

Original Article

Acupressure for postoperative nausea and vomiting in gynaecological patients receiving patient-controlled analgesia

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Summary

Background and objectives: To evaluate the effectiveness of acupressure in preventing nausea and vomiting in patients undergoing gynaecological operations and receiving a patient-controlled analgesia device. **Methods:** Patients aged between 40 and 65 yr were included. Exclusion criteria were obesity, diabetes mellitus, and history of motion sickness, postoperative nausea and vomiting, or smoking. Patients were randomized into one of two groups, acupressure and control. In the acupressure group, acupressure bands were placed on both wrists with the plastic bead positioned at the P6 point. In controls, beads were placed at a non-acupoint site. All patients received a standard general anaesthetic. Postoperatively, patients were connected to a patient-controlled analgesia device with morphine (loading dose 5 mg, background infusion 1 mg h⁻¹, bolus dose 1 mg and lock-out time 10 min). Pain and sedation scores, respiratory rate, heart rate, arterial pressure and oxygen saturation were recorded for 24 h. Metoclopramide 10 mg was administered intravenously as a rescue antiemetic. **Results:** Fifty patients received acupressure and 50 were controls. In the acupressure group, 33% of patients had nausea compared with 63% controls. The cumulative incidence of vomiting at 24 h was 25% with acupressure and 61% in controls. The incidence of nausea, vomiting and antiemetic use was significantly lower with acupressure. **Conclusions:** Acupressure at the P6 meridian point is an effective alternative for the prevention of nausea and vomiting in patients receiving patient-controlled analgesia with morphine after gynaecological surgery.

Keywords: ACUPRESSURE; POSTOPERATIVE NAUSEA AND VOMITING; SURGERY GYNAECOLOGICAL; ANALGESIA PATIENT CONTROLLED.

Introduction

Nausea and vomiting after general anaesthesia are distressing symptoms that are associated with patient characteristics, surgery, and anaesthetic and analgesic medications. Despite the use of newer antiemetic drugs, the incidence of postoperative nausea and vomiting has been reported to be in the range of 20–30% in recent large studies. The incidence has been

shown to rise up to 60–70% in patients undergoing gynaecological procedures, laparoscopy and strabismus surgery, and up to 80% in patients receiving morphine with a patient-controlled analgesia (PCA) device [1,2].

Prevention and treatment of nausea and vomiting are likely to improve patient satisfaction and reduce morbidity. Persistent vomiting may result in dehydration, electrolyte imbalance, increased bleeding under skin flaps, pulmonary aspiration, delayed discharge from recovery room or intensive care unit, and may thus increase hospital costs [3,4]. A variety of pharmacological medications are used to prevent or treat postoperative nausea and vomiting. Acupuncture and acupressure are non-invasive non-pharmacological

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treatment techniques with minor adverse effects that have been used to try to prevent postoperative nausea and vomiting.

In the present study, we aimed to evaluate the effectiveness of acupressure in preventing nausea and vomiting in patients receiving morphine via a PCA device after gynaecological surgery. We hypothesized that less nausea and vomiting would be experienced by patients wearing an acupressure band at the P6 meridian point.

Methods

After obtaining approval of the local Ethics Committee, 102 ASA I–II patients aged 40–65 yr undergoing elective gynaecological surgery (total abdominal hysterectomy and bilateral salphingo-oophorectomy) were included. Informed consent was obtained from each patient. Exclusion criteria were obesity (BMI > 30), diabetes mellitus, and history of motion sickness, postoperative nausea and vomiting, or smoking. Patients were randomized using closed envelopes into one of two groups, acupressure ($n = 51$) and control ($n = 51$). None of the patients had any previous experience with the acupressure bands. The study was observer-blinded.

The acupressure bands were applied 30 min before induction of anaesthesia in both groups. In the acupressure group, bands (SeaBand[®], UK Ltd, Leicestershire, England, UK) were placed on both wrists with the plastic bead positioned at the P6 point. The treatment point P6 (Nei-Guan) is the number 6 meridian point in the pericardium channel. It is located on the anterior surface of the forearm between the tendons of the extensor carpi radialis and palmaris longus, 2 'cun' from the distal wrist crease. A 'cun' is a Chinese measurement equal to the width of the interphalangeal joint of the thumb. In controls, bands were placed with the beads at a non-acupoint site on the dorsal surface of the forearm. There was an intention to leave the bands for 24 h postoperatively. In both groups, bands were covered by loose gauze to ensure observer-blinding. The patient's palm and fingers were examined for any signs of excessive compression due to the wrist band. The anaesthesiologist who placed the bands was not involved in the outcome assessments.

All patients were premedicated with midazolam 0.07 mg kg⁻¹ intramuscularly (i.m.). Antecubital veins were used for intravenous (i.v.) cannulation. Anaesthesia was induced with thiopental 5–7 mg kg⁻¹, vecuronium 0.1 mg kg⁻¹ and fentanyl 1.5–2 µg kg⁻¹, and was maintained with sevoflurane 1–2% and 66% N₂O in O₂. A nasogastric tube was inserted in all patients after induction of anaesthesia and the stomach was emptied. At the end of the

operation, the nasogastric tube was removed and neuromuscular block was antagonized with neostigmine 0.03 mg kg⁻¹ and atropine 0.01 mg kg⁻¹. The patients did not receive any antiemetic medication before or during surgery.

Before surgery, the use of the PCA pump (Provide Pain Management[®], Abbott, North Chicago, IL) and of the verbal pain scale (0: no pain, 10: worst possible pain) was taught to all patients. The PCA device with morphine was intended to continue for 24 h; loading dose was 5 mg, background infusion was 1 mg h⁻¹, bolus dose was 1 mg and lock-out time was 10 min. The PCA pump was connected when the patient regained consciousness in the post-anaesthetic care unit. Pain scores at rest and during coughing, sedation score, respiratory rate, heart rate (HR), arterial pressure and oxygen saturation (S_pO₂) were recorded at 0.5, 1, 2, 4, 6, 12, 18 and 24 h after the operation. The anaesthesiologists caring for the patients were not aware of group assignment. Sedation was evaluated with a 5-point scale (1: completely awake, 2: awake but drowsy, 3: asleep but responds to verbal commands, 4: asleep but responds to only physical stimulus, 5: unrousable). Respiratory depression was defined as S_pO₂ < 90% and respiratory rate < 10 breaths min⁻¹. Postoperative nausea was classified as none, mild, moderate or severe. The degree of vomiting was recorded as none, mild (1–2 number of episodes), moderate (3–5) and severe (>5). Metoclopramide 10 mg i.v. was administered as a rescue antiemetic; total requirement for 24-h period was determined for each patient. If the visual analogue scale (VAS) was >3 for pain at rest or during coughing, the patients received diclofenac 75 mg i.m., if the VAS was still >3 after 30 min, an additional bolus dose of morphine 5 mg i.v. was given. Total morphine consumption was recorded at the end of the 24-h observation period. Patient satisfaction was assessed using a 4-point scale (1: poor, 2: moderate, 3: good, 4: excellent).

Age, weight, height, operation time, HR, arterial pressure, respiratory rate and total morphine consumption were compared using *t*-test. ASA classification, nausea, vomiting, additional analgesic consumption and antiemetic requirement were analysed by χ^2 -test. VAS, sedation and patient satisfaction by *U*-test. $P < 0.05$ was considered significant.

Results

One hundred and two patients were randomized; 100 completed the study. One patient in the acupressure was excluded because of swelling and erythema of the treated hand. One control patient received analgesics that were not included in the protocol.

Patients of both groups were comparable with regard to age, weight, height, ASA physical status

Table 1. Patient characteristics data and perioperative analgesic use (mean \pm SD).

	Acupressure (<i>n</i> = 50)	Control (<i>n</i> = 50)
Age (yr)	45 \pm 7	47 \pm 7
Height (cm)	159 \pm 7	161 \pm 6
Weight (kg)	65 \pm 11	68 \pm 11
ASA (I/II)	42/8	39/11
Surgical time (min)	81 \pm 30	81 \pm 25
Intraoperative fentanyl (μ g)	128 \pm 26	141 \pm 33
Total morphine consumption per 24 h (mg)	66 \pm 15	62 \pm 18
Diclofenac use (<i>n</i>)	9	11

Table 2. Nausea, vomiting and need for antiemetic rescue (number of patients).

	Acupressure (<i>n</i> = 50)	Control (<i>n</i> = 50)
Cumulative incidence of nausea at arriving in PACU/after 24 h		
Yes	2/16*	9/32
Mild	1/6	2/2
Moderate	1/9	7/17
Severe	0/1	0/13
Cumulative incidence of vomiting at arriving in PACU/after 24 h		
Yes	1/13 [†]	4/29
1–2 episodes	1/11	4/18
3–5 episodes	0/2	0/6
>5 episodes	0/0	0/5
Antiemetic rescue (patients/doses)	13/19 [‡]	33/48

**P* = 0.003, [†]*P* = 0.002 and [‡]*P* = 0.001.

and duration of surgery (Table 1). Intraoperative fentanyl use, postoperative morphine consumption and number of patients who received diclofenac were also similar (Table 1). The incidence of nausea and vomiting and the number of patients needing antiemetic rescue medication is shown in Table 2. With acupressure, 33% of patients had nausea during the first 24 h compared with 63% of controls. The incidence of vomiting was 25% with acupressure and 61% in controls. Twenty-six percent of patients treated with acupressure received a rescue antiemetic compared with 66% controls. The cumulative incidence of nausea, vomiting and antiemetic use was significantly lower with acupressure (*P* < 0.05).

Pain scores at rest and during coughing were comparable between groups. No adverse effects or complications were observed due to the placement of acupressure wrist bands except for the patient who had to be excluded due to swelling and erythema of the treated hand. Sedation scores were not different among groups. None of the patients had respiratory

Table 3. Satisfaction scores (*n*).

	Acupressure (<i>n</i> = 50)	Control (<i>n</i> = 50)
Poor	0	3
Moderate	2	10
Good	7	12
Excellent	41*	25

**P* = 0.001.

depression. HR and arterial pressure did not show any difference between the two groups at all measurement times. Patients treated with acupressure had higher satisfaction scores (Table 3).

Discussion

Our study showed that prophylactic P6 acupressure stimulation significantly reduced the incidence of nausea and vomiting in patients receiving morphine through a PCA device after gynaecological surgery.

In traditional Chinese medical practice, the P6 (Nei-Guan) acupuncture point in the pericardium meridian is used to treat vomiting and other stomach ailments [1,5]. The efficacy of acupuncture and acupressure for the prevention of nausea and vomiting after surgery has been shown compared with placebo and metoclopramide, droperidol or ondansetron [6,7]. The mechanism of acupressure at the P6 meridian point to prevent postoperative nausea and vomiting is not yet fully understood. Acupuncture–acupressure may mediate the release of β -endorphin in the cerebrospinal fluid, potentiating the endogenous antiemetic actions of the μ -receptor [5,8]. Serotonergic and norepinephrinergic fibres may also be activated, and the antiemetic effects of acupuncture may be explained by changes in serotonin transmission [6]. Acupuncture–acupressure stimulation has been shown to enhance gastric motility suggesting that there is also a possible role of central dopaminergic receptors in antiemetic function [6]. There is no best technique defined for invasive stimulation of the P6 acupuncture point with a needle or with non-invasive transcutaneous electrical nerve stimulation and acupressure. Acupuncture or acupressure at the P6 meridian point is inconsistent in its efficacy. While several reports suggested that stimulation at the P6 point was highly effective in reducing postoperative nausea and vomiting [6,8,9], others were unable to reproduce these results [5,10]. Paediatric trials, for instance, comparing acupressure with placebo or antiemetic treatment did not find any benefit for the prevention of early or late vomiting after surgery [10,11]. The possible reasons for these poor results could be the inaccurate localization of the P6 meridian point or the wrong timing of the P6 activation [1,12,13]. The nature of anaesthesia

and surgery and the patients themselves may contribute to the outcome. It has been suggested that the activation of the P6 point has to be applied prior to the emetic stimulus in patients receiving anaesthetic drugs, opioids or chemotherapy [5,14]. Although there is no certainty in using acupressure unilateral (dominant arm or random) or bilateral, bilateral stimulation is thought to be more efficacious. In the present study, the stimulation of the P6 point was started before premedication and was continued throughout PCA use. A bilateral acupressure technique was preferred to invasive acupuncture as it can be used for a longer time postoperatively. Both acupressure and control group patients wore the same type of acupressure bands to minimize the risk of bias.

Female gender, history of motion sickness or postoperative nausea and vomiting, non-smoking status and the postoperative use of opioids are considered to be independent risk factors for nausea and vomiting after surgery [15]. We excluded smoking patients and those with a history of motion sickness or postoperative nausea and vomiting; however, all patients were females and they all received morphine postoperatively. We may thus assume that our study population was homogenous and represented a moderate baseline risk of nausea and vomiting.

The efficacy of acupressure on prevention of nausea and vomiting after gynaecological surgery has been studied before [14,16]. However, the efficacy of the non-pharmacological technique in preventing nausea and vomiting due to morphine has not well been established yet. Allen and colleagues have reported on a reduction in the requests for antiemetic rescue in patients receiving P6 acupressure but there was no difference in the incidence of nausea and vomiting [17]. In our study, the incidence of nausea and vomiting with acupressure was 33% and 25%, respectively, and in controls was 63% and 61%. With acupressure, the incidence of nausea was decreased by 48% and of vomiting by 59% which is in accordance with previous studies [6,14,16,18]. Finally, there were less episodes of moderate and severe nausea and vomiting with acupressure. PCA pumps were connected when the patients regained consciousness in the post-anaesthetic care unit. Thus, strictly speaking we report on the combined incidence of postoperative nausea and vomiting that is due to anaesthesia and surgery and nausea and vomiting that is due to postoperative analgesia with the highly emetogenic analgesic morphine.

Although effective pain relief is achieved by PCA with morphine, morphine-related nausea and vomiting are distressing adverse effects that may impair patient satisfaction. Similar rates of incidences of postoperative nausea and vomiting have been reported with other conventional postoperative analgesia methods [19–21]. In the present study, the pain

scores and total morphine consumption were similar in both groups, but patients in the acupressure group were more satisfied. We may speculate that this higher satisfaction rate is due to the antiemetic efficacy of acupressure.

Various drugs are recommended for the prevention of postoperative nausea and vomiting. Droperidol, for instance, is an effective antiemetic but has dose-related adverse effects such as agitation, sedation and extrapyramidal reactions. Phenothiazines and antihistamines may induce sedation and lethargy. High doses of metoclopramide are associated with dystocia, drowsiness and tachycardia [22]. 5-HT₃ receptor antagonists increase cost. The non-invasive acupressure stimulation is an appropriate non-pharmacological alternative to the standard antiemetic drug therapy. It is an inexpensive method without serious adverse effect and drug interaction [6,7,23].

We conclude that acupressure at the P6 meridian point is efficacious in preventing nausea and vomiting in patients receiving morphine-PCA after gynaecological surgery. In this setting it may be used as an alternative to standard antiemetics. Whether acupressure is efficacious in patients with a very high risk of nausea and vomiting remains to be shown.

References

1. Fan CF, Tanhui E, Joshi S, Trivedi S, Hong Y, Shevde K. Acupressure treatment for prevention of postoperative nausea and vomiting. *Anesth Analg* 1997; 84: 821–825.
2. Sanchez-Ledesma MJ, Lopez-Olaondo L, Pueyo FJ, Carrascosa F, Ortega A. A comparison of three antiemetic combinations for the prevention of postoperative nausea and vomiting. *Anesth Analg* 2002; 95: 1590–1595.
3. White PF, Shafer A. Nausea and vomiting: causes and prophylaxis. *Semin Anesth* 1988; 6: 300–308.
4. Habib AS, Gan TJ. Evidence-based management of postoperative nausea and vomiting: a review. *Can J Anaesth* 2004; 51: 326–341.
5. Agarwal A, Pathak A, Gaur A. Acupressure wristbands do not prevent postoperative nausea and vomiting after urological endoscopic surgery. *Can J Anaesth* 2000; 47: 319–324.
6. Agarwal A, Bose N, Gaur A, Singh U, Gupta MK, Singh D. Acupressure and ondansetron for postoperative nausea and vomiting after laparoscopic cholecystectomy. *Can J Anaesth* 2002; 49: 554–560.
7. Lee A, Done ML. The use of nonpharmacologic techniques to prevent postoperative nausea and vomiting. A meta-analysis. *Anesth Analg* 1999; 88: 1362–1369.
8. Stein DJ, Birnbach DJ, Danzer BI, Kuroda MM, Grunebaum A, Thys DM. Acupressure versus intravenous metoclopramide to prevent nausea and vomiting during spinal anesthesia for Cesarean section. *Anesth Analg* 1997; 84: 342–345.
9. Dundee JW, Ghaly RG, Bill KM *et al.* Effect of stimulation of the P6 antiemetic point on postoperative nausea and vomiting. *Br J Anaesth* 1989; 63: 612–618.

10. Lewis IH, Pryn SJ, Reynolds PI, Pandit VA, Wilton NC. Effect of P₆ acupressure on postoperative vomiting in children undergoing outpatient strabismus correction. *Br J Anaesth* 1991; **67**: 73–78.
11. Shenkman Z, Holzman RS, Kim C *et al.* Acupressure–acupuncture antiemetic prophylaxis in children undergoing tonsillectomy. *Anesthesiology* 1999; **90**: 1311–1316.
12. Dundee JW, Ghaly RG. Does the timing of P₆ acupuncture influence its efficacy as a postoperative anti-emetic? *Br J Anaesth* 1989; **63**: 630.
13. Fitzpatrick KTJ, Dundee JW, Ghaly RG, Patterson CC. Is it necessary always to use the right forearm for acupuncture antiemesis? *Br J Anaesth* 1988; **61**: 117–118.
14. Alkaissi A, Stalnert M, Kalman S. Effect and placebo effect of acupressure (P₆) on nausea and vomiting after outpatient gynaecological surgery. *Acta Anaesthesiol Scand* 1999; **43**: 270–274.
15. Apfel CC, Kranke P, Eberhart HJ, Roos A, Roewer N. Comparison of predictive models for postoperative nausea and vomiting. *Br J Anaesth* 2002; **88**: 234–240.
16. Alkaissi A, Evertsson K, Johnsson VA, Offenbartl L, Kalman S. P₆ acupressure may relieve nausea and vomiting after gynaecological surgery: an effectiveness study in 410 women. *Can J Anaesth* 2002; **49**: 1034–1039.
17. Allen DL, Kitching AJ, Nagle C. P₆ acupressure and nausea and vomiting after gynaecological surgery. *Anaesth Intensive Care* 1994; **22**: 691–693.
18. Harmon D, Gardiner J, Harrison R, Kelly A. Acupressure and the prevention of nausea and vomiting after laparoscopy. *Br J Anaesth* 1999; **82**: 387–390.
19. Ballantyne JC, Carr DB, Chalmers TC, Dear KB, Angelillo IF, Mosteller F. Postoperative patient-controlled analgesia: metaanalyses of initial randomized control trials. *J Clin Anesth* 1993; **5**: 182–193.
20. Choiniere M, Rittenhouse BE, Perreault S *et al.* Efficacy and costs of patient-controlled analgesia versus regularly administered intramuscular opioid therapy. *Anesthesiology* 1998; **89**: 1377–1388.
21. Munro AJ, Long GT, Sleigh JW. Nurse-administered subcutaneous morphine is a satisfactory alternative to intravenous patient-controlled analgesia morphine after cardiac surgery. *Anesth Analg* 1998; **87**: 11–15.
22. Rowbotham DJ. Current management of postoperative nausea and vomiting. *Br J Anaesth* 1992; **69**: 46S–59S.
23. Harmon D, Ryan M, Kelly A, Bowen M. Acupressure and prevention of nausea and vomiting during and after spinal anaesthesia for Caesarean section. *Br J Anaesth* 2000; **84**: 463–467.