

FEATURE ARTICLE

Acupuncture Anesthesia in China: Retrospect and Prospect*

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Acupuncture treatment is a great creation of ancient physicians in China, and acupuncture analgesia is the most influential therapy. After the founding of the People's Republic of China in 1949, the acupuncture analgesia of integrated traditional Chinese and Western medicine has

obtained great development.

From Acupuncture Analgesia to Acupuncture Anesthesia

Acupuncture treatment is an important part of traditional Chinese medicine (TCM). For thousands of years, acupuncture has been proven effective in relieving pain. Acupuncture anesthesia was developed from acupuncture analgesia. In 1958, the doctors of Chinese and Western medicine in the First People's Hospital of Shanghai worked together and learned from each other. They inserted needles into both sides of Hegu (LI 4) point to relieve pain and the excellent results were obtained repeatedly. Believing that acupuncture could significantly increase the pain threshold and pain tolerance threshold, they applied it to tonsillectomy with satisfactory results obtained. The first case of operation under acupuncture anesthesia was performed on August 30th, 1958. Following Shanghai, medical doctors in other cities also performed some small operations with acupuncture anesthesia⁽¹⁾.

In 1960, the First Tuberculosis Hospital of Shanghai in China succeeded in pneumonectomy using acupuncture anesthesia. After that, satisfactory results were also obtained in many other large-scale and difficult operations (such as cardiac surgery, surgery on the anterior cranial fossa, total laryngectomy, subtotal gastrectomy, panhysterectomy, cesarean section, etc.) in the 1960s and 1970s. Researchers in Shanghai First Medical College (the name was changed to Shanghai Medical University after 1985; then, to Shanghai Medical College, Fudan University since 2000) observed healthy

volunteers as well as patients treated with acupuncture, and found that the number of acupoints could be reduced markedly with almost the same analgesic effect, making it more feasible. On the other hand, the acupuncture was manipulated manually and the induction time was as long as 60 min at first. Through experiments, it was found that the manipulation of acupuncture could be replaced by an electrical machine (electroacupuncture), and the induction time could be shortened to about 20 min, with the analgesic effect remained good.

More than 40 years have passed since the successful use of acupuncture anesthesia in the first case. Substantial evidence has been accumulated that acupuncture has prominent analgesic effect and acupuncture anesthesia has scientific reliance⁽²⁾. Acupuncture anesthesia has shown some advantages in surgery. However, because acupuncture plays its analgesic role via activating the endogenous pain modulating system, it fails to produce the complete analgesia on the pain induced by surgical trauma (only incomplete analgesia). This limitation hindered the wide use of acupuncture anesthesia in the clinic.

From Acupuncture Anesthesia to Acupuncture-Drug Balanced Anesthesia

Since the 1980s, the research on acupuncture anesthesia has continued despite a decrease in the cases of operation performed with acupuncture anesthesia. Three national key projects supported by the Chinese central government were carried out from 1986 to 2000. Some famous hospitals, institutes and medical universities in Beijing, Shanghai, Chengdu and other cities took part in the national cooperation unit, and Shanghai Medical University was appointed as the head

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of this unit⁽³⁾.

In these years, the combination of acupuncture with drugs has been successfully used in anesthesia for surgical operations such as open-heart surgery with cardiopulmonary bypass, pneumonectomy, craniocerebral operation, thyroidectomy, neolarynx reconstruction, subtotal gastrectomy, cholecystectomy, and renal transplantation, etc. As it has been known, in modern anesthesiology, it is more common to use balanced anesthesia, in which various drugs and/or techniques cooperate with each other for the best effect. Similarly, acupuncture can also play a cooperating role in combination with drugs, because acupuncture has analgesic effect as well as regulatory effects on multiple important organs of the body, which usually cannot be replaced by drugs. Therefore, acupuncture combined with selected drugs to fulfill the requirement of anesthesia is called acupuncture-drug balanced anesthesia⁽⁴⁾, which can also be called acupuncture-balanced anesthesia⁽⁵⁾ or acupuncture-assisted anesthesia⁽⁶⁾.

The clinical application of acupuncture-drug balanced anesthesia has shown its advantages in surgical operations as follows: (1) acupuncture could be combined with different types of anesthesia such as local anesthesia, epidural anesthesia and general anesthesia, etc.; (2) the effect of analgesia became rather better: Usually the patients could not feel pain during the operations, and the postoperative pain was relieved as well; (3) the doses of analgesic or anesthetic drugs were reduced obviously during the surgical operations (usually about one third reduction); hence the side-effects were decreased; (4) the rate of the excellent effect of both operation and anesthesia was increased; (5) many indexes of physiological condition became more stable; (6) the postoperative recovery was accelerated, and the period of postoperative hospitalization was shortened.

Mechanisms of Synergistic Effect of Acupuncture-Drug Combination

By adopting animal models, some commonly used drugs in clinics were screened in our research group⁽⁷⁾, and they could be classified into three main categories according to their effects on acupuncture analgesia: (1) with potentiating effect; (2) with reducing effect; (3) without significant influence. This would provide clinical guiding principles for medical doctors to select the proper adjuvant in different situations. For drugs with potentiating effect, their pharmacological types could be

divided as follows: (1) agonists of opioid receptors such as fentanyl and pethidine; (2) antagonists of dopamine receptors such as droperidol, haloperidol and rotundine; (3) serotonin release agents such as fenfluramine; (4) drugs affecting the multiple functions such as metoclopramide (clinically used as an antiemetic, with actions of anticholinesterase and antidopamine).

The mechanisms of some drugs affecting acupuncture analgesia were investigated by using multidisciplinary techniques in our experimental research group⁽⁸⁾. The main pathways were listed as follows.

Endogenous opioid peptides (EOP) plays important roles in inhibiting pain. It has been known that the EOP release was increased during acupuncture analgesia. Our further work showed that, firstly EOP release could be promoted by the combination of acupuncture with drugs, which could potentiate the effect of acupuncture. Secondly, electroacupuncture induced the increases not only in the affinity but also in the density of the opioid receptors, and the combined use of acupuncture and drugs could further enhance the increase, suggesting that further activation of the opioid receptors might underlie the mechanisms of the drugs' potentiating effect on acupuncture analgesia. Thirdly, these drugs could also play their potentiating roles in the acupuncture-induced activity of EOP gene expression.

By the way, orphanin FQ (also named as nociceptin, OFQ), a recently discovered member of the opioid family, was also involved in acupuncture analgesia, but it showed different effects in the brain or spinal cord. It was found that OFQ played an antagonistic action on acupuncture analgesia in the brain, but in the spinal cord, the enhancing effect of OFQ on acupuncture analgesia was significant⁽⁹⁾. Endomorphine, the endogenous ligand of receptor, was discovered in 1997. It was shown that endomorphin-1 could mediate 2 Hz but not 100 Hz electroacupuncture analgesia in rats⁽¹⁰⁾. Another result showed that OFQ at the supraspinal level could produce hyperalgesia and was antagonistic to endomorphin-1; while at the spinal level it produced analgesia and was synergic with endomorphin-1⁽¹¹⁾.

Prospect

Up to date, the clinical researches on acupuncture-drug balanced anesthesia are still being carried out by some Chinese medical surgeons and anesthesiologists. In Beijing Tiantan Hospital and Shanghai Huashan

Hospital of Fudan University, acupoint stimulation was used to combine the modern awake anesthesia in craniotomy. In Renji Hospital Affiliated to Shanghai Second Medical University (now Affiliated to Shanghai Jiaotong University), cardiac surgery has been performed with acupuncture-drug balanced anesthesia. On December 5th, 2005, the British Broadcasting Corporation (BBC) showed a special science program about acupuncture therapy, where a cardiac surgery under acupuncture-drug balanced anesthesia in Renji Hospital was recorded and broadcasted. In April 2006, the BBC editor came to the hospital again to review this TV program. Now in China, several TCM hospitals also participate in this clinical research. Surgeons, anesthesiologists and acupuncturists from Shuguang Hospital Affiliated to Shanghai University of TCM have performed different operations, and re-established the acupuncture anesthesia units.

The Chinese central government has insisted on supporting this important research project that originated in China. In 2007, the research on acupuncture anesthesia won funds from the Major State Basic Research Program supported by the Ministry of Science and Technology, P.R. China.

We are confident that the important research will make a great progress, and this new method will be further improved. Acupuncture-drug balanced anesthesia will bring more benefits for the patients.

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