Original Article

Acupoint Stimulation to Improve Analgesia Quality for Lumbar Spine Surgical Patients

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Abstract:

Lumbar spine surgery has a high incidence of postoperative pain, but this pain is treatable through many methods, including patient-controlled analgesia (PCA). Acupoint stimulation could be considered an adjunct to PCA, improving the effectiveness of analgesia for patients recovering from lumbar spine surgery. The current study aimed to examine the effect of acupoint stimulation with PCA on improving analgesia quality after lumbar spine surgery. A single-blinded, sham-controlled design was used for the experimental, not control, groups. Data collection for the control group was completed first, followed by data collection for the other 2 groups. Participants were randomly assigned to the acupoint stimulation (AS) (n = 45) or sham group (n = 45). All participants received structural PCA multimedia information before lumbar surgery. The AS group received auricular acupressure combined with transcutaneuos electric acupoint stimulation (TEAS) at the true acupoint; the sham group received acupoint stimulation in the same manner but at a sham acupoint and without embedding seeds; and the control group received no acupoint stimulations. The analgesia quality, analgesic consumption, and postoperative nausea and vomiting (PONV) were used as measure of effects for the interventions. Significant differences were found between the AS and control groups in pain intensity but not in the belief and satisfaction subscales of analgesia quality. Also found a significant difference among the 3 groups in analgesic consumption and the severity of PONV in the first 72 hours after surgery. The current study shows that the combination of auricular acupressure and TEAS reduced pain intensity, morphine consumption, and PONV severity. Acupoint stimulation could be considered a multimodal analgesia method and an adjunct to PCA for lumbar spine surgery patients.

Pain control is a major problem for patients recovering from lumbar spine surgery (Yeh, Tsou, Lee, Chen, & Chung, 2010b). Although pain management in clinical practice has established policies and practices, approximately 50%–60% of lumbar spine surgical patients experience moderate pain at rest

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(Gepstein, Arinzon, Folman, Shuval, & Shabat, 2007; Sommer et al., 2009). Postoperative pain contributes to bleeding (Guay, 2006), delayed recovery (Shiloh et al., 2003), emotional disturbance, and prolonged hospitalization (Kwekkeboom & Gretarsdottir, 2006). Suitable postoperative pain control positively influences wound healing and patients' postoperative satisfaction (Momeni, Crucitti, & De Kock, 2006). Therefore, reducing postoperative pain is essential.

Patient-controlled analgesia (PCA) is often used to administer opioids for postoperative pain management of lumbar spine surgical patients (Yeh, Chung, Chen, Tsou, & Chen, 2010a; Yeh et al., 2010b). According to a Cochrane systematic review of 55 randomized controlled trials, PCA provides better pain control and greater patient satisfaction than "as-needed" analgesia (Hudcova, McNicol, Quah, Lau, & Carr, 2006). However, patients undergoing spine surgery using PCA still experience moderate pain in the first 24 hours after surgery (Gepstein et al., 2007; Yeh et al., 2010a). Postoperative nausea and vomiting (PONV) is the most common complication of PCA (Wang, Shen, Liu, Xu, & Guo, 2009; Yeh et al., 2009). In addition, multiple factors inhibit optimal postoperative pain management, including inadequate preoperative education (Clarke et al., 1996), negative beliefs about pain (Tzeng, Chou, & Lin, 2006), and misconceptions about analgesics (Carr, 2007; Yeh & Chung, 2009; Yeh, Yang, Chen, & Tsou, 2007). Patient education can enhance pain awareness, reduce the barriers to effective pain management, and improve analgesia quality (Carr, 2007; Yeh et al., 2007). Providing PCA information to improve pain awareness and adding non-pharmacologic remedies are significant concerns in the management of postoperative pain, and may help reduce the adverse effects of opioid usage.

Auricular acupressure and transcutaneuos acupoint electric stimulation (TAES), which is a form of noninvasive acupoint stimulation, has shown positive effects on pain relief (Asher et al., 2010; Usichenko, Lehmann, & Ernst, 2008). According to the principle of Chinese medicine, the acupoints on the ear and meridian are closely tied to the internal organs (Yeh, Yang, Chen, & Tsou, 2004b). Acupoint stimulation is the application of stimuli to an acupoint to excite qi inside meridians (qi means a sensation that is often elicited to enhance the effect of acupuncture treatment; subjects experienced more aching, pulling, heavy, dull, electric, and throbbing sensations), stabilize the body, strengthen functions, and cure disease (Yeh, Chen, & Chen, 2011a). Clinical practitioners have introduced TAES, which intermittently stimulates acupoints by alternating low- and high-frequency electrical current into their practice. Using different frequencies, TAES releases different opioid peptides that produce analgesic effects in the nervous system. Low-frequency stimulation, such as 2 Hz (Hertz, the unit of sound frequency; one Hz is equal to one cycle per second.), induces analgesia by releasing β-endorphins, enkephalin, and orphanin, whereas high-frequency stimulation, such as 80–100 Hz, releases dynorphin (Lin & Chen, 2008; White, Cummings, & Fishie, 2008). Previous research has shown that TAES produces a significant decrease in PCA morphine consumption after lumbar spine surgery (Yeh et al., 2010a).

PCA pain treatment is associated with morphine-related side effects, and previous research has suggested how to minimize such effects (Yeh, Chung, Chen, & Chen, 2011b). Lumbar spine surgery is a complex operation, and commonly taking 200 to 270 minutes (min) (Yeh et al., 2010a; Yeh et al., 2010b). Lumbar spine surgery patients with PCA feel the worst postoperative pain at a moderate intensity during the first 72 hours after surgery. However, auricular acupressure alone does not relieve pain efficiently (Yeh et al., 2010b). In contrast, TAES has analgesic effects during the first 24 hours when used alone (Yeh et al., 2010a) or when combined with acupuncture (White et al., 2008). The effect of acupressure alone was insufficient to relieve postoperative pain. In addition, the adjuvant effects of the combination of auricular acupressure and TAES for lumbar spine surgical patients with PCA require further research-based support.

AIM

The current study aimed to examine the effects of acupoint stimulation on postoperative analgesia quality, analgesic consumption, and PONV severity during the first 72 hours after lumbar spinal surgery. There were significant differences in postoperative analgesia quality, analgesic consumption, and PONV severity were hypothesized among three groups.

METHODOLOGY

Design

A single-blinded, sham-controlled design was used for the experimental, not control, groups. To avoid contamination of intervention, participants were enrolled in tandem, whereby data collection for the control group was completed first, followed by data collection for the other two groups. Computer-generated numbers were used, and information on the intervention was allocated sequence in opaque, sealed envelopes to ensure random assignment of participants to the AS or sham group. Each participant received the