Acupressure Treatment for Prevention of Postoperative Nausea and Vomiting

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Postoperative nausea and vomiting are still common problems after general anesthesia, especially in ambulatory surgery. Drug therapy is often complicated with central nervous system symptoms. We studied a nonpharmacological method of therapy—acupressure—at the Pericardium 6 (P.6) (Nei-Guan) meridian point. Two hundred consecutive healthy patients undergoing a variety of short surgical procedures were included in a randomized, double-blind study: 108 patients were in the acupressure group (Group 1) and 92 patients were in the control group (Group 2). Spherical beads of acupressure bands were placed at the P.6 points in the anterior surface of both forearms in Group 1 patients, while in Group 2 they were placed inappropriately on the posterior surface. The acupressure bands were placed before induction of anesthesia and were removed 6 h postoperatively. They were covered with a soft cotton wrapping to conceal them from the blinded observer who evaluated the patients for presence of nausea and vomiting and checked the order sheet for any antiemetics prescribed. In both groups, the age, gender, height, weight, and type and duration of surgical procedures were all comparable without significant statistical difference. In Group 1, only 25 of 108 patients (23%) had nausea and vomiting as compared to Group 2, in which 38 of 92 patients (41%) had nausea and vomiting ($P = 0.0058$). We concluded that acupressure at the P.6 (Nei-Guan) point is an effective prophylaxis for postsurgical nausea and vomiting and therefore a good alternative to conventional antiemetic treatment.

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Postoperative nausea and vomiting are distressing symptoms associated with general anesthesia. In several studies the incidence has been shown to be between 60% and 70% in patients undergoing gynecologic procedures (1–3), laparoscopy (4), and strabismus surgery (5,6). Various medications have been used to alleviate these symptoms, but none has been devoid of side effects. Antiemetic drugs can cause symptoms varying from lethargy to extrapyramidal effects which could lead to delayed discharge and unintended hospital admission. Treatment with acupuncture at the Pericardium 6 (P.6) (Nei-Guan) point has shown good results in the treatment of morning sickness (7,8) and nausea/vomiting after chemotherapy (7,9). However, this mode of therapy is invasive and the risk of infection is a concern.

The purpose of this study was to test the hypothesis that less postoperative nausea and vomiting would be experienced by patients wearing an acupressure band at the P.6 meridian point compared to those wearing a placebo band at a different location. We selected operative cases which were prone to these complications to emphasize the value of this treatment.

Methods

The protocol for this study was approved by our institutional research committee, and informed consent was obtained from all patients. Two hundred consecutive healthy (ASA physical status I or II) patients of both genders, aged between 19 and 59 yr, and having surgery associated with a high incidence of postoperative nausea and vomiting such as laparoscopic and gynecologic procedures, tonsillectomy, and open cholecystectomy, were included in a randomized, double-blind study. Patients receiving antiemetic medications, a histamine H_2-receptor antagonist within 72 h of surgery, or tranquilizers, or those with hypertension were excluded to prevent interference secondary to drug interactions.

Three individuals were specifically trained in the proper application of the acupressure band and they

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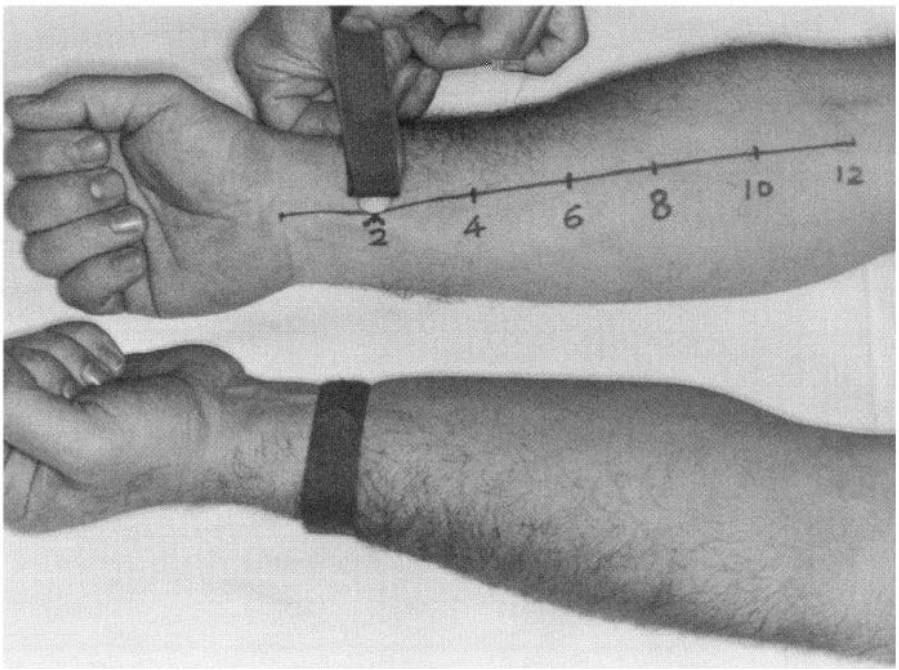

Figure 1. The location of Pericardium 6 (P.6) meridian point and the proper application of acupressure band to the wrist.

were the only ones who applied them. Patients included all ethnic groups, however there were no Oriental patients in the study group. AcuBand™ wrist straps (AcuBand Inc., PO Box 355, Little Silver, NJ) were placed on both wrists in all patients. The acupressure band has an adjustable strap, ¾ inch in width, with a spherical plastic bead attached to it and Velcro fasteners to prevent the bead from slipping from its position. Both bands were concealed from the blinded observer with the use of a soft cotton roll.

The treatment point P.6 (Nei-Guan), is the number 6 meridian point in the Pericardium Channel of Hand-Jueyin, and is located on the anterior surface of the forearm, 2 inches proximal to the distal wrist crease between the tendons of musculus flexor carpi radialis and musculus palmaris longus (10). The forearm of the patient from the transverse crease of the wrist to the cubital crease is measured as 12 inches. Thus, 2 inches are one sixth of the forearm (Fig. 1). The P.6 is the meridian point specifically designated in Chinese medicine for the treatment of nausea and vomiting (10). In the study group (Group 1), spherical beads of the acupressure band were placed at the P.6 point on both wrists of patients. In the control group (Group 2), the acupressure bands were tied loosely and the spherical beads were placed on the dorsum of both wrists. There is no known acupressure point or meridian pathway located at that anatomic site. Acupressure bands were all placed preoperatively in the holding area and the spherical beads were compressed intermittently for a few minutes to activate the P.6 meridian point. Patients wore them continuously for 6 h postoperatively when the study was completed. No patients in either group received any premedication. No antiemetic medication was given pre- or intraoperatively. Anesthesia was administered by different anesthesiologists under a standardized plan. The anesthetic technique included induction with midazolam 1–2 mg intravenously (IV), fentanyl 2–3 μg/kg IV, thiopental 4 mg/kg IV, and a muscle relaxant selected by the anesthesiologist. Anesthesia was then maintained with oxygen, nitrous oxide, isoflurane, and a nondepolarizing muscle relaxant. The electrodes of the neuromuscular monitor were placed on the ulnar side of either forearm near cubital crease in all patients. A nasogastric tube was inserted orally in all patients after induction of anesthesia and the stomach was then emptied. Drugs with antiemetic properties, such as propofol (5,11) and droperidol (6), were avoided.

At the end of the surgical procedure, patients were tracheally extubated in the operating room after reversal with appropriate doses of neostigmine or edrophonium and atropine or glycopyrrolate. The nasogastric tube was removed and patients transferred to the postanesthesia care unit (PACU). A blinded observer evaluated patients for the presence of nausea and/or vomiting, and dose and frequency of antiemetics administered. The study was concluded 6 h after patient's arrival in the PACU. Nursing staff in the PACU were unaware of which patients were in the study group and which were in the placebo group.

For the postoperative pain management, our standard practice was to administer meperidine 25 mg IV

Table 1. Demographic Data

	Acupressure group (Group 1)	Control group (Group 2)
Age (yr)	37 ± 9	36 ± 9
Gender (M/F)	5/103	6/86
Weight (kg.)	67 ± 13	72 ± 18
Height (cm)	161 ± 7	164 ± 8

Values are mean ± SD.

and repeat once if necessary. Most patients felt comfortable after such pain medication. However, if the patient still had severe pain, more meperidine was administered.

If the patients vomited, they received an antiemetic medication, i.e., metoclopramide, percloperazine or ondansetron, and the study was concluded. If the patient merely felt nausea which was tolerable, then no antiemetic medication was given. However, if the patient felt nausea which was intolerable, even though no vomiting occurred, the patient received antiemetic treatment and the study ended at that point.

Results

Two hundred consenting patients were enrolled in the study. One hundred eight patients were in the acupressure group (Group 1) and 92 patients were in the control group (Group 2). No patients were excluded subsequent to their admission to the study. The age, gender, and height were comparable in both groups. The mean weight of patients in the control group was more than the acupressure group, but this was not statistically significant (Table 1).

The procedures in both groups were comparable (Table 2). The duration of procedures (Table 3) and postoperative nausea and vomiting secondary to the use of meperidine for postoperative pain control in both groups were not statistically significant (Table 4). The acupressure group had a significantly lower incidence of nausea and vomiting as compared to the control group, using χ^2 test, $P = 0.0058$ (Fig. 2). There were no observed side effects or complications due to the placement of the acupressure band in either group and all patients felt comfortable while wearing them.

Discussion

The P.6 (Nei-Guan) meridian point in acupuncture has been used to treat vomiting and other stomach ailments in traditional Chinese medical practice (10). In 1990, Dundee (8) revealed that acupuncture or acupressure at the P.6 meridian point was as effective as the standard antiemetic in treating nausea and vomiting. Our present study of 200 patients demonstrated that acupressure at the P.6 can indeed significantly reduce postoperative nausea and vomiting ($P = 0.0058$).

No treatment is effective in all cases of nausea and vomiting. Pharmacologic therapy, using drugs such as droperidol, metoclopramide, and ondansetron, is often associated with side effects. Droperidol at the dose of 0.1 mg/kg may be associated with drowsiness and extrapyramidal symptoms (12). Metoclopramide has the same type of side effects in addition to headache and diarrhea. Ondansetron is associated with headache, diarrhea, and transient increase in hepatic transaminase levels. Drowsiness is of particular concern in ambulatory surgical patients because it can cause extended stay in the PACU or possible hospital admission for overnight stay which can inconvenience

Table 2. Number of Procedures in Each Group

Procedures	Acupressure group (Group 1; $n = 108$)	Control group (Group 2; $n = 92$)
Laparoscopic cholecystectomy	38	43
Laparoscopic tubal ligation	23	12
Hysteroscopy, D & C	10	9
Diagnostic laparoscopy	29	17
D & C	5	2
Open cholecystectomy	1	3
Tonsillectomy	2	1
Laparoscopic lysis of adhesions	0	4
Gynecologic tubal reanastomosis	0	1

D & C = dilation and curettage.

Table 3. The Duration of Surgical Procedures in Minutes

Acupressure group (Group 1)		Control group (Group 2)	
No N/V	N/V	No N/V	N/V
84 ± 41	89 ± 31	85 ± 49	96 ± 51

Values are mean ± SD; *t*-Test = two samples assuming equal variance.
N/V = nausea/vomiting.
Acupressure group versus Control group: No N/V, $P = 0.15$; N/V, $P = 0.56$.
No N/V versus N/V in the same group: Acupressure group, $P = 0.55$; Control group, $P = 0.87$.

Table 4. Effect of Meperidine on Postoperative Nausea and Vomiting

	Acupressure group (Group 1; $n = 108$)		Control group (Group 2; $n = 92$)	
Meperidine	N/V	No N/V	N/V	No N/V
Yes	15	48	22	28
No	10	35	16	26

χ^2 test: Group 1, $P = 0.853$; Group 2, $P = 0.580$.
N/V = nausea/vomiting.

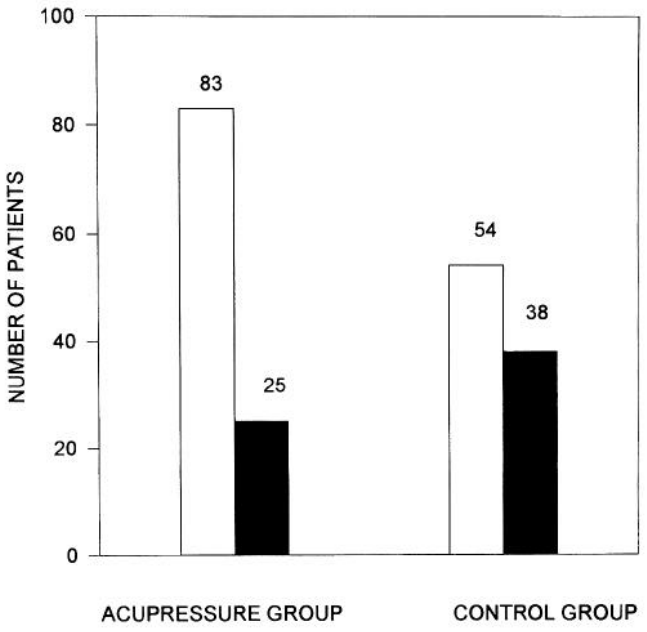

Figure 2. Statistical analysis of acupressure treatment for postoperative nausea and vomiting. Open bars denote patients who had no nausea and vomiting and solid bars denote patients who had nausea and vomiting. χ^2 test, $P = 0.0058$.

the patient and also increase the hospital cost. In contrast, acupressure has no side effects or drug interactions. It is noninvasive, simple to apply, has a high degree of patient acceptance, and is economical (approximately $8.00 for a reusable pair of acupressure bands). Thus, acupressure is a good alternative to the routinely prescribed antiemetics for the treatment of postoperative nausea and vomiting.

Acupuncture or acupressure at the P.6 meridian point is inconsistent in its efficacy. Dundee et al. (8,13,14), Hyde (15), and our preliminary study in 41 patients proved that the stimulation by acupuncture or acupressure at the P.6 point is highly effective in reducing postoperative nausea and vomiting. Lewis et al. (16) and Yentis and Bissonnette (17) did not demonstrate good efficacy with this treatment. The possible reasons for the poor results could be the inaccurate localization of the P.6 meridian point or the wrong timing of the P.6 activation. As Mann (18) has explained, "The only thing of importance in acupuncture is to stimulate the right place. What the stimulus is, is of secondary importance". Dundee and Ghaly (19) failed to demonstrate an antiemetic effect of the P.6 when acupressure was applied immediately before induction of anesthesia or during its maintenance. We would surmise that in order to be effective, the acupressure bands must be applied prior to the emetic stimulus which occurs during anesthesia and surgery (14). This is also supported by studies in oncology which showed that the P.6 acupressure was as effective as an antiemetic only when it was given before chemotherapy was started (9). Thus, to achieve good antiemetic effect, the timing of the P.6 meridian point activation is important.

The psychological aspect, or placebo effect, of acupressure at the P.6 meridian point in our study can be ruled out, since both the acupressure group and the control group wore the same type of acupressure bands.

The mechanism of acupressure (or acupuncture) at the P.6 meridian point to prevent postoperative nausea and vomiting is not yet fully understood. Additional research (20–23) has shown that acupuncture for pain therapy is mediated by a neurochemical substance, possibly endorphin, and its analgesic effect can be blocked by naloxone. The P.6 (Nei-Guan) meridian point is located near the median nerve (10). It is possible that a variety of stimuli to the P.6 point, e.g., either with a needle (with manual twisting or electrical stimulation) or with acupressure (8) may release a neurochemical substance which in turn desensitizes the chemoreceptor trigger zone in the brain and prevents postoperative nausea and vomiting caused by intravenous or inhalation anesthetics or chemotherapeutic drugs. However, once the chemoreceptor trigger zone is sensitized, it is difficult to overcome or desensitize it by the neurochemical substance. This may explain why acupressure, to be effective in treating nausea and vomiting, must be applied before the emetic stimulus has been initiated (14). The nature of the neurochemical substance has not yet been elucidated.

In conclusion, the traditional Chinese method of acupuncture or acupressure at the P.6 (Nei-Guan) meridian point, although looked upon in the past with skepticism, has a demonstrated effectiveness in preventing postoperative nausea and vomiting and is a valid nonpharmacological alternative to the standard drug therapy.

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