SunKrist Publishing
Accelerate Scientific Knowledge in Open Access

SunKrist Journal of Trauma, Emergency Medicine and Acute Care

Case Report *Volume: 2, Issue: 2* *Scientific Knowledge*

Electro-acupuncture Improved the Outcome of the Patient with Severe Traumatic Brain Injury: A Case Report

Jie Liu[1], Xinsheng Xue[2], Ning Li[1], Huiping Li[3*]

[1]Department of Traditional Chinese and Western Medicine, West-China Hospital of Sichuan University, China

[2]Department of Critical Care Medicine, West-China Hospital of Sichuan University, China

[3]Department of Respiratory and Critical Care Medicine, First Hospital of South University of Science and Technology of China

1. Abstract

This case report demonstrated that electro-acupuncture treatment has improved the outcome of an adolescent with severe traumatic brain injury due to a traffic accident. The patient had a bilateral frontal hematoma, subdural hematoma, subarachnoid hemorrhage, stem hematoma and diffuse parenchymal swelling with the initial Glasgow Coma Scale score of $E_1V_1M_1$. Daily electro-acupuncture therapy was prescribed with strong stimulation at GV 26 (Shuigou), PC6 (Neiguan) and EX-UE11(Shixuan) when the vital signs of the patient became stable. The patient had a full recovery of the consciousness in 30 days. The follow-up observation found that he has also restored the motor and speech functions. This result suggested a potential role of electro-acupuncture in the treatment of consciousness disturbance for patient with traumatic brain injury.

2. Keywords Electro-Acupuncture; Traumatic Brain Injury; Consciousness; Shuigou (GV26); Neiguan (PC6); Shixuan (EX-UE11).

3. Introduction

Traumatic brain injury (TBI) is the major cause of death among young people worldwide. Although high-quality epidemiological monitoring of TBI is lack, the incidence of TBI is rising with the rapid development of urban construction and transportation in China [1]. Survivors may have lifelong disability resulting in great burden to the family and society [2]. Long-term management of severe TBI relies mainly on supports from family in China due to the limited sources of health care, so early intervention to reduce the risk of morbidity is of great importance to the patients.

Chinese traditional acupuncture therapy has been used in promoting the consciousness and neurological functions in patients with neurological injury for many years [3]. Although studies on the efficacy of acupuncture are controversial, scientists and clinicians are making great efforts to evaluate its real effects. In this case report, we present a significantly improved outcome of an adolescent with severe TBI using early acupuncture strategy.

***Corresponding author**: Huiping Li, Department of Respiratory and Critical Care Medicine First Hospital of South University of Science and Technology of China Dongmenbeilu 1017, Shenzhen, Guangdong, China, Telephone: +86 755 29449819, E-mail Address: huipingli2154@hotmail.com

Received Date: July 4, 2020; **Accepted Date:** July 5, 2020; **Published Date:** July 21, 2020.

4. Case presentation

History and examination

A 14-year-old boy with severe TBI in a car accident was admitted to the intensive care unit (ICU) on July 1st, 2016. He was healthy with no medical or surgical history before. He fell into coma immediately after the accident. The initial Glasgow Coma Scale (GCS) was $E_1V_1M_1$ in the emergency room. An immediate computed tomography (CT) scan was performed revealing a bilateral frontal hematoma, subdural hematoma, stem hematoma, subarachnoid hemorrhage and diffuse parenchymal swelling

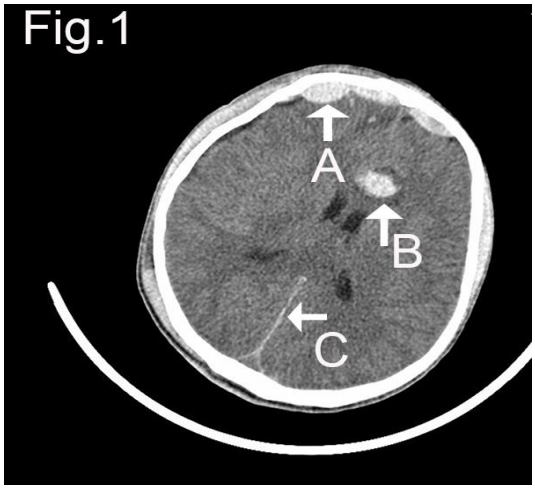

Figure 1: Computed tomography scan (CT) revealed a bilateral frontal hematoma (A), subdural hematoma(B), stem hematoma, subarachnoid hemorrhage (C) and diffuse parenchymal swelling.

He was transferred to ICU after an urgent intracranial pressure (ICP) probe implantation. Physical examination found that the diameter of his right pupil was 3 mm and the left was 1 mm without light reflex. The Babinski's sign was positive. The patient started to have a fever with the temperature up to 40ºC and the ICP fluctuated from 15 to 34 mmHg from day2. So, a 5-day hypothermia therapy was performed. After the temperature and ICP were restored, he remained in a comatose state. Tracheotomy was performed for airway protection on day10. He was weaned from mechanical ventilation on day14. Electro-acupuncture therapy was started according to the suggestion of a traditional Chinese medical doctor.

5. Acupuncture

The core acupuncture points selected were listed in Table.

Table 1: Descriptions of the acupuncture points in Xingnaokaiqiao theory.

Acupoint	Location	Indications
Shuigou (GV26)	at the junction of the upper and middle third of the philtrum	coma, mental disorders, epilepsy, hysteria, apoplexy
Neiguan (PC6)	2 can above the transverse crease of the wrist, between the tendons of the m. palmaris longus and m. flexor radialis	palpitation, cardiac pain, mental disorders, epilepsy, insomnia, nausea, vomiting
Shixuan (EX-UE11)	On the tips of ten fingers, about 0.1 cun distal to the nails	apoplexy, coma, epilepsy, high fever

The major point was GV26 (Shuigou) to improve his consciousness. PC6 (Neiguan) was also used to improve the cardiac function and subsequent cerebral perfusion. In addition, EX-UE11 (Shixuan) was used to enhance the stimulation for consciousness recovery. He received acupuncture therapy for 30 minutes every day. After 2 weeks, his GCS score improved to $E_4V_TM_5$. He was transferred to the general neurological ward 30 days after the surgery.

6. Outcome

After a 4-week acupuncture treatment, the patient gained full recovery of the consciousness and started the rehabilitation. He was extubated 32 days after the surgery. A careful neurological function assessment showed that he had no deficits in speech, motion or cognition. He was released from the hospital on day43.

7. Discussion

Acupuncture has been widely used as a complementary therapy for different neurological disorders including stroke and hemiplegia in China. Patients survived in severe TBI may remain in vegetative state or have neurological disability on which conventional therapy alone has little effects.

Since TBI can cause similar pathophysiological changes as stroke, acupuncture might show some benefits in neurological dysfunctions induce by TBI. Traditional Chinese medicine believes that brain is the sea of marrow dominating all activities of the life. TBI may cause Qi and Blood stagnation resulting in Liver Yang rising and Liver Wind occurring, subsequently affecting the consciousness level. Acupuncture treatment can restore the consciousness by regulating the flow of Qi and Blood and clear Liver Wind [4].

The acupuncture protocol was based on the Xingnaokaiqiao theory [5]. The major acupoints used in this patient were PC6 (Neiguan) and GV26 (Shuigou). Neiguan was acupunctured first to elicit the cardiac function and increase cerebral perfusion. Animal researches have proved that acupuncture at Neiguan can increase cardiac output and brain perfusion thus increasing blood and oxygen supply to the brain, preventing oxygen free radical damage and ameliorating brain edema [6]. Meanwhile, stimulation of Neiguan can induce connections between different cerebral cortex regions implying the possible important role of this acupoint in the regulation of brain function [7]. Shuigou was acupunctured following Neiguan. Shuigou is usually used as first aid stimulation point in patients with stroke. Recent studies in animals showed that acupuncture at Shuigou was associated with up-regulation of TGF-beta in ischemia brain injury and proliferation of brain stem cells in rat TBI models [8,9]. Shixuan is frequently used in patients of persistent vegetative state combing with phlebotomy method to elicit neurological excitability and restore consciousness [10].

The protocol of Xinnaokaiqiao suggests using of another important acupoint DU16 (Fengfu). However, it wasn't used in this patient for two reasons. First, this acupoint was difficult to access in comatose patients. Second, DU16 was very close to the medulla oblongata. Inappropriate depth of acupuncture might result in a sudden death. Although studies have indicated that the safe depth in adults was ranged from 27~33mm, there was no study in adolescents so far [11].

Electro-acupuncture was used in this patient to obtain a better control in the depth, lifting and thrusting frequency as well as the duration of acupuncture therapy. Previous studies using quantified acupuncture in infarct rat models have shown that frequency and duration had significant influence on the cerebral flow and infarct volume [12]. In this patient, we used a frequency of 1Hz and long duration of 180 seconds. The quantified acupuncture would be a good choice for the future random control trials (RCT).

Although this patient has restored the neurological function, we have no evidence to conclude that acupuncture was the only cause for the significant improvement of this patient for lacking effective controls. Age and original cerebral injury pattern may also influence the outcome. However, the rapid and remarkable recovery was rarely observed in other patients with severe TBI. Numerous clinical studies on acupuncture have been performed but the results remained controversial. Many factors including study design, proper placebo and the consistency of acupuncture have contributed to the controversy. Additionally, many studies focused on the short-term outcomes which may underscore the effects of acupuncture. More high-quality RCTs are demanded to clarify the role of acupuncture in the treatment of the patients with TBI.

8. Conclusions

This case report presented a patient with a severe TBI regained consciousness using early electro-acupuncture therapy. The rapid and significant recovery of the neurological functions achieved in this patient indicated that electro-acupuncture may be considered as a beneficial complementary treatment for patients with severe TBI. With the proper frequency and duration, quantified electro-acupuncture may have a better control in the efficacy,

consistency and safety. This report may provide some evidence for further studies to confirm the efficacy and safety of the acupuncture therapy in clinical applications.

8. Abbreviations: TBI: traumatic brain injury; GCS: Glasgow coma scale; CT: computed tomography; ICU: intensive care unit; ICP: intracranial pressure; RCT: random controlled trial.

9. Funding: This study is supported by the High-level Hospital Construction Fund.

10. References

1. Li Y, Gu J, Zhou J, Xia X, Wang K, Zheng X et al. The epidemiology of traumatic brain injury in civilian inpatients of Chinese Military Hospitals, 2001-2007. *Brain Inj* 2015; 29: 981-988.

2. Roozenbeek B, Maas AI, Menon DK. Changing patterns in the epidemiology of traumatic brain injury. *Nat Rev Neurol.* 2013; 9: 231-236.

3. Yang A, Wu HM, Tang JL, Xu L, Yang M, Liu GJ. Acupuncture for stroke rehabilitation. Cochrane Database *Syst Rev* 2016; 26: CD004131.

4. Cheng XN. Qi, blood and body fluid. In: Cheng XN. Chinese acupuncture and moxibustion. 3rd ed. Beijing: Foreign Language Press.

5. Shi XM. Xingnaokaiqiao Method. In: Shi XM. Shi Xuemin Practical acupuncture. 1st ed. Beijing: Traditional Chinese Medicine Press.

6. Quirico PE, Allais G, Ferrando M, de Lorenzo C, Burzio C, Bergandi F et al. Effects of the acupoints PC 6 Neiguan and LR 3 Taichong on cerebral blood flow in normal subjects and in migraine patients. *Neurol Sci*. 2014; 1: 129-133.

7. Yu HL, Xu GZ, Guo L, Fu LD, Yang S, Shi S, et al. Magnetic stimulation at Neiguan (PC6) acupoint increases connections between cerebral cortex regions. *Neural Regen Res.* 2016; 11: 1141-1146.

8. Wang WB, Yang LF, He QS, Li T, Ma YY, Zhang P, et al. Mechanisms of electroacupuncture effects on acute cerebral ischemia/reperfusion injury: possible association with upregulation of transforming growth factor beta 1. *Neural Regen Res.* 2016; 11: 1099-1101.

9. Jiang S, Chen W, Zhang Y, Zhang Y, Chen A, Dai Q, et al. Acupuncture induces the proliferation and differentiation of endogenous neural stem cells in rats with traumatic brain injury. *Evid Based Complement Alternat Med*. 2016.

10. Zheng L. Acupuncture treatment for persistent vegetative state after operation of acute subdural hematoma. *Zhongguo Zhen Jiu*. 2005; 25: 82-84.

11. Yang SD, Li YD, Jiang GH, Hu NN, Cong SY. Study on needling depth of Fengfu (GV16) with CT. *Zhongguo Zhen Jiu.* 2008; 28: 47-48.

Zhang Y, Yang S, Fan X, Wang S, He N, Li L, et al. Orthogonal design to sift the optimal parameter of Neiguan acupuncture for cerebral infarction. *Neural Regen Res.* 2013; 8: 2641-2648.

Citation: Huiping Li. Electro-acupuncture Improved the Outcome of the Patient with Severe Traumatic Brain Injury: A Case Report. SunKrist J Trauma Emerg Med Acute Care. 2020; 2: 1007.