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Cerebral Hemorrhage Absorption Following Acupuncture Intervention: A Case Report

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Abstract: Intracerebral hemorrhage (ICH) is a devastating type of stroke that occurs worldwide. Previous experimental studies reported that the neuronal destruction involved in ICH-induced brain injury included the primary injury caused by hematoma occupying and the secondary injury caused by hematoma degradation products. Conventional Western medical treatment typically applies a combination of medication and surgery, which reduces mortality but fails to achieve desired outcomes in post-operative rehabilitation at any time. This report presented a case of cerebral hemorrhage, whose hematoma and accompanying symptoms were significantly absorbed and alleviated, respectively, after receiving an acupuncture treatment.

1. Key clinical message

This case highlights the potential of acupuncture as an adjunctive treatment for intracerebral hemorrhage (ICH), showing significant absorption of hematoma and alleviation of symptoms, suggesting acupuncture's role in enhancing post-stroke recovery and rehabilitation.

2. Background

Intracerebral hemorrhage (ICH) is non-traumatic that results from rupture of blood vessels in the brain and causes blood accumulation in the brain parenchyma. It has a high incidence that ranks second only to ischemic stroke among various subtypes of stroke. Primary principles of treatment include measures to keep patients quiet, stabilize blood pressure, prevent rebleeding, appropriately lower intracranial pressure while preventing cerebral edema, maintain water-electrolyte balance,

stabilize blood sugar and temperature, enhance airway management and care, prevent and manage various intracranial and systemic complications. Besides medical management, surgical intervention plays a vital role in managing hypertensive hemorrhagic stroke, attributed to its high efficacy in hematoma evacuation, alleviation of intracranial pressure, and relief of mechanical compression.

Acupuncture is a non-invasive treatment that has been widely used in China for treatment of stroke. Recent studies reported several positive effects of acupuncture in cases with secondary injuries after ICH. For example, acupuncture can suppress inflammatory responses, decrease cerebral edema, inhibit apoptosis, activate autophagy, reduce ferroptosis, alleviate oxidative stress, promote neuroregeneration, improve cerebral circulation, and modulate neurotransmitter levels [1]. Our studies confirmed that acupuncture method had great advantages over Chinese herbal medicine and Western medicine (WM) approaches in the treatment of stroke, related complications and sequelae

3. Case Report

On June 4, 2024, a 71-year-old man was admitted to a tertiary hospital in Tianjin for 3-hour left limb motor deficit and speech impairment without obvious cause. Head computed tomography (CT) showed a high-density shadow in the right basal ganglia (blood loss: about 10 ml).

Felodipine and glycerol fructose dehydration were administrated to lower blood pressure and intracranial pressure, respectively; Pantoprazole was given to suppress stomach acid secretion and then protect digestive tract mucosa; symptomatic supportive treatment such as potassium citrate potassium supplementation. Head CT on June 5, 2024 showed a larger hematoma in the right basal ganglia (blood loss: about 25 ml). Tranexamic acid was used to stop bleeding, and cerebral blood-thinning oral solution was administrated to improve circulation. The patient developed dysphagia, and a lower gastric tube was placed. Head CT on June 6, 2024 showed a hematoma in the right basal ganglia, consistent with the before.

After 5 days of hospitalization, the patient suffered expectoration and pain in both feet. Mechanically assisted expectoration was performed. Ambroxol and budesonide were given to dissolve sputum. Benzbromarone was excreted with uric acid. Head CT on June 11, 2024 showed changes in the absorption of the hematoma in the right basal ganglia, lacunar foci in the pontine, right thalamus and left basal ganglia, cerebral atrophy, and right ethmoid sinus opacification. The patient has a history of hypertension and cerebral infarction, and the specific treatment drugs were unknown. In order to seek a TCM treatment, the patient presented at our hospital on June 12, 2024. The patient was in a drowsy state, but when he received external stimulation, he would become alert.. Presentations include discomfort of the left limb, red, swollen, hot and painful left toe. He had difficulty drinking water, occasionally coughed and produced sputum.

4. Physical Examination

Physical examination reported speech difficulties, a flattened right nasolabial fold, tongue

deviation toward the left, normal bilateral muscle tone, Grade 0 left upper and lower limb muscle strength, Grade V right upper and lower limb muscle strength, diminished superficial sensation in the left limbs, a left Babinski sign (±), uncoordinated (left) and clumsy (right) movements. No signs of meningeal irritation were noted.

Based on these presentations, the patient was diagnosed with basal ganglia hemorrhage with a WM diagnosis.

5. Treatment Intervention

During hospitalization, the patient did not receive any drug for dissipating blood stasis. Instead, acupuncture treatment was performed once daily based on his symptoms and diagnosis.

5.1 Acupuncture Strategy

5.1.1 Scalp Acupuncture

Table 1 Acupoints

Acupoints	Location	Acupoints	Location
Baihui (GV20)	At the vertex, at the junction of a line connecting the apex of the ears and the midline, 5 inches behind the anterior hairline.	**Binao (LI14)**	On the radial side of the humerus, superior to the lower end of deltoid muscle, 7 inches proximal to Quchi LI11.
Hegu (LI4)	Between the 1st and 2nd metacarpal bones, approximately in the middle of the 2nd metacarpal bone on the radial side.	**Quchi (LI11)**	In the depression at the lateral end of the cubital crease, midway between Chize LU5 and the lateral epicondyle of the humerus.
Chengling(GB18)	On the head, 4 inches posterior to the anterior hairline, 1 inch anterior and 2.25 inch lateral to Baihui GV20.	**Waiguan (TE5)**	2 inches above Yangchi TB4 at the dorsal distal wrist joint space, between the radius and ulna.
Zhengying(GB17)	On the head, 2.5 inches posterior to the anterior hairline, 1 inch posterior to Muchuang GB16.	**Qianding(GV21)**	On the midline, 3.5 inches posterior to the anterior hairline.
Fengchi (GB20)	In the posterior aspect of the neck, below the	**Yanglingquan(GB34)**	In the depression anterior and inferior to the head of the fibula.

	occipital bone, in the depression between the upper portion of sternocleidomastoid and trapezius muscle.		
Fengfu (DU16)	Directly below the external occipital protuberance, in the depression between the origins of the trapezius muscle.	**Zusanli (ST36)**	3 inches below Dubi ST35, 1 finger breadth lateral to the anterior crest of the tibia, on the tibialis anterior muscle.
Yifeng (TE17)	Posterior to the lobule of the ear, in the depression between the mandible and mastoid process.	**Jinjin (EX-HN12)**	Below the tongue, on the left lingual vein side of the frenulum.
Taichong (LR3)	On the dorsum of the foot, between the 1st and 2nd metatarsal bones, in the depression proximal to the metatarsophalangeal joints and the proximal angle between the two bones.	**Yamen (GV15)**	On the back of the neck, 0.5 inch directly above the midpoint of the posterior hairline, below the spinous process of 1st cervical vertebrae (C1).
Yuye(EX-HN13)	Below the tongue, on the right lingual vein side of the frenulum.	**Juquan (EX-HN10)**	In the center of the tongue body when it is extended to the maximum.
Lianquan (CV23)	On the anterior midline of the neck, above the Adm's apple, in the depression at the upper border of the hyoid bone.	**Jialianquan**	In the anterior cervical area, above the Adam's apple, the upper edge of the hyoid bone is 1 inch in the depression and 1 point on the left and right.

1) Midline: From the Baihui acupoint to the Qianting acupoint, at a depth of 1.5 inches (Table 1).

2) Lateral Line: From the Chengling acupoint to the Zhengying acupoint, 2.25 inches lateral to the midline, at a depth of 1.5 inches (Table 1).

3) Diagonal Line 1: From the Baihui acupoint downwards at a 45-degree angle, at a depth of 1.5 inches (Table 1).

4) Diagonal Line 2: From the Chengling acupoint downwards and outward at a 45-degree angle, at a depth of 1.5 inches (Table 1).

5.1.2 Body Acupuncture

Acupoints included bilateral Fengchi, Yifeng, and Yamen; Shouzhong, Quchi, Waiguan, Hegu, Sihuan, Zusanli, Yanglingquan, Taichong, Yongquan, Jinjun, Yuye, and Juquan on the affected side (Table 1).

5.2 Acpuncture Procedure

Disposable sterile acupuncture needles (0.25 * 40 mm; Wujiang City Cloud & Dragon Medical Device Co., Ltd., China) were used. The patient was placed in a supine position for both scalp and body acupuncture procedures. Acupuncture was performed by an acupuncturist following routine disinfection.

5.2.1 Scalp Acupuncture

A needle was inserted on the midline, from the Baihui acupoint horizontally toward the Qianting acupoint. Another needle was inserted on the lateral line, horizontal from the Chengling acupoint to the Zhengying acupoint. Two more needles were inserted at a 45-degree angle from the Baihui acupoint and the Chengling acupoint, respectively. All needles were inserted with a small amplitude within about 30 s, and placed at a depth of approximately 30 mm. All needles were manipulated with lifting, thrusting, and rotating, with a larger amplitude. The patient was encouraged to move his left limbs while the needles were inserted, such as alternative left upper-limb movements, hand opening and closing, and finger pinching. The scalp needles were alternatively used on the affected and opposite sides, and were retained for a duration of 30 min before being carefully removed.

5.2.2 Body Acupuncture

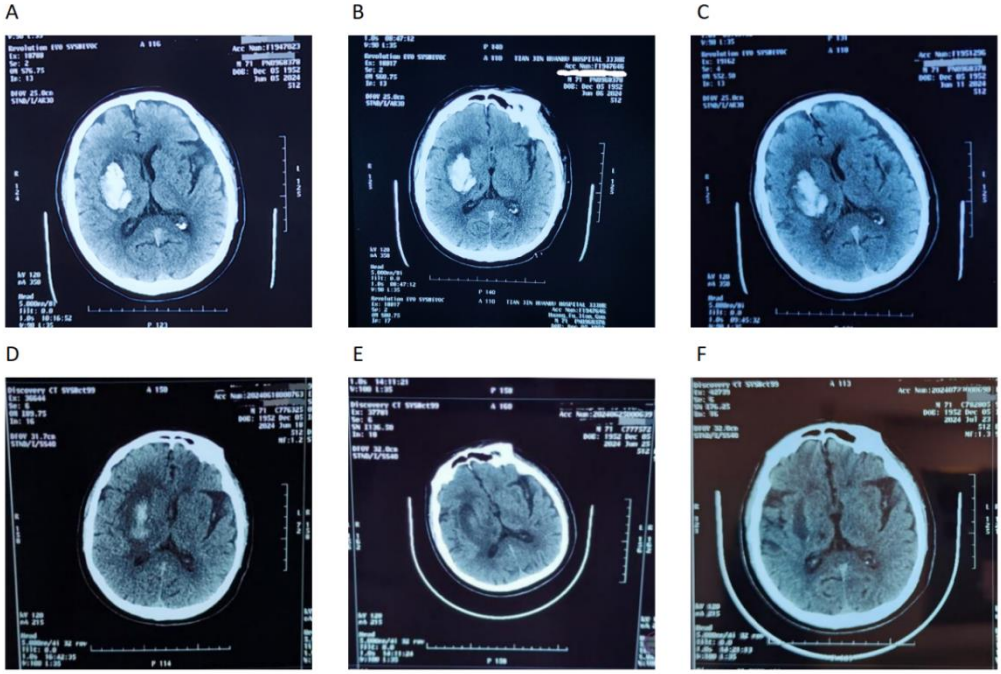
Acupoints for body acupuncture were selected with the effect of eliciting de qi. The Fengchi acupoint was inserted at a depth of about 1.2 inches, toward the nose tip. The Yamen acupoint was inserted at a depth of 1 inch, toward the jaw. The Jinjun and Yuye acupoints were inserted superficially with 5-10 needle punctures, without retention. The Lianquan and the adjacent acupoints were obliquely inserted at a depth of 0.5-0.8 inches, toward the root of the tongue. The Fengchi, Taichong, Hegu, and Waiguan acupoints were directly inserted at a depth of approximately 0.5-1 inches. The Zusanli and Yanglingquan acupoints were directly inserted at a depth of about 1-1.5 inches and manipulated with tonifying and dispersing, retained for 30 min.

6. Efficacy Evaluation

6.1 Imaging Findings

Head CT images of the patients who were treated by Western medicine in another hospitals in Tianjin on the 2th, 3th, and 8th days, and we also provide the head CT images on the 7th, 14th, and 42th days after the patient's treatment in our hospital(Figure 1).

During the initial onset, a head CT scan (June 4, 2024) that was performed in a tertiary hospital in our city found a high-density area in the right basal ganglia, with perilesional edema and a mass effect (blood loss: approximately 10 ml). The CT scan on June 5, 2024 showed an increased hematoma in the right basal ganglia (blood loss: about 25 ml), along with lesions in the pontine, right thalamus and left basal ganglia, and signs of cerebral atrophy (Figure 1A). The CT scan on June 6, 2024 indicated a hematoma in the right basal ganglia (blood loss: approximately 25 ml), consistent with last check (Figure 1B). The CT scan on June 11, 2024 changes in the absorption of the hematoma in the right basal ganglia (volume approximately 22 ml), lesions in the pontine, right thalamus and left basal ganglia, cerebral atrophy, and right ethmoid sinus opacification (Figure 1C). In order to seek further diagnosis and treatment, the patient presented at our hospital on June 12, 2024. Based on the CT image on June 11, 2024, acupuncture was administrated for 7 days. The CT scan on June 18, 2024 displayed significant absorption of the hematoma (volume approximately 5.5 ml), with a reduced density (Figure 1D). The CT scan on June 25, 2024 indicated a marked decrease in the hematoma (volume around 0.8 ml), with a lower density and a blurred margin (Figure 1E). Perilesional edema and mass effect were gradually alleviated (Figure 1E). The CT scan on July 23, 2024 showed complete absorption of the hematoma in the right basal ganglia, with evidence of infarctions and softening in the brainstem, bilateral thalamus, and bilateral basal ganglia regions, bilateral periventricular white matter ischemic changes, cerebral atrophy and arteriosclerosis .



(Figure 1A: The CT scan on June 5, 2024, Figure 1B: The CT scan on June 6, 2024, Figure 1C: The CT scan on June 11, 2024, Figure 1D: The CT scan on June 18, 2024 Figure 1E: The CT scan on June 25, Figure 1F: The CT scan on July 23)

Figure 1 Head CT images.

7. Discussion

Despite significant advancements in our knowledge of the etiology, pathophysiology, acute treatment and prevention of ICH in recent years, there is still a need for improvement in clinical outcomes [2]. ICH has three main pathophysiological stages: (1) artery rupture and hematoma formation; (2) hematoma expansion; (3) perilesional edema. The rate of neurological recovery after ICH depends on the absorption rate of hematoma, the rate of edema reduction, and neuronal survival. The release of cytokines from microglia after ICH can directly damage cellular components of the central nervous system, leading to increased edema, while the increased edema is directly related to worsened neurological function and prognosis [3]. Currently, surgical hematoma evacuation has shown apparent effects, but its long-term impact on rehabilitation remains uncertain. Acupuncture, a non-invasive therapy, not only shows sound therapeutic effects in acute ICH but also plays a crucial role in later rehabilitation process (Figure 2).

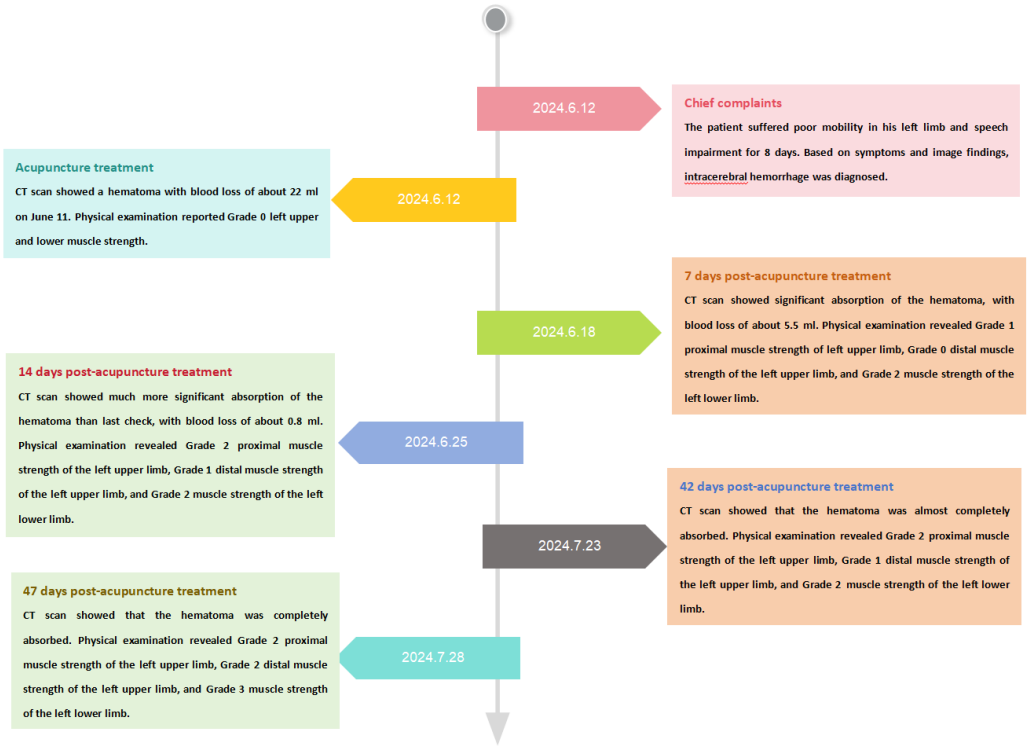


Figure 2 Timeline of treatment.

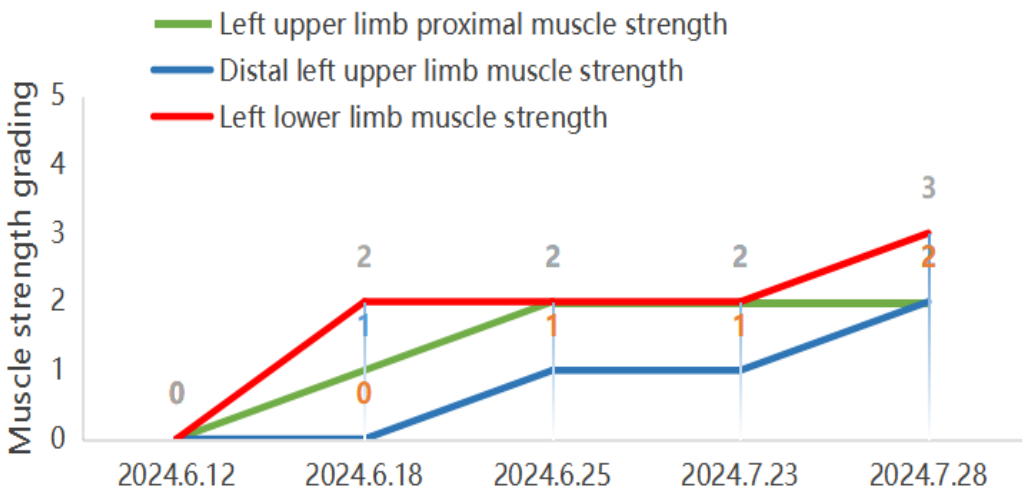


Figure 3 Left upper- and lower-limb muscle strength before and after acupuncture treatment.

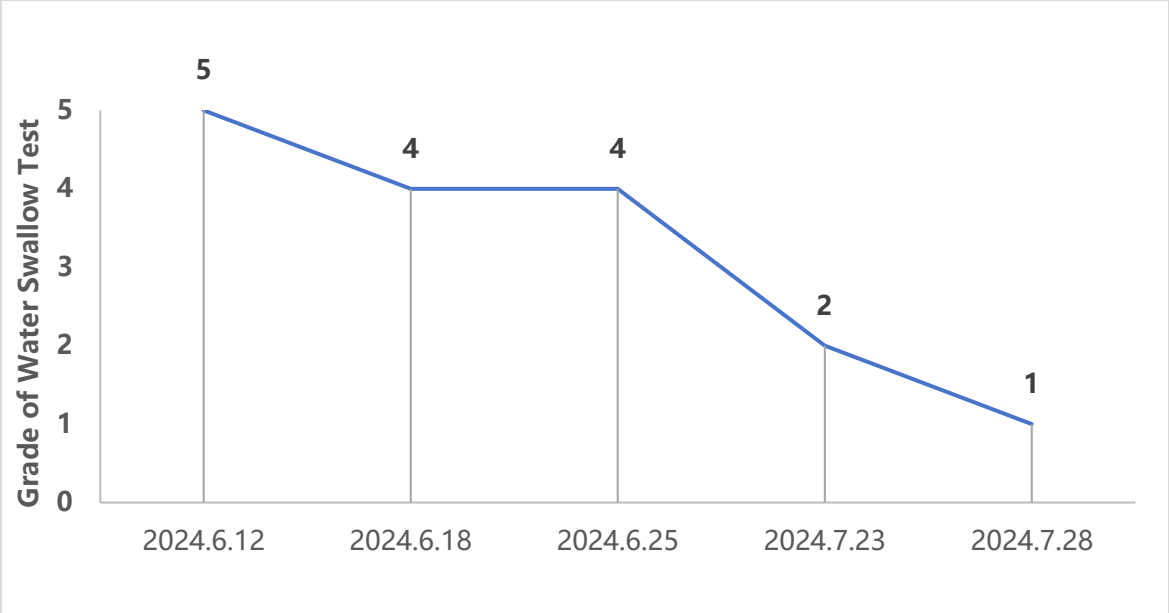


Figure 4 Swallowing function of the patient before and after acupuncture treatment.

In the case reported here, the hematoma found on CT scan was completely absorbed after acupuncture treatment, showing a clear advantage over traditional absorption rates. Additionally, significant improvement in the left upper- and lower-limb muscle strength (Figure3) and swallowing function(Figure4) of the patient was also observed after treatment.

In this case, acupuncture were conducted on the head of the patient, and the specific scalp area corresponding to the functional area of the cerebral cortex was stimulated to activate the relevant nerve tissue and promote the recovery of neural function. It also regulates vascular contraction and dilation, increases cerebral blood flow, and enhances brain perfusion.

In the treatment of ICH, we focus on not only the control of the acute phase of ICH, but also the recovery from sequelae. Acupuncture can improve the sequelae of ICH, such as low muscle strength,

reduced muscle tension, swallowing dysfunction, and aphasia, etc. The case reported here was focused on the improvement of swallowing function and muscle strength.In this case, left limb muscle strength of the patient was significantly improved following acupuncture treatment. However, the improvement in left upper limb muscle strength was not notable after 42 days of acupuncture. The probable reason is that the patient became negative during this period, and his compliance was poor. Thus, subjective cooperation may be a significant factor influencing efficacy. Above all, disease progress is not the only aspect that we should focus on during treatment, and the emotional state and degree of cooperation of patient should be considered as well.

Relevant experimental studies showed that there were multiple mechanisms involved in the acupuncture treatment of the brain injury induced by cerebral hemorrhage, including the mechanisms related to hematoma, brain edema, blood-brain barrier, hemorheology, immune and inflammatory reactions, focal hemorrhagic hypoperfusion, hemorheology, and neuro electrophysiology [4]. A deep understanding of hematoma degradation products and their impact on acupuncture treatment may provide a new potential direction for the treatment of acute cerebral hemorrhage. Moreover, acupuncture a single therapy in the current treatment scheme, has shown significant effects in promoting hematoma absorption, improving swallowing and limb motor function, without any adverse events reported. This therapy, therefore, is considered as a potential treatment option for patients in acute and recovery stages. However, due to the limitations of existing research, high-quality, comprehensive research is urgently needed to evaluate the long-term efficacy and safety of acupuncture. This will guide the treatment for cerebral hemorrhage better and further improve the prognosis of patients.

Contributors

Zhao, Xinwei and Zhang Wanyi were in charge of case provision and manuscript drafting. Jiang, Jun and Zhang, Linlin performed the acupuncture and contributed to manuscript checking. Both authors read and approved the final version of the manuscript accepted for publication.

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Declaration of conflicting

Interests:

The authors declared no potential conflicts of interest with respect to the research, author ship, and/or publication of this article.

Ethical approval:

Written informed consent for publication was obtained from the patient to publish the case.The authorization was not obtained from Ethics Committee of the Second Affiliated Hospital of Tianjin

University of Traditional Chinese Medicine.

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