

Randomised, controlled study of preoperative eletroacupuncture for postoperative pain control after cardiac surgery

Luiz Eduardo Faria Coura,¹ Cláudia Hideco Uratsuka Manoel,² Robinson Poffo,¹ Antonio Bedin,¹ Glauco Adrieno Westphal¹

¹Centro Hospitalar Unimed, Joinville, Brazil

²Centro de Estudos de Acupuntura do Parana, Curitiba, Brazil

Correspondence to

Dr Luiz Eduardo Faria Coura, Intensivist and Acupuncturist Member of Intensive Care Therapy at Centro Hospitalar Unimed Joinville, Rua Blumenau 314, Joinville-SC 89204-250, Brazil; ludoterapia@bol.com.br

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ABSTRACT

Background This study aims to evaluate the effects of preoperative electroacupuncture (EA) on the need for opioids in the postoperative stage of conventional cardiac surgery.

Methods A prospective, randomised and controlled study was conducted at Unimed Hospital Centre in Joinville, SC, Brazil. The day before the surgery, 32 patients undergoing cardiac surgery were randomised into two groups: patients from the treatment group received preoperative EA at bilateral points (LI4–LI11, LR3–ST36, PC6–TE5) for 30 min with alternating frequencies of 3 and 15 Hz. Patients from the control group received sham transcutaneous electrical nerve stimulation (TENS). Use of fentanyl during the postoperative period was measured.

Results 10 patients were excluded because of hemodynamic and ventilatory instability leaving 13 (10 male) in the treatment group and 9 (4 male) in the control group. The average total doses of fentanyl given were 13.1 ± 2.2 and 16.3 ± 1.6 $\mu\text{g}/\text{kg}$ in the treatment and control groups respectively ($p < 0.002$). The doses of patient controlled analgesia were 4.1 ± 2.0 and 6.9 ± 1.7 $\mu\text{g}/\text{kg}$ in the treatment and control groups respectively ($p < 0.003$). The number of boluses issued also differed (treatment 13.9 ± 7.0 vs control 24.8 ± 7.0 , $p < 0.002$). Pain intensity scores differed between the groups (treatment 2.5 ± 1.1 vs control 4.0 ± 2.0 , $p < 0.04$). One patient from the control group experienced drowsiness that justified a change in fentanyl infusion, as decided by the anaesthetist.

Conclusion Preoperative electro-acupuncture in conventional cardiac surgery may reduce the postoperative consumption of fentanyl.

INTRODUCTION

Postoperative pain is the result of surgical trauma. Several inflammatory mediators are locally diffused (prostaglandin, histamine, substance P, bradycinin and serotonin), which can increase local nociceptive sensitivity. Sensitisation of the central nervous system increases as a result of segmental and suprasegmental reorganisation.^{1–3}

Postoperative pain can be regarded as inevitable because of intense surgical trauma, but if not controlled can cause several clinical risks

such as atelectasis, venous thrombosis and elevated blood glucose levels with increased risk of infection, as well as cardiac risks such as higher blood pressure with increased left ventricle afterload and increased myocardial oxygen consumption.^{1,2}

Multiple nociceptive stimulants occur in thoracotomy procedures such as surgical incision, insertion of chest tubes and mediastinal and parietal pleura stimulation, making the provision of analgesia quite complex and requiring a combination of techniques and medication.⁴ Efficient pain control can reduce post-thoracotomy complications.⁴ As one of the analgesic methods available, pre-emptive analgesia aims to reduce central sensitisation and amplification processes in the spinal cord before injury has occurred.¹

In most cases, pain control is obtained from the administration of opioids, which might in turn incur several undesirable side effects like nausea, vomiting and decreased level of consciousness. The use of customised strategies for analgesia such as patient controlled analgesia (PCA) is introduced to reduce these side effects by reducing consumption of opioid analgesics.^{1,2} However, even using this technique, the incidence of side effects is still high.

Electroacupuncture (EA) has shown potential to reduce the amount of medication given to general surgery patients. Its association with PCA has been reported as having achieved a decrease in the amount of medication during the immediate postoperative period after thoracotomy.⁵ Acupuncture has been recommended by The American College of Chest Physicians as complementary therapy for lung cancer patients that suffer from postchemotherapy nausea and post-thoracotomy pain.⁶ The analgesic action results from its direct inhibitory effect on the spinal cord interneurons involving the opioid mechanism and also from the increasing release of enkephalins and β endorphins at central levels.^{3,7}

Several studies have demonstrated the effect of EA on pain control⁵ and postoperative nausea.^{8–11} The use of preoperative EA in conjunction with PCA in cardiac surgery has not been used systematically in a way that allows