

Comparing the Efficacy of Prophylactic P6 Acupressure, Ondansetron, Metoclopramide and Placebo in the Prevention of Vomiting and Nausea after Strabismus Surgery

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Abstract- To compare the efficacy of acupressure wrist bands, ondansetron, metoclopramide and placebo in the prevention of vomiting and nausea after strabismus surgery. Two hundred patients, ASA physical status I or II, aged between 10 and 60 years, undergoing strabismus surgery in Farabi Hospital in 2007-2008 years, were included in this randomized, prospective, double-blind and placebo-controlled study. Group I was the Control, group II received metoclopramide 0.2 mg/kg, group III received ondansetron 0.15 mg/kg iv just before induction, in Group IV acupressure wristbands were applied at the P6 points. Acupressure wrist bands were placed inappropriately in Groups I, II and III. The acupressure wrist bands were applied 30 min prior to the induction of anesthesia and removed six hours after surgery. Postoperative nausea and vomiting (PONV) was evaluated within 0-2 hours and 2-24 hours after surgery by a blinded observer. Results were analyzed by X² test. A P value of < 0.05 was taken as significant. The incidence of PONV was not significantly different in acupressure, metoclopramide and ondansetron during the 24 hours. Acupressure at P6 causes a significant reduction in the incidence of PONV 24 hours after strabismus surgery as well as metoclopramide 0.2 mg/kg and ondansetron 0.15 mg/kg iv for patients aged 10 or more.

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Introduction

Postoperative nausea and vomiting (PONV) is the most frequent complication especially in outpatient surgery. The incidence of PONV varies between 20% and 30% depending on surgical and patient factors (1). Some types of surgeries have been found to be correlated with a higher incidence of PONV such as strabismus surgery. The incidence of nausea and vomiting in the first 24 hrs after strabismus surgery has been found to be as high as 72% in some studies (2). There are several possible reasons for this (3). Some prior studies showed PONV is still being experienced by 41–88% of patients following strabismus surgery when antiemetic prophylactics are not administered (4,5). Most pharmacologic treatment options cause undesirable side effects or are expensive. For this reason, nonpharmacologic treatment options for

PONV have been studied. Acupressure is one of the nonpharmacologic treatment options which is a therapeutic modality that has been used in China for thousands of years. Stimulation of P6 (Neiguan or pericardium-6) is reported to reduce PONV (6-8). There is great value in preventing PONV for the patient, for the surgery center or the hospital, and for the surgeon. The aim of this study was to compare the effectiveness of prophylactic P6 acupressure with ondansetron, metoclopramide and placebo in the prevention of vomiting and nausea after strabismus surgery under general anesthesia.

Patients and Methods

The study was approved by the Ethics Committee of the Tehran University of Medical Sciences, Tehran, Iran.

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Written informed consent was obtained from all patients. Two hundred patients, ASA physical status I or II, aged between 10 and 60 years, undergoing strabismus surgery in Farabi Hospital in 2007-2008 years, were included in this randomized, prospective, double-blind and placebo-controlled study.

Patients were randomized into four groups of 50 each using a table of random numbers:

Group I – Control

Group II – Metoclopramide

Group III – Ondansetron

Group IV – Acupressure

In Groups I, II and III, the spherical beads of the acupressure wrist bands were placed inappropriately on the posterior surface of both forearms 30 min prior to induction of anesthesia. Group II patients received metoclopramide 0.2 mg/kg *iv* just before induction. Group III patients received ondansetron 0.15 mg/kg *iv* just before induction. In Group IV patients, acupressure bands were applied at the P6 point on both forearms 30 min before induction of anesthesia and remove after 6 hours. Groups I and IV patients received normal saline 1 mL *iv* just before induction of anesthesia to maintain blinding. The acupressure wrist band has an adjustable strap 1.5 cm in width, a spherical plastic bead and a Velcro fastener to hold the bead in position (Figure 1). The treatment point P6 is located on the anterior surface of the forearm approximately 1 cm deep to the skin, 2 *body inches* proximal to the distal crease of the wrist joint between the two tendons of flexor carpi radialis and palmaris longus. *One body inch* is equal to the width of the interphalangeal joint of the patient's thumb.

The acupressure band was placed around the wrist, in such a way that the patient felt only a gentle pressure without discomfort. To confirm that the compression was not excessive, a pulse oximeter was placed on the index finger to confirm adequate blood flow.



Figure 1. Location of P6 meridian point and the proper application of the acupressure wristband (see methods for details)

Wrist bands were considered too loose and were tightened in order that a wedge of paper could fit between the pressure band and skin. Forearms were raised by 60 degree at the elbow and venous emptying occurred normally in all cases. Patients who refused to participate in the study or the ones with nausea or vomiting in the previous week, local infection near the acupuncture point, symptomatic medical illness, travel sickness, recovery more than 2 hours and patients receiving any medical therapy immediately before surgery were excluded. For all patients, we noted gender, body weight, duration of surgery, retching, nausea, vomiting while at the recovery and in the ward. All patients were premedicated with 1 mg midazolam and 2 mcg/kg fentanyl, and patients fasted for at least 6-8 hours prior to surgery. Heart rhythm (with ECG), noninvasive blood pressure, peripheral oxygen saturation and EtCO₂ were monitored. Anesthesia induction was achieved with 5 mg/kg thiopental (T) and 0.5 mg/kg atracurium which were administered via IV-line. Anaesthesia was maintained with halothane 1MAC in 50% N₂O–O₂ and atracourium 0.2 mg/kg when considered necessary. Patients were followed up at the recovery (0-2 hr) and in the ward (2-24 hr) during first 24 hours and were assessed for PONV. Postoperatively retching, nausea and vomiting were recorded by nursing staff who were unaware of the type of treatment given to the individual patients.

Statistical analysis

Age and other normally distributed data were compared with ANOVA. In this study Incidence of retching, nausea and vomiting and other nominal data were compared with Chi-squared or fisher's exact tests analysis. In this study *P* values less than 0.05 were considered significant. SPSS version 13.00 was used for all computations.

Results

Patients were comparable in all groups with regard to age, sex, weight and duration of surgery. There were no statistically significant differences with respect to demographic data between groups study (Table 1). Also, in this study, no patient was excluded after admission to the study. The incidence of vomiting at the recovery after the strabismus surgery in the placebo group was 16%. The metoclopramide, ondansetron and acupressure groups had a significant decrease in the incidence of vomiting during the recovery (6%, 0% and 0%, *P*=0.001), (Figure 2).

Comparing the efficacy of prophylactic P6 acupressure

Table 1. Demographic and other data

	Acupressure (n=50)	Metoclopramide (n=50)	Ondansetron (n=50)	Placebo (n=50)
Age	19.44 ± 10.12	17.68 ± 8.52	22.04 ± 11.97	18.06 ± 9.29
Sex; Male: Female	31:19	28:22	27:23	22:28
Weight; Kg	46.54 ± 19.91	43.52 ± 18.43	52.86 ± 17.56	45.46 ± 20.59
Duration of surgery ;Min	70 ± 40.54	63.30 ± 17.54	63.50 ± 17.12	71.30 ± 20.29

The incidence of retching, nausea and vomiting in the ward after strabismus surgery in the placebo group was 20%, 38% and 49%, respectively. The metoclopramide, ondansetron and acupressure groups showed a significant decrease in the incidence of retching during the recovery (10%, 2% and 8%, $P=0.025$, respectively). There is also a significant decrease in the incidence of nausea in metoclopramide, ondansetron and acupressure groups (14%, 18%, 12%, $P=0.004$) as well as vomiting (10%, 18%, 20%,

$P=0.000$, respectively) in the ward after strabismus surgery (Figure 3).

In the study the acupressure group, it has been noticed that the incidence of nausea and vomiting reached a significant decrease in compare to the placebo group during the time at the recovery and in the relevant ward. Comparison between acupressure and ondansetron groups implicated and proved no significant difference between acupressure and metoclopramide groups in incidence of PONV (Table 2).

Table 2. Comparison of incidence of PONV between acupressure group and study groups

	Metoclopramide (n=50)	Ondansetron (n=50)	Acupressure (n=50)	Placebo (n=50)	<i>P</i> value ap	<i>P</i> value ao	<i>P</i> value am
Retching (recovery)	0 (0%)	0 (0%)	2 (4%)	0 (0%)	0.153	0.153	0.153
Nausea (recovery)	3 (6%)	2 (4%)	0 (0%)	4 (8%)	0.041	0.153	0.079
Vomiting (recovery)	3 (6%)	0 (0%)	0 (0%)	8 (16%)	0.003	-	0.079
Retching (Ward)	5 (10%)	1 (2%)	4 (8%)	10 (20%)	0.084	0.401	0.727
Nausea (Ward)	7 (14%)	9 (18%)	6 (12%)	19 (38%)	0.003	0.169	0.766
Vomiting (Ward)	5 (10%)	9 (18%)	10 (20%)	23 (46%)	0.006	0.799	0.161

**P* value ap= acupressure to placebo, *P* value ao= acupressure to ondansetron, ,
P value am= acupressure to metoclopramide

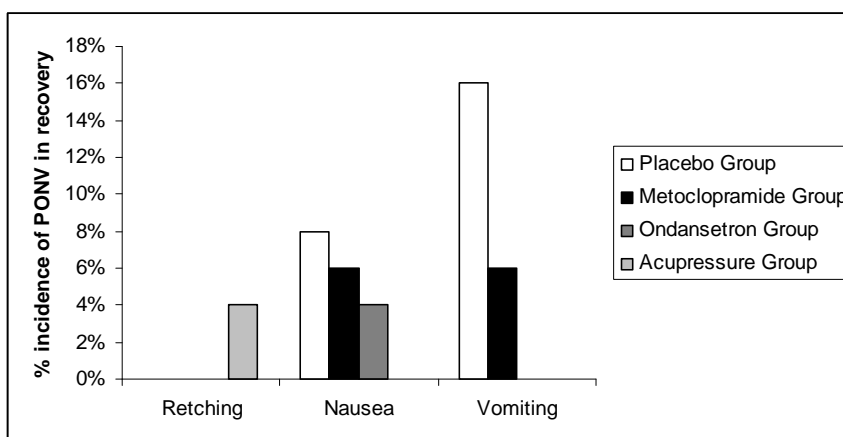


Figure 2. Comparison of incidence of PONV in recovery

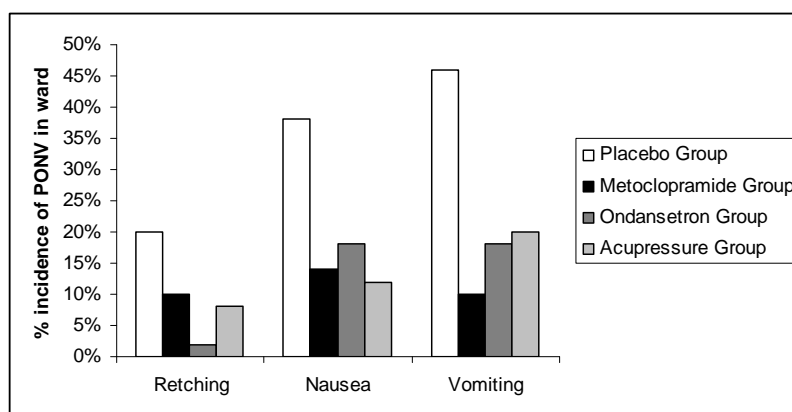


Figure 3. Comparison of incidence of PONV in ward

Discussion

PONV is costly, inconvenient, and uncomfortable. Pharmacologic prophylaxis may be expensive or have undesirable side effects. Acupressure wristbands may be effective in preventing PONV after short surgical procedures. There are no side effects from drugs, because there are no drugs. The only equipment needed is patient's hands. Patients can thus practice acupressure safely anytime, anywhere.

In this study, we found that incidence of PONV at recovery has been reduced statistically significant in acupressure group compared with placebo (incidence of nausea in acupressure group 0%, placebo group 8%, $P=0.041$, incidence of vomiting in acupressure group 0%, placebo group 16%, $P=0.003$, respectively). Lewis IH *et al.* (6) compared P6 acupressure with placebo and found that P6 acupressure did not reduce the incidence of postoperative vomiting in children undergoing strabismus surgery. On the other hand, Fan CF *et al.* (7) found that acupressure at the P.6 (Nei-Guan) point is an effective prophylaxis for postsurgical nausea and vomiting (incidence of PONV 23% in treatment group and 41% in placebo group; $P = 0.0058$) and therefore a good alternative to the conventional antiemetic treatment. Schlager A *et al.* (8) compared Korean hand acupressure with placebo and found that incidence of PONV was significantly lower (20%) compared with placebo group (68%). Ming JL *et al.* (9) compared acupressure with placebo and found a reduction in incidence rate of nausea from 73.0% to 43.2% and incidence rate of vomiting from 90.5% to 42.9% in acupressure group. Therefore we found that most studies that have been done so far show that acupressure is effective compared to placebo. In this study, the acupressure has been compared with ondansetron and we figured out that both acupressure and ondansetron

are of similar efficacy and there is no substantial difference between them. Agarwal A *et al.* (10) compared anti emetic efficacy acupressure at P6 similar to that of ondansetron 4 mg iv and no significant difference in incidence of PONV was observed between acupressure and ondansetron groups which confirms results of this study. Also comparison of acupressure with metoclopramide showed a similar efficacy in incidence of PONV. Sadighha A *et al.* (11) showed a similar anti emetic efficacy between acupressure and metoclopramide groups that confirms results of our study. Routine medications to prevent PONV are not recommended for several reasons including economic reasons, potential side-effects of antiemetic drugs and lack of increased patient satisfaction (12,13).

Therefore, non-pharmacologic strategies are also important. From the perspective of the surgeon there are fewer complications, better surgical results, less time dealing with the complaints, with the care, increased productivity, happier patients and less stress. The management of patients undergoing a strabismus surgery has been changed over recent years both from surgical and anesthetic management aspects. Traditionally speaking, these patients would spend most hours of the day and maybe the whole night in hospital after surgery. Strabismus surgery has been associated with one of the highest incidences of PONV of any surgical procedure. Our study demonstrates that the application of acupressure is effective in reducing PONV and may especially be useful in the late postoperative period. Further studies are necessary to prove the helpfulness of acupressure in decreasing the incidence of PONV among age groups after strabismus surgery. Further studies are also necessary to directly compare the severity of incidence of PONV between acupressure, ondansetron, metoclopramide and placebo groups after strabismus surgery.

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