



Integrative acupoint stimulation to alleviate postoperative pain and morphine-related side effects: A sham-controlled study



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ABSTRACT

Background: Although it can be reduced, postoperative pain remains a problem. Acupressure with electric stimulation may be more effective for postoperative pain management than acupressure alone.

Objectives: This study aimed to evaluate the effects of integrative acupoint stimulation (IAS) on the relief of postoperative pain and on the reduction of morphine-related side effects.

Design: A single-blinded, sham-controlled study with three groups.

Setting: An orthopedic ward in a 2900-bed teaching medical center.

Participants: Forty-five subjects in each of three groups.

Methods: Each subject received a multimedia course on patient-controlled analgesia (PCA) before surgery to learn about the use of narcotic analgesics and the operation of the PCA device. Treatment was as follows: (1) for the IAS group, auricular acupressure combined with transcutaneous electric acupoint stimulation (TEAS) at the true acupoint; (2) for the sham group, acupoint stimulation in the same manner but at a sham acupoint or without embedding seeds and pressure; (3) for the control group, no IAS intervention.

Results: Pain scores were significantly lower in the IAS group than the other two groups at 2 h and 4 h after returning to the ward, and 24 h after surgery. The analgesic requirement during the 72 h after surgery and the overall incidence of morphine-related side effects were significantly lower in the IAS group.

Conclusion: The study demonstrates that combined auricular acupressure and TEAS decreased postoperative pain, the use of equianalgesic morphine, and morphine-related side effects. IAS provides better analgesia when used in conjunction with PCA after lumbar spine surgery and can be regarded as a component of multimodal analgesia.

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What is already known about the topic?

- Clinical pain management practices are well established, but 50–60% of the lumbar spine surgical patients experience moderate pain.
- With PCA, patients may decrease their pain but in the process cause postoperative nausea and vomiting.
- Pain beliefs and pain attitudes of patients could interfere with postoperative pain management, such as misconceptions about the use of analgesics.

What this paper adds

- Auricular acupressure combined with TEAS tends to decrease pain intensity over the first 72 h after lumbar spine surgery, especially during the 4–7 h period just after surgery when pain is at its peak.
- Auricular acupressure combined with TEAS helps reduce postoperative analgesic requirements and morphine-related side effects.
- Postoperative analgesic requirement is reduced by IAS, but the high incidence of morphine-related side effects needs to improve.

1. Introduction

Postoperative pain continues to be a concern because treatment of pain is not optimal (Benhamou et al., 2008; Sommer et al., 2009). There are well-established procedures for clinical pain management, but more than half of lumbar spine surgery patients experience moderate pain at rest (Sommer et al., 2009). Postoperative pain contributes to emotional distress, and prolonged hospitalization (Kwekkeboom and Gretarsdottir, 2006). Up to 5% of individuals undergoing surgery will develop severe persisting pain leading to chronic physical disability and psychosocial distress (Poleshuck and Green, 2008). Reduction of postoperative pain is therefore essential. Patient-controlled analgesia (PCA), a patient-oriented approach, is widely used to administer opioids for postoperative pain management. PCA provides better pain control and greater patient satisfaction than 'as-needed' analgesia according to a Cochrane systematic review of 55 randomized controlled trials (RCTs) (Hudcova et al., 2006). However, pain in patients with access to PCA is moderate during first 24 h after spinal surgery (Yeh et al., 2010b). With PCA, postoperative nausea and vomiting (PONV) is the most common complication (Wang et al., 2009a; Yeh et al., 2009). A systematic review showed the incidence of PONV without antiemetics ranged from 54% to 87% (Tramer and Walder, 1999). With antiemetics, the incidence of PONV decreased to 20–48% (Huh et al., 2010; Warren and King, 2007). However, use of antiemetic therapy for PONV, though it is effective, has risks (Golembiewski et al., 2005). Non-pharmacologic postoperative pain management interventions and their PONV side effects are of considerable concern.

Evidence shows that auricular acupressure combined with transcutaneous acupoint electric stimulation (TAES), a noninvasive method of acupoint stimulation, relieves

pain. According to principles of Chinese medicine, the acupoints on the ear and meridian are closely tied to the internal organs (Yeh et al., 2004a,b). Stimulation of the acupoint rectifies *qi*, stabilizes the body, strengthens bodily functions, and cures disease (Yeh et al., 2011a). In TAES, the acupoint is stimulated intermittently with alternating low- and high-frequency (called dense-and-dispersed) electrical current. Different frequencies of TAES cause the release of different opioid peptides with analgesic effects. Low frequency stimulation (e.g., 2 Hz) induces analgesia by release of β -endorphin, enkephalin, and orphanin, whereas high frequency stimulation (typically 80–100 Hz) induces analgesia by release of dynorphin (Lin and Chen, 2008; White et al., 2008). TAES stimulates the large myelinated ($A\beta$) fibers that inhibit the transmission of nociceptive stimuli and thereby stimulates the release of γ -aminobutyric acid (GABA, which relieves pain) according to the gate control theory of pain (Melzack and Wall, 1965). TAES produces an obvious decrease in PCA opioid consumption after lumbar spine surgery (Yeh et al., 2010a).

According to a systematic review of the literature on the effect of auricular acupuncture on postoperative pain, the effects were positive in eight of nine randomized controlled trials. However, these studies had methodological problems including small sample size and inadequate control of nonspecific effects or blinding (Usichenko et al., 2008). Although a meta-analysis of 17 auriculotherapy studies showed pain reduction, it was suggested that further large, well-designed trials would be necessary to obtain a more accurate estimate of this effect (Asher et al., 2010). It has also been suggested that auriculotherapy can be used to minimize the morphine-related side effects of PCA pain treatment (Yeh et al., 2011b). For lumbar spine surgery, the average operating time is 200–270 min (Yeh et al., 2010a,b), that is a major surgical procedure. Patients using self-controlled analgesia still felt moderate intensity postoperative pain 72 h after surgery and adding auricular acupressure did not relieve pain efficiently (Yeh et al., 2010b). In contrast, TAES had analgesic effects when used alone (Yeh et al., 2010a) or combined with acupuncture (White et al., 2008). The effect of acupressure alone was insufficient. Studies are needed to determine the adjuvant effects of auricular acupressure combined with TAES on pain in lumbar spine surgical patients with access to PCA.

There are many obstacles to postoperative pain management. Patients' reluctance to report pain and to use analgesics is major barriers to the control of pain. This is caused by inadequate preoperative instruction (Clarke et al., 1996), beliefs concerning pain (Tzeng et al., 2006), and misconceptions (Yeh and Chung, 2009), and taking the drugs will lead to addiction (Yeh et al., 2007). Some studies identified the preoperative determinants of severe postoperative pain, including young age (Gagliese et al., 2008), female (Gagliese et al., 2008), preoperative narcotic use (Lynch et al., 1997), moderate to severe preoperative pain (Sommer et al., 2009), preoperative anxiety and depression (Caumo et al., 2002), chronic sleeping difficulty (Mamie et al., 2004), and catastrophizing (Sommer et al., 2009).

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