

Acupressure wristbands versus metoclopramide for the prevention of postoperative nausea and vomiting

Afshin Sadighha,^a Navid Nurai^b

From the ^aIlam University of Medical Science, Ilam, Iran, and the ^bDepartment of Anesthesiology, Shahid Beheshti University of Medical Science, Tehran, Iran

Correspondence and reprints: Afshin Sadighha, MD · Ilam University of Medical Science, Ilam 1234, Iran · afshin.sadighha@gmail.com · Accepted for publication March 2008

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Nausea and vomiting almost always occur after general and regional anesthesia. Despite minimally invasive surgical methods like laparoscopy and rapid- and short-acting anesthesia, nausea and vomiting after surgery remain a common problem.¹⁻⁵ Nausea and vomiting can result in dehydration, electrolyte imbalance and delay in discharge from the hospital. Serious complications, such as pressure on the suture lines and venous hypertension, may also occur. The incidence of post-operative nausea and vomiting (PONV) has been estimated as 60% to 70% following laparoscopic cholecystectomy.⁶⁻¹¹ Various factors can influence PONV, such as the type of surgery, anesthesia technique, certain drugs, pain and vertigo upon walking.

In Chinese and acupuncture medicine, the P6 (neiguan) meridian point is recognized as a target point for reducing nausea and vomiting.¹²⁻¹⁷ Several studies have shown that stimulus of P6 results in a reduction in the incidence of nausea and vomiting after surgery.^{8,11-13} A Cochrane systemic review concluded that P6 acupressure point stimulation seems to reduce the risk of nausea despite conflicting results in randomized trials.¹⁸ Our study investigated the effect of placement of acupressure wristbands at the P6 point in decreasing nausea and vomiting after laparoscopic cholecystectomy in comparison with metoclopramide.

PATIENTS AND METHODS

We enrolled patients undergoing elective laparoscopic cholecystectomy into a randomized, double-blind, placebo-controlled study that compared the efficacy of acupressure wristband at the P6 point versus intravenous metoclopramide or placebo in preventing PONV. Patients were in status I (healthy with no systemic disease) or II (mild to moderate systemic disease) of the

American Society of Anesthesiologists physical status classification system.¹⁹ Patients were randomly assigned to treatment groups according to the last digit of the medical record number. Exclusion criteria included a history of PONV, kidney dysfunction with elevated urea and creatinine, diabetes, a body mass index >35 kg/m², use of anti-vomiting or H₂-receptor antagonist drugs during the 72 hours prior to surgery, a history of stomach or intestinal disease, intrabdominal pressure >15 mm Hg, or a length of operation more than 2 hours. This study was conducted at Shahid Mudarras Hospital in Tehran, Iran.

Patients in the acupressure group had a wristband applied at the P6 point (a point on the anterior surface of the forearm between the palmaris longus and carpi radialis extensor tendons) for a distance two times wider than the distance of the thumb interphalangeal joint from the distal wrist crease (almost 4 centimeters from the distal wrist crease) before induction of anesthesia until clearance from recovery. The wristband was an elastic band with a width of 1.5 centimeters and a circular plastic button at the end for applying pressure to the P6 point (Figure 1). The wristband was not a commercial product. The metoclopramide group received metoclopramide 0.2 mg/kg intravenously at the end of surgery. To maintain the blind, the acupressure wristband was applied at a place not considered an acupressure point. The control group received no medical therapy and also had an acupressure wrist band applied at a place not considered an acupressure point.

Nausea was assessed in recovery and at 2, 6, and 24 hours after the operation. Nausea was assessed on a numeric analog scale as follows: no nausea (1), mild (2-5), moderate (6-7), and severe (8-10). Vomiting was assessed as none, mild (1-2 episodes), moderate (3-5 episodes), and severe (more than 5 episodes). General

anesthesia was the same for all patients and involved midazolam, fentanyl, sodium thiopental, atracurium, halothane, and 100% oxygen. Assessors of nausea and vomiting were blinded to the treatment.

Our statistical power calculation showed that 50 patients were needed in each group for 80% power, with a PONV risk of 60% and an alpha of 95%. All the patients provided informed consent to participate in the trial and this trial was approved by the Shaheed Beheshti University Ethical Board. We used the Fisher exact test for comparisons with a *P* value < .05 considered statistically significant. SPSS version 11.5 was used for all computations.

RESULTS

We enrolled 156 patients into the trial, including 52 in the placebo group, 53 in the metoclopramide group, and 51 in the acupressure wristband group. Demographic and clinical characteristics of the three groups were similar (Table 1). At recovery, fewer people in the control group had no nausea than in the other two groups, but the difference was not statistically significant (Table 2). At 2 hours after surgery, only 3 patients in the metoclopramide group (5.7% of patients in the group) and 2 patients in the acupressure group (3.9% of patients in the group) compared with no patients in the control

group were without nausea symptoms. Five patients in the control group had severe nausea compared with no patients in either the metoclopramide and acupressure groups. The statistical comparison showed a statistically significant difference between the three groups (Table 2). At 6 hours after surgery, everyone in the control had some degree of nausea while 9 patients in the metoclopramide group (17% of patients in the group) and 7 patients in the acupressure group (13.7% of patients in the group) were without nausea symptoms. The statistical comparison showed a statistically significant difference between the three groups. At 24 hours after surgery, none of the patients in the three groups had severe nausea, while 47 patients in the control group (90.4% of patients in the group), 49 patients in the metoclopramide group (92.5% of patients in the group) and 49 patients in the acupressure group (96.1% of patients in the group) were without nausea symptoms. The statistical comparison indicated that there was no difference in the number of cases of nausea between the three groups at 24 hours after operation.

There was no episode of vomiting in 6 patients in the control group (7.6% of patients in the group), in 32 patients in the metoclopramide group (60.4% of patients in the group) and in 41 patients in the acupressure group (84.5% of patients in the group). The statistical comparison indicated a statistically significant difference between the three groups.

DISCUSSION

Laparoscopy for cholecystectomy has advantages over open surgery, the most important of which are shorter hospitalization, a faster return of the patient to normal, less pain because of the use of small incisions, and milder illness after surgery.¹⁻⁶ However, PONV after surgery is inevitable. For overcoming nausea and vomiting after surgery, different solutions have been suggested,²⁰⁻⁴⁹ one of which is the use of acupuncture. Dundee first noted that use of the P6 point stimulus acts as an antiemetic.⁴⁰⁻⁴² The mechanism has not been specified completely,⁴² but it seems that use of this method results in an electrical stimulus of low frequency on sensory receptors in



Figure 1. Acupressure wristband.

Table 1. Patient characteristics by treatment assignment.

	Age (y) (mean±SE)	Sex (male/female)	Weight (kg)
Controls (n=52)	45±7.32	44/8	70.3±5.49
Metoclopramide (n=53)	44.4±6.86	46/7	71.40±4.48
Acupressure wristband (n=51)	44.4±6.6	42/9	72.22±5.33
<i>P</i> value	.88	.821	.165

Table 2. Nausea intensity by treatment assignment and time after surgery.

Nausea intensity	Control (n=52)	Metoclopramide (n=53)	Acupressure (n=51)	P value
At recovery				
None	6 (11.5%)	13 (24.5%)	11 (21.6%)	.509
2-5	21 (40.4%)	19 (35.8%)	21 (41.2%)	
6-7	24 (46.2%)	21 (39.6%)	19 (37.2%)	
8-10	1 (1.9%)	0 (0%)	0 (0%)	
2 hours after surgery				
None	0 (0%)	3 (5.7%)	2 (3.9%)	.0001
2-5	8 (15.4%)	18 (34%)	31 (60.8%)	
6-7	39 (75%)	32 (60.3%)	18 (35.3%)	
8-10	5 (9.6%)	0 (0%)	0 (0%)	
6 hours after surgery				
None	0 (0%)	9 (17%)	7 (13.7%)	.0490
2-5	35 (67.3%)	29 (54.7%)	23 (45.1%)	
6-7	16 (30.8%)	15 (28.3%)	20 (39.2%)	
8-10	1 (1.9%)	0 (0%)	1 (2%)	
24 hours after surgery				
None	0 (0%)	0 (0%)	0 (0%)	.521
2-5	47 (90.4%)	49 (92.5%)	49 (96.1%)	
6-7	5 (9.6%)	4 (7.5%)	2 (3.9%)	
8-10	0 (0%)	0 (0%)	0 (0%)	

Values are number of patients and percentages of total for that treatment group.

Table 3. Number of vomiting episodes by treatment assignment.

Number of vomiting episodes	Control (n=52)	Metoclopramide (n=53)	Acupressure (n=51)	P value
None	6 (11.5%)	32 (60.4%)	41 (80.4%)	.0001
1-2	37 (71.2%)	21 (39.6%)	10 (19.6%)	
3-5	9 (17.3%)	0	0	

Values are number of patients and percentage of total for that treatment group.

the skin that are activators of A delta and A beta fibers. These fibers synapse in the posterior horn and this might result in release of endorphin in the hypothalamus.⁴³⁻⁴⁸ The increase in beta-endorphin concentration in human CSF after acupuncture stimulus has been described.²⁴ In addition, serotonergic and norepinephrinergic fibers may be activated and alter serotonin levels, which may also have a role in prevention of PONV.²⁵⁻²⁹ Also, opioids have a beta-endorphin function that can have an anti-nausea effect on the μ receptor. Fassoulak and colleagues, in considering the possible role of central dopa-

minergic receptors in acupuncture, mentioned that the anti-nausea effect of the P6 point is probably opposite that of the function of central dopamine.³⁸ Acupuncture and acupressure have been in use for a long time, with various reported results.

Our data indicate that use of acupressure and the P6 point stimulus is meaningfully effective in reducing nausea and vomiting at 2 and 6 hours after surgery. The point of its maximum effectiveness in comparison with the control and metoclopramide group was at 2 hours after surgery. An important point is the similar anti-anu-

sea activity of metoclopramide and acupressure, while metoclopramide is associated with extrapyramidal complications and interactions with anesthetic drugs.²²

Alkaissi noted that in women with a history of motion sickness, P6 stimulus resulted in an increase in tolerance to nausea-producing stimuli and also reduced signs and symptoms.¹³ Agarwal and colleagues mentioned that P6 point stimulus results in a considerable reduction of PONV occurrence and the need for antiemetic drugs during the first 6 hours after surgery and that its effects are similar to ondansetron.¹⁵ They mentioned that P6 point stimulus effectiveness is comparable with ondansetron and was most effective during the first 6 hours after surgery.

In a review of non-drug methods for reduction of postoperative nausea and vomiting, Rowebotham emphasized the possible function of A delta and beta fibers and mentioned that fiber stimulus with different frequencies results in release of different neurotransmitters.¹⁴ For example, a 2-Hz stimulus causes release of enkephalin, beta-endorphin and endomorphin while a 100-Hz stimulus causes a release of dynorphin. He also mentioned the regulatory role of acupuncture in stomach movement. Dune suggested that acupressure is effective in reduction of nausea and vomiting, but is without the side effects of drugs.²⁰ In reviewing 26 well-designed trials he mentioned that this method is effective for prevention of nausea and vomiting (but not for

treatment). Samad and colleagues confirmed that the use of this method is effective for prevention of PONV when applied before the stimulus of nausea and therefore before performance of surgery.¹² The effectiveness of this method in prevention of nausea and vomiting in obstetrics surgery was confirmed by Turgut and coworkers.¹⁶ Cohen and coworkers mentioned during an investigation that acupressure could result in reduction of nausea, vomiting, anxiety and pain in cesarean delivery, while the effectiveness of this method has been challenged in some studies.²⁷ Melchart reported that acupressure was not effective in treating nausea and vomiting after chemotherapy in a small pilot study.¹⁷ Poor methodology and the small number of patients in his study could have reduced the internal validity of the study. In addition, Klein mentioned that use of wristbands in acupressure in reduction of nausea after heart surgery is not effective.²¹ Other studies have noted the ineffectiveness of this method after tonsillectomy.^{46,47} Agarwal noted that acupressure in urologic surgery is not effective compared with drug therapy, although two important components of treatment are time of application and accurate placement of the wristband. We emphasize that P6 stimulus should begin before the nausea stimulus.

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