Original Article



The effect of acupuncturing pericardium 6 (nei guan) on nausea and vomiting in patients under appendectomy operation with general anesthesia

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ABSTRACT

Introduction: the use of acupuncture is expanding. There are numerous studies in which acupuncturing pericardium 6 (nei guan) or simply P6 has been studied for its effect on the reduction of the nausea and vomiting after the surgical operations and the results have been found different, sometimes contradictory. The present study aims at determining the effect of P6 acupuncture's effect on the nausea and vomiting in patients after appendectomy operation. Materials and Methods: the present study is a double-blind clinical trial conducted on 150 appendectomy patients. The patients were randomly assigned to three groups, namely intervention, placebo and control. The intervention group underwent P6 acupuncturing half an hour before anesthesia induction. Telescopic needle was installed on P6 in the placebo group and the control group was not subjected to any acupuncturing effect. The intensity of the nausea and vomiting after surgery and till 24 hours afterwards was measured and recorded through administering questionnaires. The data were analyzed using SPSS software, version 16, based on descriptive and inferential statistics (ANOVA, Chi-Square and Kruskal-Wallis tests). Findings: no significant difference was observed between the three groups in terms of age, gender, BMI and education level. The intensity of the nausea and vomiting was smaller in the intervention group than in placebo and control groups during all hours after operation. The intensity of the nausea and vomiting was not found statistically significant during the first six hours post-operation (P=0.54) but it became significant during 7 to 12 hours after operation (P=0.00) and also during 13 to 24 hours after operation (P=0.009). In sum, seven patients had severe nausea and vomiting (one in intervention group, two in placebo group and four in control group). Conclusion: acupuncturing of pericardium 6 (nei guan) exerts a significant effect on the reduction of nausea and vomiting in patients under appendectomy operation.

Keywords: Acupuncture, appendectomy, nausea, vomiting, P6

Introduction

Post-operation nausea and vomiting is inter alia the most common side effects in the patients under general surgical operations and they are most often ignored ^[1]. Post-operation

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nausea and vomiting occurs in over 30% of the non-selected (emergency) patients and they are the most frequently seen side effects in patients having undergone anesthesia ^[2]. These side effects occur for a prevalence rate of sometimes over 70% in surgical operations like women certain surgeries, appendectomy and laparoscopy and eye surgery and also for a prevalence rate ranging from 20% to 30% in the rest of the surgeries. With no prophylactic intervention, post-operation nausea and vomiting occurs in a range from 40% to 90% prevalence in one third of the patients under inhalational anesthesia [3]. The main reasons contributing to nausea and vomiting after surgical operations are the anesthetic medications, ileus paralysis and injection of narcotics for relieving pain, the increase in vagus nerve activity,

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms. gastrointestinal stimulation, hypotension resulting from anesthetics and long duration of the surgical operation. The nausea and vomiting-specific risk factors are: being a female, a history of motion sickness, being a non-smoker, obesity, postoperation pain, the surgery type and abdominal distension ^[4, 5]. The outcomes of post-operation nausea and vomiting are: delay in dismissal from recovery ward, the increase in hospital stay period, the increase in pulmonary aspiration likelihood, dehydration, imbalance of water and electrolyte, delay in wound healing, pain increase, discomfort and anxiety all of which might result in a bitter experience of the surgical operation for the patient. The use of drugs is the only effective method for preventing and treating nausea and vomiting after surgical operation but they are also accompanied by many side effects [6]. The most commonly administered medications in controlling nausea and vomiting are: nk-1 (neurokinin 1) receptor antagonists (aprepitant), anticholinergic (scopalamine), antihistamine (hydroxyzine), phenothiazine (promethazine), butyrophenones (droperidol), prokinetics (metoclopramide), serotonin antagonists (ondansetron), vasopressors (ephedrine) and corticosteroids (dexamethasone), each having its own specific side effects ^[7]. For example, acute heart arrhythmia has been reported with the use of droperidol and haloperidol. Headache, epigastric pain and dehydration are the side effects of taking aprepitant. The serotonin antagonists, except palonosetron, cause lengthening of heart's QT interval. Metoclopramide might lead to severe arrhythmia and cardiac arrest and promethazine can result in vascular necrosis that causes tissue generation requiring surgical grafting, sometimes amputation ^[1, 8]. On the other hand, the use of such medications has been found along with the high treatment costs accompanied by other side effects like extrapyramidal side effects, blood pressure drop, headache, constipation, fatigue, mouth dryness, dizziness, diarrhea, anxiety, restlessness, extreme sedition and mild increase in hepatic enzymes that restrict their uses [9, 10]. Also, the studies have shown that although medicinal treatments counteracting nausea and vomiting cause lessening of nausea and vomiting, they do not remove such states completely. For now, there is no alternative treatment method for completely preventing and treating nausea and vomiting ^[1]. Therefore, the use of non-medicinal methods concomitantly with medications has been recommended for lowering nausea and vomiting [11]. The advised non-medicinal methods include listening to music, relaxation techniques, hypnotism, Yoga, defecation of the stomach before operation, medicinal herb-assisted treatment, acupressure and acupuncture that are widely used for reducing nausea and vomiting ^[1, 12-17]. Acupuncture and acupressure are methods of supplementary medicine applied to treat nausea and vomiting resulting from morning disease, chemotherapy, general anesthesia and morphine administration post-surgical operation. P6 is a point in Chinese meridian used for treating nausea and vomiting [3]. China's acupuncture and Korea's acupressure have mentioned P6 and K-K9 points, respectively, for reducing the nausea and vomiting and the Korean

acupressure knows K-K9 as equivalent to Chinese P6 [18, 19]. There are numerous studies performed regarding the effect of acupressure on nausea and vomiting. In a study by Sadri et al (2006), called "the effect of acupressure on post-diagnostic laparoscopy feelings of nausea and vomiting under anesthesia", it was reported that acupressure does not play an important role in controlling nausea and vomiting ^[20]. In a study by Naseri et al (2007), named "the effect of acupressure on nausea and vomiting after orthopaedic surgical operation", it was demonstrated that the use of acupressure on P6 point is useful for decreasing nausea and vomiting in adults after orthopaedic operations ^[21]. Nikbakht Nasr Abadi et al (2011), in a study titled "the effect of acupressure on the reduction of nausea in patients under strabismus surgical operation", reported that acupressure is effective on the reduction of nausea intensity after surgery ^[22]. It was reported in a study by Agarwal A., et al (2002), with the objective of comparing the effect of acupressure, that P6 point stimulation like ondansetron administration causes reduction in nausea and vomiting within the first six hours after gall bladder laparoscopic surgery ^[23]. In a study carried out by Chen et al¹ (2015) under the title of "the effect and the comparison of electro-acupuncture points with the equivalent points of acupressure for coping with nausea and vomiting stemming from chemotherapy", it was reported that the stimulation of the pressure points is a reliable method for fighting nausea and vomiting resulting from chemotherapy ^[24]. In 1990, Dundee suggested that acupressure or acupuncture on P6 point is effective as an anti-vomiting standard in treating nausea and vomiting ^[25]. But, it was concluded differently in the later studies and the effect of stimulating P6 point on nausea and vomiting is yet to be proved in a decisive manner ^[26]. The review studies and the clinical trials aiming at the determination of the effect of acupressure and acupuncture on P6 point have occasionally presented different, sometimes contradictory, results. Thus, the present study was carried out with the objective of determining the effect of P6 point acupuncture on nausea and vomiting in patients after appendectomy operation as the most common emergency operation performed on the abdominal region.

Materials and Methods

The present study is a randomized double-blind clinical trial that has been conducted on 150 appendectomized patients who had referred to Imam Khomeini (may Allah sanctify the sacred soil of his tomb) Hospital during a three-month period. The appendectomy candidates were entered to the study in case of being qualified for the study inclusion criteria, including age, in a range from 15 to 60 years, having the ability to read and write and lack of hepatic diseases, renal diseases, digestive tract diseases, malignant cerebral diseases, lack of nausea and vomiting during the past week, lack of receiving anti-nausea and anti-vomiting drugs for a period of 24 hours before surgery, not being undergone acupuncture during three months before surgery, not being NPO for at least six hours before surgery, lack of anatomic defect in P6 point and also expression of consent by the patients and their corresponding physician. The study exclusion criteria were as follows: non-routine incision (laparotomy), administration if drugs other than what is routinely prescribed, diagnosis of appendix rupture during operation (peritonitis), operation duration of more than two hours, blood pressure drop for over 20% of the baseline (before operation), hemorrhage for over 10% of the patient's blood volume and systolic blood pressure drop for less than 80 mmHg. The patients who were found with severe nausea and vomiting were excluded from the study. Appendectomy candidates were consecutively entered the study and randomly assigned to three groups: intervention, placebo and control. To do so, sextuple block randomization methods were utilized. The sampling was continued to the completion of the study sample volume in all three groups. After the patients were admitted to the operation room and half an hour before anesthesia induction, the special acupuncture needle (1.5-cun needle for a depth of 0.8 cun) was installed in a 30-degree angle on the P6 points on the patients' two hands after disinfecting the needle piercing location with alcohol and the P6 was stimulated every five minutes by spinning the needle (180° to 360° and vice versa) every time for 30 seconds. After the expiration of stimulation time, the needle was extracted and the stimulation place was again disinfected using alcohol. It is worth mentioning that the researcher had passed a course on acupuncture before the commencement of the study. The telescopic needles were used for placebo group patients and these needles were placed on P6 points. It has to be pointed out that the telescopic needles bounce back after hitting the P6 point and feel as if the needle is inserted. No intervention was taken for the control group patients. P6 point is located within a 2 cun distance (each cun is equivalent to the thumb and about 2.5 cm) in the upper section of the wrist's transversal wrinkle along the median nerve path between the palmaris longus and flexi carpi radialis flexor tendons. All the patients were subjected to general anesthesia using premedication drug (Midazolam, 0.05 mg/kg and fentanyl, 2mcg/kg) and anesthesia induction using thiopental sodium (5mg/kg) and intubation with atracurium (6.0 mg/kg). To maintain anesthesia, there was made use of a gas combination, O2+N2O, each 50%, and isoflurane inhalation gas in a range of one MAC (minimum alveolar concentration). Ringer lactate serum was prescribed based on calculations of the following items: anesthesia induction and maintenance, pre-surgery deficit, intravascular compensatory expansion volume, surgery procedure (third space), estimation of blood loss during operation. The patients were asked to lie in a supine position and the general plan of the study was explained to each patient without it being clear to which group s/he belongs. After the termination of surgery and in the onset of the recovery care at drug administration time, the patients were transferred to their corresponding wards using one method of transportation by a

trained group (ward nurse and the patient carrier) so as to prevent the effect of any motion and movement on the nausea and vomiting of the patients (the patients were generally in a supine position and they were turned to lie on their sides in case they were found having nausea or vomiting). It is noteworthy that the patients who had nausea and vomiting after surgery were treated using the routine ondansetron (0.6 mg/kg), if it was deemed necessary by the corresponding physician and they were kept in the course of study if no violation of the drug halflife (3 hours) was occurred. The measurement tools were a demographic questionnaire for recording the patients' personal characteristics, a visual analogue scale (VAS) for measuring the intensity of the nausea and acupuncture questionnaire designed by Roads (INV-2) for measuring the times, intensity and duration of vomiting and gagging. A visual 10-number ruler was used to determine the intensity of nausea after the termination of anesthesia in6, 12 and 24 hours post-operation; number zero being indicative of having no feeling of nausea and 10 indicating the most severe state of nausea. The patients were asked to specify their nausea intensity by drawing a multiply symbol on the ruler; furthermore, the questionnaire form designed by Roads was distributed and completed after anesthesia and within 24 hours afterwards by recovery unit colleague and the coworker present in the corresponding wards. The reliability and validity of Roads questionnaire was evidenced appropriate in the study carried out by Zhu and Suken (2001) through assessing the face and content validity rates. The face validity of the instrument was also confirmed in a study by Nouri (2005), as well [27, 28]. In prior studies, the reliability and validity coefficients of the questionnaire were found equal to 0.84 and in the study by Hana et al a value equal to 0.91 was acquired ^[1]. After the termination of sampling, the data were collected and coded and analyzed in SPSS 16. The data were analyzed using descriptive and inferential statistics (ANOVA, chi-square and Kruskal-Wallis tests).

Findings

The study was carried out on 150 patients who had been assigned to three groups, named intervention, placebo and control (each containing 50 subjects). The average age of the patients was 25.09 (intervention group, 25.54, placebo group, 25.28, and control group, 24.46) (table 1). The age differences between the three groups were not statistically significant (P=0.646). The study samples (including 76 male patients and 74 female patients) were homogenous in terms of gender and no significant difference was evidenced between them (P=0.373) (table 2). Also, the three groups were homogenous in terms of body mass index (P=0.692) and education level (P=0.809) and no significant difference was documented between them in this regard (tables 3&4). The intensity of nausea was smaller in intervention group as compared to placebo and control groups during the first six hours postintervention but the difference was not statistically significant (P=0.150). The intensity of nausea was lower in intervention

group in respect to the placebo and control groups within 7 to 12 hours after surgery and the difference was found statistically significant (P=0.00). the intensity of nausea in the intervention group was also found smaller in the intervention group in contrast to placebo and control groups within 13 to 24 hours after surgery and the difference was found statistically significant (P=0.009). The intensity of vomiting, as well, was found lower in the intervention group in comparison to the placebo and control groups during the first six hours after the surgery but the difference was not statistically significant (P=0.380). The intensity of vomiting was found smaller in the intervention group as compared to the placebo and control groups within 7 to 12 hours after surgery and the difference was found statistically significant (P=0.010). the intensity of vomiting was also found lower in the intervention group as compared to the placebo and control groups within 13 to 24 hours after the intervention and the difference was not statistically significant (P=0.604). The intensity of nausea and vomiting was lower during all hours after surgery for the intervention group in respect to the placebo and control groups, however, it was not statistically significant during the first six hours after surgery (P=0.54) but it was significant within 7 to 12 hours after surgery (P=0.00) and within 13 to 24 hours after surgery (P=0.009). In sum, seven patients had severe vomiting and nausea (one individual in the intervention group, two individuals in placebo group and four individuals in control group).

Discussion

In the present study, the stimulation of P6 point based on acupuncture method was found clinically reducing the mean values of nausea and vomiting intensity in patients after surgery and it lasted for 24 hours after surgery. Although it was not statistically significant during the first 6 hours after surgery, the mean values of nausea and vomiting were found reduced within 7 to 12 hours and 13 to 24 hours after surgery that was statistically significant. Based on the researcher's studies, this paper is the first research paper using acupuncture for stimulating P6 point so that its effect could be determined on nausea and vomiting in patients under open appendectomy with general anesthesia. The other studies in this regard have used acupressure using acuband, exertion of pressure by fingers and electro-acupuncture to stimulate P6 point. The other researches have investigated the effect of stimulating P6 point on nausea and vomiting in such other surgical operations as strabismus, woman surgery, cesarean, stapedectomy, cholecystectomy, laparoscopy, thyroid and patients undergoing chemotherapy. The studies conducted on P6 point for the determination of its stimulation effect on nausea and vomiting have reported different, sometimes contradictory results. Lee et al (1999) undertook a meta-analysis and observed that the non-medicinal methods, like acupuncture, electrical acupuncture, nerve stimulation through skin (TENS) and acupressure, exert higher effects in contrast to placebo in preventing nausea and vomiting during the first hour after surgery in adults but no such an effect was evidenced for children [29]. Nikbakht Nasr Abadi et al (2011) reported in a study called "the effect of acupressure on the reduction of nausea after strabismus surgery", that the acupressure is effective on reducing nausea after surgery [30]. Their conclusion conforms to what has been found herein. It was reported in another study by Sadri et al (2006) that acupressure plays a significant role in controlling nausea and vomiting after surgery [20]. It was reported in the study by Samad et al (2004) that the method is not effective on nausea and vomiting after cholecystectomy [31]. But, the other studies reported its significant effectiveness have on adenotonsillectomy, women surgeries and nausea and vomiting after chemotherapy [24, 32, 33]. Generally, the various studies regarding the effect of P6 point stimulation on nausea and vomiting have not come to a clear-cut conclusion. In some studies, the stimulation of P6 point has been undertaken after the patients retrieved their consciousness and the effect of anesthetics was removed so as to more effectively stimulate the nausea and vomiting center in brain. In some other researches, the stimulation of the point has been conducted before general anesthesia induction because it has been believed that the beta level of endorphin during the first 20 minutes after P6 point stimulation would hit its highest level hence it would sensitize the chemical receptors extant in the region pertinent to nausea and vomiting in brain and if the point is previously stimulated by the use of anesthetics then it will be hard to reduce the sensitivity of that region. In the present study, the stimulation of P6 point was carried out half an hour before anesthesia induction and the results signified the reduction in the mean values of nausea and vomiting intensities after surgery that lasted for a period of 24 hours. The results of the present study are consistent with the findings obtained in studies by Adib Haj Bagheri et al (2013) called "the effect of P6 acupressure on nausea and vomiting in patients under appendectomy" [34].

Conclusion

The results of the present study indicated that P6 stimulation using acupuncture can reduce the intensity of nausea and vomiting in patients undergoing appendectomy under general anesthesia. The reduction was found statistically significant during 7 to 24 hours after surgery. In clinical terms, the stimulation of P6 causes reduction in nausea and vomiting postappendectomy and the effect lasts for a period of 24 hours thereafter. Therefore, it is suggested that the nurses and the treatment cadre take acupuncture and acupressure courses in hospitals so that the method can be applied along with medications to reduce the nausea and vomiting in patients. The use of acupuncture after surgery and with a larger sample volume might be followed by more significant results. Thus, it is suggested that researches be carried out in future using acupuncture after surgery and with larger volume of study subjects.

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Table 1: the average age of the intervention, placebo and								
control groups								
	95% confidence							
Group	N	Mean	Standard	Standard	interva	for mean	Min	Max
Group	.,	mean	deviation	error	Lower	Upper		max
					bound	bound		
Intervention	50	25.54	6.041	0.854	23.82	27.26	15	47
Placebo	50	25.28	6.350	0.898	23.48	27.08	17	44
control	50	24.44	6.021	0.851	22.73	26.15	15	39
Total	150	25.09	6.116	0.499	24.10	26.07	15	47

Table 2: patients' gender in intervention, placebo and							
-	control groups						
		Patie	nt gender	T-4-1			
		Male	Female	Total			
Patient group	Intervention group count	25	25	50			
	% within patient group	50.0%	50.0%	100.0%			
	Placebo group count	29	21	50			
	% within patient group	58.0%	42.0%	100.0%			
	Control group count	22	28	50			
	% within patient group	44.0%	56.0%	100.0%			
Total count		76	74	150			
% within patient group 50.7% 49.3% 100.09				100.0%			

Table 3: patients' education levels in intervention,							
placebo and control groups							
	Patient level education						
	Third				Master		
	grade	Diploma	Associate	Bachelor	degree	Total	
	middle	and less	nosociate	Bucheloi	and		
	school				higher		
Intervention							
group count	7	23	4	15	1	50	
% within	14.0%	46.0%	8.0%	30.0%	2.0%	100.0%	
patient group Placebo group							
count	7	21	5	14	3	50	
% within	14.0%	42.0%	10.0%	28.0%	6.0%	100.0%	
patient group Control group							
count	4	20	4	19	3	50	
% within	8.0%	40.0%	8.0%	38.0%	6.0%	100.0%	
patient group							
Total count % within	18 12.0%	64 42.7%	13 8.7%	48 32.0%	7 4.7%	150 100.0%	
patient group							

Table 4	: BMI of the	interventio groups	on, place	bo and c	ontrol
		Body Mass Index			
			BMI equal and less than 27.5	BMI more than 27.5	Total
	Intervention group	Count % within patient group	36 72.0%	14 28.0%	50 100.0%
Patient group	Placebo group	Count % within patient group	32 64.0%	18 36.0%	50 100.0%
	Control group	Count % within patient group	34 68.0%	16 32.0%	50 100.0%

Table 5: mean ranks of vomiting in intervention,placebo and control groups

Patient group		Ν	Mean rank
	Intervention	50	64.25
Score of ponv in 6h after	Placebo	50	79.74
surgery	Control	50	82.51
-	Total	150	
	Intervention	50	56.64
Score of ponv between 7 and	Placebo	50	82.36
12 hours after surgery	Control	50	87.50
	Total	150	
	Intervention	50	62.56
Score of ponv between 13 and 24 hours after surgery	Placebo	50	83.30
	Control	50	80.64
	Total	150	

Table 6: mean ranks of nausea in intervention, placebo and control groups

0 1		
	Ν	Mean rank
Intervention	50	66.51
Placebo	50	78.73
Control	50	81.26
Total	150	
Intervention	50	56.64
Placebo	50	82.36
Control	50	87.50
Total	150	
Intervention	50	62.56
Placebo	50	83.30
Control	50	80.64
Total	150	
	Intervention Placebo Control Total Intervention Placebo Control Total Intervention Placebo Control Total Total	N Intervention 50 Placebo 50 Control 50 Total 150 Intervention 50 Placebo 50 Control 50 Placebo 50 Control 50 Total 150 Intervention 50 Placebo 50 Control 50 Placebo 50 Control 50 Total 150

Table 7: mean ranks of vomiting in intervention,	
placebo and control groups	

1	0	1	
Patient gro	up	Ν	Mean rank
	Intervention	50	64.25
Score of vomiting in 6h after surgery	Placebo	50	79.74
	Control	50	82.51
	Total	150	
	Intervention	50	56.64
	Placebo	50	82.36
7 and 12 hours after surgery	Control	50	87.50
6,5	Total	150	
Score of vomiting between 13 and 24 hours after surgery	Intervention	50	62.56
	Placebo	50	83.30
	Control	50	80.64
	Total	150	



Figure 1: the diagram of nausea and vomiting intensity means in intervention, placebo and control groups

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