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Journal of Acupuncture and Meridian Studies

journal homepage: www.jams-kpi.com

CLINICAL CASE REPORT

Electroacupuncture-Assisted Craniotomy on an Awake Patient

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Available online ■ ■ ■

Received: May 3, 2016
Revised: Jun 18, 2016
Accepted: Jun 27, 2016

KEYWORDS

acupuncture;
awake craniotomy;
neurosurgery

Abstract

Although acupuncture has existed for over 2000 years, its application as an anesthetic aid began in the 1950s in China. The first surgical procedure performed under acupuncture anesthesia was a tonsillectomy. Soon thereafter, major and minor surgical procedures took place with electroacupuncture alone providing the anesthesia. The procedures performed were diverse, ranging from cardiothoracic surgery to dental extractions. Usage of acupuncture anesthesia, specifically in neurosurgery, has been well documented in hospitals across China, especially in Beijing, dating back to the 1970s. We present a case of a 65-year-old man who presented with right-sided body weakness. He had a past medical history of uncontrolled diabetes mellitus, hypertension, and obstructive sleep apnea requiring use of a nasal continuous positive airway pressure device during sleep. We performed a computed tomography brain scan, which revealed a left-sided acute on chronic subdural hemorrhage. Due to his multiple comorbidities, we decided to perform the surgical procedure under electroacupuncture anesthesia. The aim of this case report is to describe a craniotomy performed under electroacupuncture on an elderly patient with multiple comorbidities who was awake during the procedure and in whom this procedure, if it had been performed under general anesthesia, would have carried high risk.

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pISSN 2005-2901 eISSN 2093-8152

<http://dx.doi.org/10.1016/j.jams.2016.06.005>

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Please cite this article in press as: Sidhu A, et al., Electroacupuncture-Assisted Craniotomy on an Awake Patient, Journal of Acupuncture and Meridian Studies (2016), <http://dx.doi.org/10.1016/j.jams.2016.06.005>

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1. Introduction

Although acupuncture has existed for over 2000 years, its application as an anesthetic aid began in the 1950s in China [1]. Electroacupuncture is believed to have been first used in France and Italy as far back as the 19th century [2]. Currently, it is an increasingly popular form of treatment and is used by practitioners of traditional Chinese medication for a wide array of conditions. Electroacupuncture involves the insertion of thin, sterile needles into specific trigger points at anatomical locations on the body that are associated with neural and vascular structures [3]. Stimulations of these structures through stimulations at the anatomical locations then influence various neurophysiologic processes.

Several theories have been presented to explain how electroacupuncture works [4]. One such theory is that electroacupuncture stimulation causes an increase in the levels of endorphins in several parts of the central nervous system, which, in turn, inhibits the transmission of pain signals because that is a principal function of endorphins. Another is the gate theory proposed by Melzack, which hypothesizes that painful excitation is transmitted in a gelatinous substance within the spinal cord through thin nerve fibers and that acupuncture stimulates the thick myelinated fibers that have an inhibitory effect on pain by closing the gate at the spinal level. This, therefore, inhibits the transmission of pain via the thin nerve fibers.

The analgesia effect afforded by acupuncture, especially electroacupuncture [5], can be so profound that it has, at times, been used as the sole pain-relieving measure during surgery. If acupuncture anesthesia is used in combination with an anesthesia drug, a lower dosage of the anesthetic drug can have the desired effect. The aim of this report is to describe how electroacupuncture can be used as a viable option in the surgical treatment of patients for whom the use of general anesthesia would carry a higher risk.

2. Case presentation

A 65-year-old man presented with a gradual onset of right-sided body weakness, which had been associated with headache during the previous 2 weeks. On further questioning, he revealed that he had had a trivial fall 2 weeks prior to presentation. On presentation, his vital signs were stable. His Glasgow Coma Scale was 15/15. Pupils were 2 mm bilaterally. The neurological examination revealed a right-sided upper and lower limb weakness with muscle power of 3/5. He had a past medical history of obstructive sleep apnea, which required that he use a nasal continuous positive airway pressure device during sleep. He also had uncontrolled diabetes mellitus and hypertension. A computed tomography brain scan was done and revealed a left-sided acute-on-chronic subdural hemorrhage (Fig. 1).

Due to the patient's multiple comorbidities and the risk of general anesthesia, the patient received counsel from the anesthesiologist and the neurosurgeons. As acupuncture is a viable anesthesia option at our center for patients that have increased risk if they undergo surgery under general anesthesia, he was given the option of using electroacupuncture solely during the surgery. After careful consideration, the patient agreed to undergo a craniotomy

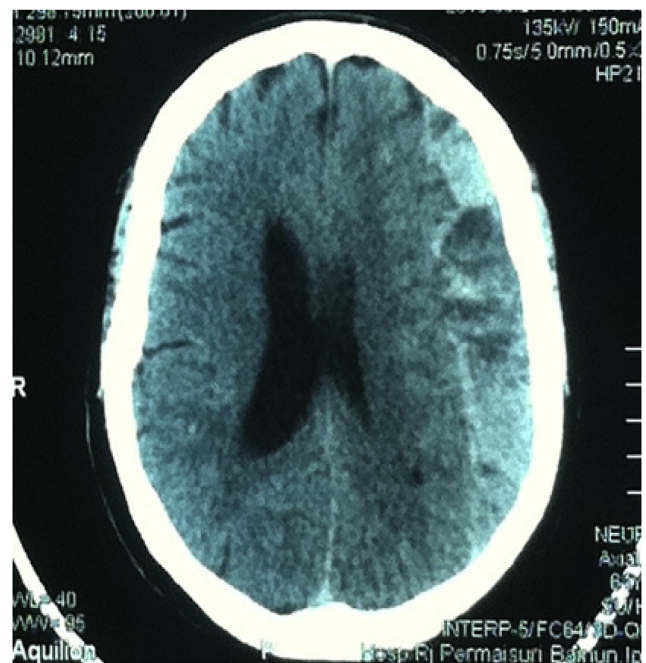


Figure 1 Computed tomography scan showing left acute or chronic subdural bleeding.

under electroacupuncture while awake and provided full, informed, written consent for the use of electroacupuncture instead of general anesthesia. The patient also consented to the publication of this case report and the use of figures showing his surgery. The Ethics Committee at our Center approved the protocol of this study.

The operative procedure for the craniotomy performed under electroacupuncture was as follows: firstly, the patient was taken into the operation theater and placed in the supine position. Acupuncture points GB-3, GB-14, GB-19, and GB-20 were used, and acupuncture needles with a 0.25 mm diameter and a 40 mm length were inserted under aseptic conditions (Fig. 2).

Next, the needles were attached to an electronic acupuncture treatment instrument (Hwato 6-channel Needle Stimulator; Fig. 3). The patient's scalp incision was marked. Then, the operative field was cleaned and draped. The device was set at a frequency of 50 Hz, a pulse duration of 50 ms, and an intensity of 12 mA. Second was the surgical procedure (Fig. 4). Prior to the incision, local anesthesia with lignocaine was used only to infiltrate the skin (lignocaine 2 mg/kg). The skin was incised with an 11 blade right up to the periosteum. Next, the periosteum was separated, and the craniotomy was performed. The dural layer was incised, and the underlying blood clot removed. After irrigation and adequate hemostasis, the dura was apposed and the bone re-anchored. Finally, the galea and skin were sutured.

No general anesthesia was used throughout the surgery. The operation took about 1 hour, and the electroacupuncture stimulation was terminated once the skin had been closed. Overall, the patient tolerated the procedure well. He did not complain of any pain throughout his surgery; neither did he complain of any immediate complications such as nausea or vomiting. Postoperatively, the patient recovered without complications. A repeat

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