additional points including Fengchi (GB 20) and Fengshi (GB 31), were selected to dispel wind and alleviate spasm, and were combined with Ashi points as needed.

For auricular acupuncture, the main points used included Shenmen, Endocrine, Shoulder, Spine, Knee, Elbow, Liver, Kidney, Lumbar, Thorax, and Cervical Vertebrae [3].

The selection of points aimed to regulate Qi and Blood circulation, reduce spasticity, and promote functional recovery of the limbs.

Treatment Result

The early functional improvements observed during the initial phase have been reported previously [4]. The current report focuses on the subsequent phase of treatment and long-term functional outcomes. After the first phase of treatment, the patient regained the ability to ambulate with a wheeled walker. The second phase of treatment commenced in September 2025, focusing on further improvement in motor function and reduction of limb spasticity.

Progressive neurological and functional improvements were observed during the second phase treatment period beginning in September 2025.

A noticeable reduction in involuntary tremors of the extremities occurred after 2–3 treatment sessions. During the early part of the follow-up phase, continued improvements in ambulation were observed, with the patient gradually progressing toward independent walking.

Within two months, improvements in muscle tone, joint range of motion, and overall functional mobility were documented. According to the Medical Research Council (MRC) scale, muscle strength of the quadriceps and tibialis anterior improved significantly from grade 1/5 to grade 4/5 [5]. Hand spasticity was significantly reduced, enabling the patient to open the hand and perform basic grasping movements.

PROGNOSIS

The prognosis is favorable. There is strong potential for continued improvement of the patient's primary symptoms without surgical intervention. Future treatment will continue to integrate scalp acupuncture, auricular acupuncture, and traditional body acupuncture techniques to further improve limb mobility, enhance range of motion and flexibility, and reduce muscle spasticity, ultimately enabling the patient to ambulate confidently without concern for recurrent leg spasms.

RE-EVALUATION

Region	Movement	Before (MRC)	After (MRC)
Arm	Shoulder Extension	1/5	3/5
	Elbow Flexion	1/5	4/5
	Elbow Extension	1/5	3/5
	Wrist Flexion	1/5	4/5
	Wrist Extension	1/5	3/5
Leg	Hip Extension	1/5	3/5
	Knee Extension	1/5	4/5
	Knee Flexion	1/5	4/5
	Foot Dosiflexion	1/5	3/5
	Foot Plantar Flexion	1/5	4/5

Discussion

Unlike the initial report, which emphasized early neurological recovery, the present follow-up highlights the role of acupuncture in long-term modulation of spasticity and functional stabilization. Jiao's scalp acupuncture, developed by Dr. Jiao Shunfa in 1971 [6], is a specialized acupuncture technique that targets functional areas of the cerebral cortex. The scalp is divided into 14 therapeutic zones, each corresponding to specific neurological and functional systems. It is widely applied in the management of neurological disorders and central nervous system dysfunction, particularly in conditions involving motor impairment, paralysis, and sensory deficits [7,8].

In this case, the therapeutic approach aimed to enhance neural activation, improve limb coordination, and facilitate functional recovery following cervical spinal cord injury. The observed clinical improvements—including enhanced motor function, increased muscle strength, reduced spasticity, and improved ambulation—may be associated with neuroplastic changes and cortical reorganization induced by scalp acupuncture stimulation.

Acupuncture has been shown to promote neuroplasticity through modulation of neurotrophic factors such as brain-derived neurotrophic factor (BDNF) and nerve growth factor (NGF), as well as through functional brain reorganization [9]. Experimental studies further demonstrate that acupuncture facilitates neurogenesis, synaptic plasticity, and angiogenesis, contributing to neurological recovery [10]. In addition, recent clinical evidence suggests that acupuncture enhances dendritic remodeling and synapse formation, thereby improving motor function outcomes [11].

These findings suggest that Jiao's scalp acupuncture may be a beneficial adjunctive therapy for patients with chronic cervical spinal cord injury, particularly those with limited response to conventional rehabilitation. However, due to the limitations of a single-case report, further controlled studies with larger sample sizes are warranted to better define its efficacy and underlying mechanisms within integrative neurorehabilitation.

Conclusion

Jiao's scalp acupuncture may serve as an effective complementary therapy in improving motor function and reducing spasticity in patients with cervical spinal cord injury.

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