
Acupressure wristbands do not prevent postoperative nausea and vomiting after urological endoscopic surgery

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Purpose: To evaluate the efficacy of acupressure wristbands in the prevention of postoperative nausea and vomiting (PONV).

Methods: Two hundred ASA I - II patients undergoing elective endoscopic urological procedures were included in a randomized, prospective, double blind, placebo-controlled study. Spherical beads of acupressure wristbands were placed at the P6 points in the anterior surface of both forearms in Group 1 patients (acupressure group, n=100) whereas, in Group 2 (control group, n=100) they were placed inappropriately on the posterior surface. The acupressure wristbands were applied 30 min before induction of anesthesia and were removed six hours postoperatively. Anesthesia was induced with thiopental and maintained with nitrous oxide and oxygen, fentanyl, isoflurane and vecuronium. The tracheas were extubated on the operation table after patients received neostigmine and atropine. Post operative nausea and vomiting were evaluated separately as none, mild, moderate or severe at the time of patient's arrival in PACU, then at six hours and twenty-four hours after surgery by a blinded observer.

Results: In the acupressure group, 25 patients had PONV compared with 29 patients in the control group ($P = NS$).

Conclusion: Application of acupressure wristbands at the P6 of both forearms 30 min before induction of anesthesia did not decrease the incidence of PONV in patients undergoing endoscopic urological procedures.

Objectif : Évaluer l'efficacité de bracelets d'acupression utilisés pour la prévention des nausées et des vomissements postopératoires (NVPO).

Méthode : Deux cents patients, ASA I - II, devant subir une intervention urologique endoscopique planifiée ont participé à l'étude randomisée, prospective et à double insu contre placebo. Des bracelets de billes d'acupression ont été placés aux points P6 de la face antérieure des deux avant-bras des patients du Groupe 1 (groupe d'acupression, n=100) tandis que dans le Groupe 2, (groupe témoin, n=100), ils l'ont été, de façon inappropriée, sur la face postérieure. On les a appliqués 30 min avant l'induction de l'anesthésie et retirés six heures après l'opération. L'anesthésie comportait du thiopental, à l'induction, et du protoxyde d'azote, de l'oxygène, du fentanyl, de l'isoflurane et du vécuronium. L'extubation trachéale a eu lieu à la salle d'opération après l'administration de néostigmine et d'atropine. Un observateur objectif a évalué les nausées et les vomissements postopératoires comme absents, légers, modérés ou sévères au moment où le patient est arrivé à la salle de réveil, puis six et vingt-quatre heures après l'opération.

Résultats : Dans le groupe d'acupression, 25 patients ont eu des NVPO, comparativement à 29 patients du groupe témoin ($P = NS$).

Conclusion : L'application de bracelets d'acupression en P6 aux deux avant-bras, 30 min avant l'induction de l'anesthésie, n'a pas diminué l'incidence de NVPO chez des patients qui subissent une intervention urologique endoscopique.

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Accepted for publication January 9, 2000.

POSTOPERATIVE nausea and vomiting (PONV) is associated with considerable morbidity in anesthetic practice. Often, this is a temporary phenomenon, but may constitute the most memorable distress for many patients after an otherwise uncomplicated anesthetic and surgical course. The stimulus for nausea and vomiting arises from various sites throughout the gastrointestinal tract. Additional stimuli for nausea and vomiting include distention of the uterus, renal pelvis or urinary bladder.¹

The incidence of PONV may be as high as 60-70% which is influenced by various factors in the perioperative period including patient characteristics.²⁻⁶ The medications used to alleviate PONV may be associated with side effects varying from lethargy, restlessness, tachycardia and extrapyramidal symptoms.

Acupuncture and acupressure are based on the belief that an individual's well being depends on the balance of energy in the body as well as the overall energy level. It is hypothesized that energy flows in the body along paths referred as meridians and that these techniques restore the balance of energy by manipulating these meridians.⁷ P6 (Nei-Guan), a Chinese meridian point, is specifically designated for the treatment of nausea and vomiting. P6 is located on the anterior surface of the forearm, approximately 1 cm deep to the skin, two (body) inches proximal to the distal crease of the wrist joint between the tendons of flexor-carpi-radialis and palmaris longus. A body inch is equal to the width of the interphalangeal joint of the patient's thumb.



FIGURE 1 Location of pericardium 6 (P6) meridian point and the proper application of acupressure wristband; which is an adjustable velcro strap, 3/4 inch in width, with a spherical plastic bead attached to it.

Acupuncture at P6 has produced good results in the treatment of morning sickness,^{8,9} nausea and vomiting after chemotherapy.⁸ However, acupuncture at P6 is invasive and may be associated, though rarely, with side effects such as nerve damage and transmission of infectious disease. Acupressure is non-invasive and is devoid of these complications. If acupressure is found to be effective in preventing or minimizing PONV, it may reduce the patient's inconvenience, decrease hospital stay and, thus, the total cost of treatment. There have been reports suggesting that acupressure can reduce the nausea due to morning sickness,¹⁰ general anesthesia,¹¹ cytotoxic therapy,¹² and postoperative morphine administration.¹³ The present study was aimed at validating the usefulness of acupressure wristbands in preventing PONV in patients undergoing endoscopic urological surgery in the setting of distention of the renal pelvis or urinary bladder which are known to induce additional afferent stimuli for nausea and vomiting.¹

Methods

The study protocol was approved by our institutional research committee, and informed consent was obtained from all patients. Two hundred consecutive patients (ASA I or II) of either sex, aged between 18 and 60 yr, undergoing endoscopic urological surgery were included in this randomized, prospective, double blind, placebo controlled study. Patients were assigned to two different groups according to a computer-generated table of random numbers. One hundred patients were in the acupressure group (Group 1) and 100 were in the control group (Group 2). A spherical bead of acupressure wristbands was placed at the P6 points on both forearms in the acupressure group (Group 1) patients. In the control group (Group 2), the spherical bead of acupressure wristbands was placed on the posterior surface. The acupressure wristbands were applied 30 min before induction of anesthesia.

The acupressure wristbands were applied by two individuals specially trained in their proper application. The acupressure wristband has an adjustable strap, 3/4 inch in width, with a spherical plastic bead attached to it and Velcro fastener to prevent the head from slipping from its position (Figure 1). The treatment point P6 (Nei-Guan) is located on the anterior surface of the forearm, approximately 1 cm deep to the skin, two body inches proximal to the distal crease of the wrist joint between the tendons of flexor-carpi-radialis and palmaris longus (Figure 1). One body inch is equal to the width of the interphalangeal joint of patient's thumb. The acupressure band was placed snugly around the wrist so that the patient felt gen-

TABLE I Demographic data

	Acupressure group (Group 1; n=100)	Control group (Group 2; n=100)
Age (yr)	36.5 ± 8.2	34.2 ± 6.1
Sex (M / F)	46 / 54	51 / 49
Weight (kg)	56 ± 10	61 ± 12
Height (cm)	164 ± 6	160 ± 7

Values are mean ± SD

TABLE II Number of procedures in each group

	Acupressure group (Group 1; n =100)	Control group (Group 2; n =100)
DVIU	21	26
Cysto/panendoscopy	17	16
DJ Stunting	26	25
Uretrorenoscopy	19	18
Percutaneous nephrostomy	11	08
Cystolithopaxy	06	07

DVIU = Direct visualization internal urethrotomy

DJ Stunting = Double J stunting

tle pressure without discomfort. The patient's palm and fingers were examined for any signs of excessive compression due to the wristband. A pulse oximeter was also placed on the index finger to confirm that blood flow to the digits was adequate. Wristbands were considered too loose and were tightened if a wedge of paper could fit between the pressure band and the skin. Forearms were raised by 60° at the elbow and venous filling emptied normally in all cases. The acupressure bands were loosely covered with gauze and tape so that they could not be distinguished from the placebo bands.

Exclusion criteria included patient refusal to participate in the study, previous history of PONV and travel sickness, impaired renal function with increased urea and creatinine concentrations, diabetes mellitus, obesity, patients receiving antiemetic medication, histamine H₂-receptor antagonist within 72 hr of surgery.

Anesthesia was administered by different anesthesiologists using a standardized technique. No antiemetic medication was given before or during operation. All patients received 2 mg lorazepam *po* on the night before surgery and two hours before surgery with sips of water. Anesthesia was induced with 2 µg·kg⁻¹ fentanyl *iv* and 4-5 mg·kg⁻¹ thiopental *iv*, and maintained with isoflurane 0-1% and nitrous oxide 60% in oxygen. Neuromuscular block was provided by vecuronium.

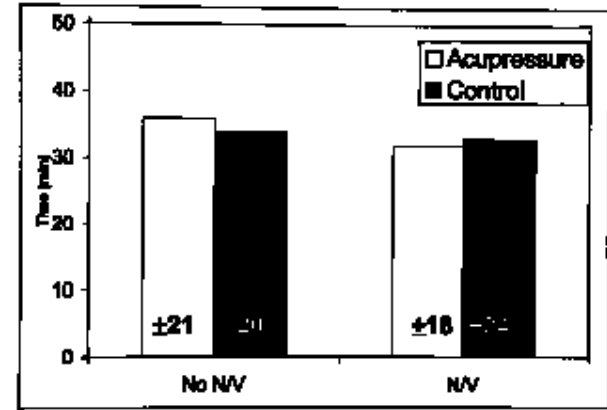


FIGURE 2 The duration of surgical procedures. Values are mean ± SD; N/V = nausea/vomiting

um. At the end of the surgical procedure, the tracheas were extubated in the operating room after reversal of the neuromuscular block with appropriate doses of neostigmine and atropine. A blinded observer evaluated patients for the presence of PONV. The acupressure wristband was removed six hours postoperatively.

Postoperative analgesia was provided with 100 mg diclofenac *im* eight hourly along with 50 µg fentanyl *iv prn* to keep the pain score <2 on a visual analogue scale of 0 to 10. An anesthesiologist blinded to the therapy registered the incidence of nausea and vomiting at three different times in the first 24 hr postoperatively: on arrival of the patient in PACU, and at six hours (time of removal of acupressure wristband) and 24 hr after operation. The results were scored as described by Allen *et al.*¹⁴ as none, nausea, retching/vomiting. Patients experiencing both nausea and vomiting were included in the vomiting group. For examining the severity of nausea and vomiting, nausea was classified as none, mild, moderate or severe. Vomiting and retching were not distinguished and their severity was classified by the number of episodes over 24 hr: none, mild (0-2), moderate (3-5), or severe (5).¹⁵ If the patient vomited, they were given 4 mg ondansetron *iv*.

Patient characteristics in the two groups were assessed using the unpaired Student's t test. PONV data were analyzed using z test to compare proportions of occurrence in both the groups. Comparisons between groups was performed for overall nausea and retching/vomiting; then separately at various score levels like none, mild, moderate and severe for nausea and retching/vomiting. A P value of < 0.05 was considered significant.

TABLE III Severity of nausea and vomiting, and antiemetic requirements. Score is the maximum reported score over 24 hr along with statistical analysis.

	Acupressure group (Group, n=100)	Control group (Group 2, n=100)	Statistical analysis		
			Z	P	Power
<i>Nausea</i>					
None	82	80	0.36	0.36	92.22
Nausea(A+B+C)	18	20	0.36	0.35	92.22
A = Mild	11	13	0.43	0.33	98.01
B = Moderate	7	7	0.00	0.00	99.4
C = Severe	0	0			
<i>Vomiting</i>					
None	93	91	0.52	0.30	95.96
Vomiting(A+B+C)	7	9	0.52	0.30	99.74
A = Mild	5	6	0.31	0.38	99.95
B = Moderate	2	3	0.45	0.33	100
C = Severe	0	0			
Anti-emetic (1 dose)	6	7	0.29	0.39	99.84

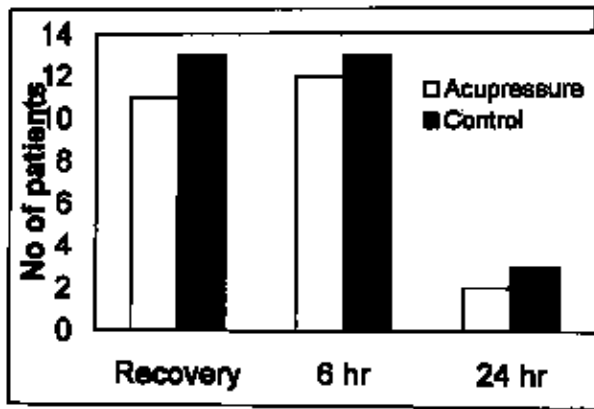


FIGURE 3 Incidence of nausea / vomiting in the acupressure and control groups at three different times.

Results

No patient was excluded after admission to the study. Patients were comparable in both the groups as regards to age, sex, height and weight (Table I).

Surgical procedures performed (Table II) and the duration of the procedures (Figure 2) were comparable in both groups. The acupressure group had a slightly lower numerical incidence of nausea and vomiting compared with the control group but this difference was not statistically significant, (Figure 3), with a relative risk ratio of 0.86. Severity of nausea and vomiting and anti-emetic requirements in the both the groups were comparable using Z test and are shown along with their power analysis in (Table III). No side

effects or complications were observed due to the placement of acupressure wristband in both the groups and all patients felt comfortable wearing them.

Discussion

The P6 (Nei-Guan) meridian point in acupuncture has been used to treat vomiting and other stomach ailments in traditional Chinese medical practice. In 1990, Dundee revealed that acupuncture or acupressure at the P6 meridian point was effective as a standard antiemetic in the treatment of nausea and vomiting.⁹ The mechanism of action of acupressure is not clear. It is postulated that acupressure causes low frequency electrical stimulation of the skin sensory receptors which may activate A- β and A- δ fibres. These fibres synapse within the dorsal horn and may, in turn, cause release of endorphins from the hypothalamus. Increased levels of β -endorphin concentration have been reported in human cerebrospinal fluid after acupuncture stimulation.¹⁶ It is also postulated that opioids may have antiemetic effects mediated by the action of β -endorphins on μ receptors. Acupressure has been shown to enhance gastric motility.¹⁷

Acupuncture or acupressure at P6 meridian point is inconsistent in efficacy. Harmon,⁵ Dundee *et al.*^{11,12,18} and Fan,¹⁹ observed the efficacy of acupressure or acupuncture at the P6 meridian. The important component of this treatment includes the timing of the stimulation²⁰ and correct location.²¹ Lee *et al.*²² performed a meta-analysis and found that non-pharmacological techniques including acupuncture, electroacupuncture, transcutaneous electrical nerve stimulation, acupoint stimulation, and acupressure have more effect than placebo in the prevention of PONV within six hours of surgery in adults, but there was no benefit

in children. O'Brien *et al.*²³ found no apparent benefit from the use of P6 acupressure during pregnancy, an observation similar to the findings of Lewis *et al.*²⁴ during correction of strabismus. The present study was performed in adult patients undergoing urological endoscopic surgery.

Acupressure, when applied after induction of anesthesia, did not report favourable results.²⁴ This emphasizes the importance of application of acupressure before induction of anesthesia. In our study the acupressure wristbands were applied 30 min before induction of anesthesia. The effect of combined use of acupuncture and acupressure has also been studied by Shenkman *et al.*²⁵ in children undergoing tonsillectomy without any significant effect on PONV.

It is recognised that certain types of surgery are associated with a higher incidence of PONV. In adults, surgical procedures performed laproscopically and otolaryngological, plastic, gynecological and ophthalmological surgical procedures have a higher incidence of associated PONV.³ Fan¹⁹ in their study included patients having surgery associated with a high incidence of PONV such as laproscopic cholecystectomy and gynecological procedures along with tonsillectomy and open cholecystectomy similar to the studies by Harmon *et al.*⁵ and Stein.²⁶ In our study, we included patients undergoing endoscopic urological procedures to validate the usefulness of acupressure in preventing PONV in the setting of distention of the renal pelvis or urinary bladder which are known to send additional afferent stimuli for nausea and vomiting.¹ In this study, acupressure wristbands, applied prior to the induction of anesthesia, in adult patients listed for urological endoscopic surgery, did not offer any benefit.

In conclusion, acupressure at P6 was ineffective in preventing PONV in patients undergoing endoscopic urological procedures.

References

- 1 Orkin FK Postoperative nausea and vomiting. In: Gravenstein N, Kirby RR (Eds.). *Complications in Anaesthesiology*, 2nd ed. Philadelphia: Lippincott-Raven Inc., 1996: 691–9.
- 2 Korttila K The study of postoperative nausea and vomiting. *Br J Anaesth* 1992; 69: 20S–3.
- 3 Watcha MF, White PF. Postoperative nausea and vomiting. Its etiology, treatment and prevention. *Anesthesiology* 1992; 77: 162–84.
- 4 Haley S, Edelist G, Urbach G Comparison of alfentanyl, fentanyl and enflurane as supplements to general anaesthesia for outpatient gynaecological surgery. *Can J Anaesth* 1988; 35: 570–57.
- 5 Harmon D, Gardiner J, Harrison R, Kelly A Acupressure and the prevention of nausea and vomiting after laproscopy. *Br J Anaesth* 1999; 82: 387–90.
- 6 Watcha MF, Simeon RM, White PF, Stevens JL. Effect of propofol on the incidence of postoperative vomiting after strabismus surgery in pediatric outpatients. *Anesthesiology* 1991; 75: 204–9.
- 7 Vincent CA, Richardson PH. The evaluation of therapeutic acupuncture: concepts and methods. *Pain* 1986; 24: 1–13.
- 8 Dundee JW, McMillan CM. Clinical uses of P6 acupuncture antiemesis. *Acupunct Electrother Res* 1990; 15: 211–5.
- 9 Dundee JW. Belfast experience with P6 acupuncture antiemesis. *Ulster Med J* 1990; 59: 63–70.
- 10 Dundee JW, Sourial FBR, Ghaly RG, Bell PF. P6 acupressure reduces morning sickness. *J R Soc Med* 1988; 81: 456–7.
- 11 Dundee JW, Ghaly RG, Bill KM, Chestnutt WN, Fitzpatrick KTJ, Lynas AGA. Effect of stimulation of the P6 antiemetic point on postoperative nausea and vomiting. *Br J Anaesth* 1989; 63: 612–8.
- 12 Dundee JW, Ghaly RG, Fitzpatrick KTJ. Optimizing antiemesis in cancer chemotherapy (Letter). *BMJ* 1987; 294: 179.
- 13 Ho CM, Hseu SS, Tsai SK, Lee TY. Effect of P-6 acupressure on prevention of nausea and vomiting after epidural morphine for post-cesarean section pain relief. *Acta Anaesthesiol Scand* 1996; 40: 372–5.
- 14 Allen DL, Kitching AJ, Nagle C. P6 acupressure and nausea and vomiting after gynaecological surgery. *Anesth Intensive Care* 1994; 22: 691–3.
- 15 Tigerstedt I, Salmela L, Aromaa U. Double-blind comparison of transdermal scopolamine, droperidol and placebo against postoperative nausea and vomiting. *Acta Anaesthesiol Scand* 1988; 32: 454–7.
- 16 Clement-Jones V, McLoughlin L, Tomlin S, Besser GM, Rees LH, Wen HL. Increased β -endorphin but not met-enkephalin levels in human cerebrospinal fluid after acupuncture stimulation for recurrent pain. *Lancet* 1980; 2: 946–9.
- 17 Lin X, Liang J, Ren J, Mu F, Zhang M, Chen JDZ. Electrical stimulation of acupuncture points enhances gastric myoelectrical activity in humans. *Am J Gastroenterol* 1997; 92: 1527–30.
- 18 Dundee JW, Milligan KR. Acupuncture as an antiemetic (Letter). *BMJ* 1988; 296: 135.
- 19 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: 821–5.
- 20 Dundee JW, Ghaly RG. Does the timing of P6 acupuncture influence its efficacy as a postoperative anti-emetic? *Br J Anaesth* 1989; 63: 630P.

- 21 *Fitzpatrick KTJ, Dundee JW, Ghaly RG, Patterson CC.* It is necessary always to use the right forearm for acupuncture antiemesis? *Br J Anaesth* 1988; 61: 117P-8.
- 22 *Lee A, Done ML.* The use of nonpharmacologic techniques to prevent postoperative nausea and vomiting: a meta-analysis. *Anesth Analg* 1999; 88: 1362-9.
- 23 *O'Brien B, Relyea MJ, Taerum T.* Efficacy of P6 acupressure in treatment of nausea and vomiting during pregnancy. *Am J Obstet Gynecol* 1996; 174: 708-16.
- 24 *Lewis IH, Pryn SJ, Reynolds PI, Pandit UA, Wilton NCT.* Effect of P6 acupressure on postoperative vomiting in children undergoing outpatient strabismus correction. *Br J Anaesth* 1991; 67: 73-8.
- 25 *Shenkman Z, Holzman RS, Kim C, et al.* Acupressure-acupuncture antiemetic prophylaxis in children undergoing tonsillectomy. *Anesthesiology* 1999; 90: 1311-6.
- 26 *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: 342-5.