ARAŞTIRMA MAKALESİ/ORIGINAL RESEARCH

DOI: 10.5505/ktd.2022.87523
Kocaeli Med J 2022;11(3)238-246

Effect of the Timing of Acupressure Application to P6 on Postoperative Nausea and Vomiting in Laparoscopic Cholecystectomy

Laparoskopik Kolesistektomide P6 Akubasınç Uygulama Zamanının Postoperatif Bulantı ve Kusma Üzerine Etkisi

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ÖZ

GİRİŞ ve AMAÇ: Postoperatif bulantı kusma, genel anestezi sonrası görülen en sık ikinci komplikasyondur. Laparoskopik kolesistektomi vakalarında sık görülmekle birlikte postoperatif dönemde hasta memnuniyetini etkileyen önemli bir morbidite sebebidir. Çalışmamızda laparoskopik kolesistektomi vakalarında el bileğinde P6 akupunktur bölgesine akubasınç uygulama zamanının postoperatif bulantı kusma üzerine etkilerini prospektif olarak araştırmayı planladık.

YÖNTEM ve GEREÇLER: 18 yaş üstü elektif laparoskopik kolesistektomi uygulanacak 150 hasta çalışmaya dahil edildi. Hastalar 50 hasta indüksiyon öncesi (grup 1), 50 hasta indüksiyon sonrası (grup 2), 50 hasta cerrahi sonrası (grup 3) olmak üzere randomize olarak 3 gruba ayrıldı. Grup 1' de hastalara anestezi indüksiyonundan önce P6 akubasınç bilekliği uygulanırken, aynı işlem grup 2' de indüksiyondan sonra, grup 3' te ise cerrahi bitiminde uygulandı. Postoperatif 24 saat boyunca postoperatif bulantı kusma sıklığı, şiddeti ve antiemetik ihtiyacı olup olmadığı kaydedildi.

BULGULAR: Gruplar, bulantı skoru ve kurtarıcı antiemetik ihtiyacı yönünden değerlendirildiğinde, grup 2' de en düşük bulantı skoru olduğu gözlemlendi ve grup 3' e göre daha düşük değerler bulunmakla birlikte (p = 0,046, p = 0,021), grup 1' den farklı olmadığı gözlemlendi. Diğer saatlerde gruplar arasında bulantı skoru ve antiemetik ihtiyacı açısından farklılık gözlemlenmedi. Kusma, öğürme açısından gruplar arası farklılık gözlemlenmedi.

TARTIŞMA ve SONUÇ: P6 akubasınç yönteminin ameliyat öncesinde uygulanmasının özellikle erken dönem postoperatif bulantı kusma kontrolünde daha etkin olduğu ve antiemetik tedavi ihtiyacını azaltmada etkili olduğu sonucuna varılmıştır.

Anahtar Kelimeler: postoperatif bulantı kusma, sea band, laparoskopik kolesistektomi, akubasınç, akupunktur

ABSTRACT

INTRODUCTION: Postoperative nausea and vomiting (PONV) are the second most common complications following general anesthesia. PONV has a high incidence rate in laparoscopic cholecystectomy cases and is an important cause of morbidity that significantly decreases patient satisfaction in the postoperative period. We prospectively investigated the effects of the timing of acupressure application to the P6 acupuncture point on the wrist for the prevention of PONV.

METHODS: This study included 150 adults who were aged 18 years or older, who were scheduled for elective laparoscopic cholecystectomy under general anesthesia. Patients were randomly assigned to three groups of 50 patients: pre-induction (group 1), post-induction (group 2), and post-operative (group 3). While the acupressure wristband was applied to the patients in Group 1 before anesthesia induction, the wristbands were applied to Group 2 and Group 3 after anesthesia induction and at the end of the surgery, respectively. During postoperative 24 hours, the incidence and severity of nausea/vomiting and the need for antiemetic therapy were recorded.

RESULTS: The lowest median nausea score was found in group 2, which significantly differed from group 3 (p= 0.046), but not from group 1. This was also the case for the need for antiemetic therapy (p= 0.021). There were no differences among the groups at other specified time points. The incidence of retching or vomiting was similar across the groups.

DISCUSSION AND CONCLUSION: Acupressure applied before surgery on the P6 point seems to be effe

Keywords: postoperative nausea vomiting, wristband, laparoscopic cholecystectomy, acupressure, acupuncture

Kabul Tarihi: 01.02.2022

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INTRODUCTION

Postoperative nausea and vomiting (PONV) are common complaints after general anesthesia, with an overall incidence of 20-30% which can be as high as 70% in patients of high-risk groups (1). PONV adversely affects the patient's comfort, can lead to serious complications such as dehydration, risk of pulmonary aspiration, metabolic imbalance, surgical site stress, venous hypertension, and bleeding. It can also increase postoperative pain due to patient motion. Additionally, PONV causes the extension of the time to postoperative recovery which may result in higher costs associated with postoperative recovery unit stay. For these reasons, it is very important to prevent from and treat PONV (2-5).

The incidence of PONV depends on not only the type of anesthesia and surgery but also patient characteristics. The incidence rate of PONV is high in upper abdominal surgeries, especially laparoscopies. Pharmacological treatment modalities for PONV have some disadvantages, e.g. extrapyramidal side effects, prolonged sedation and hypotension, QT prolongation on electrocardiogram (ECG), and high cost (6). Due to such disadvantages, alternative treatment options have been investigated. Acupuncture is a treatment option, and in 2002 World Health Organization (WHO) introduced nausea and vomiting in the list of symptoms effectively treated by acupuncture (7). Furthermore, acustimulation and acupressure can be applied noninvasively as an alternative to acupuncture. Noninvasive methods are getting increasingly preferred in the prophylaxis and treatment of PONV, as they have no drug-related side effects, they do not result in pain and they are better tolerated.

Even though antiemetic prophylaxis has become a routine for postoperative patients who are at high risk for postoperative nausea and vomiting, PONV is still a major challenge for patients (8).

The acupuncture point P6, also known as the "neiguan" point, is on the pericardium meridian used for antiemesis, including hyperemesis gravidarum. The acupuncture point P6 is located on the volar surface of the forearm, 3 fingerbreadths proximal to the distal wrist fold, between flexor carpi radialis and palmaris longus muscle tendons, located about 1 cm under the skin. It can be stimulated by acupuncture, acupressure, or acustimulation (9). Acupressure and acustimulation have been shown to be comparable in the prevention of nausea and vomiting, without causing any side effects (10,11). Data from the literature supports that acupuncture shows the best PONV-reducing effect in the early postoperative period. The aim of the present study was to determine the effect of the timing of acupressure application on PONV and whether it decreases postoperative antiemetic use or not.

METHODS

This prospective randomized double-blind study was conducted in Marmara University Pendik Training and Research Hospital with the decision of the Ethic Committee (number 09.2017.13 dated 21.09.2017). A written informed consent form was obtained from each patient included in the study. A total of 150 patients with an American Society of Anesthesiologists (ASA) score of I-III who were scheduled for elective laparoscopic cholecystectomy were enrolled. Patients with nausea or vomiting, or those who had taken antiemetic or glucocorticoids during the 24-hour preoperative period, pregnant or breastfeeding women, those with a Body Mass Index (BMI) >35 kg/m2, those with severe cardiovascular, pulmonary, renal, or hepatic derangement, those with central nervous system injury, vertebrobasilar insufficiency or vestibular disease, and patients for whom the operation was switched to laparotomy were not included in the study. There are some studies in the literature about BMI and PONV relationship, however as there is still no consensus about it, we excluded obese patients from the study (12).

A detailed medical history was obtained and patients' age, height, body weight, and PONV risk factors (history of PONV or motion sickness, hyperemesis gravidarum, tobacco use, etc.) were questioned and noted in the case report form.

Patients were allocated into three groups via a computer-based randomization system. All patients received active wristbands with a small ball (Sea-Band®, UK Ltd, Leics, England), which were applied on their wrists bilaterally to exert acupressure on the P6 point (Figures 1 and 2). In group 1, the wristbands were applied to the patients before anesthesia induction and removed at the 24th hour. In group 2, the patients received sham wristbands before anesthesia induction and those were replaced by real ones after anesthesia

induction which were removed at the 24th hour. In group 3, the patients received sham wristbands before induction, which were replaced by real ones at the end of the operation just before patients recover from anesthesia, and those bands were again removed at the 24th hour.

Figure 1: P6 acupressure wristband

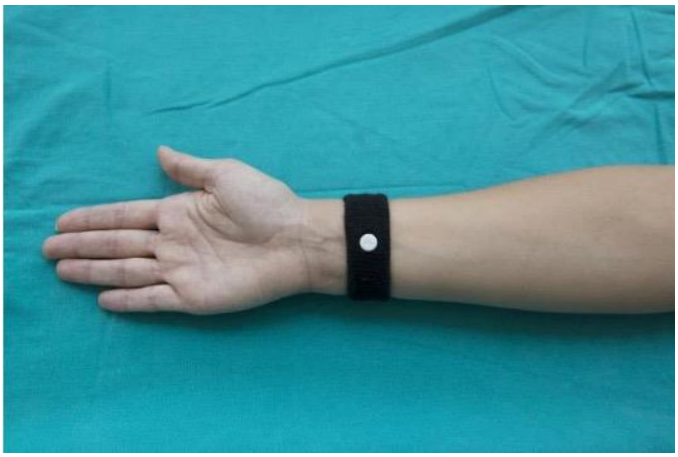

Figure 2: Application of an acupressure wristband on the Pericardium 6 (P6) acupressure point on the patient's wrist

The wristbands were applied to the patients'' wrists in a way that they contacted the skin at the P6 acupuncture point, located 2-3 cm proximal to the wrist between flexor carpi radialis and palmaris longus tendons. The sham wristband appeared the same as the real one but there was not a ball inside that is dedicated to providing acupressure. Using sham wristbands ensured that the study team and the patients were blinded.

Verbal Rating Scale (VRS) was used for the evaluation of PONV (13). Nausea was graded on a 10-point scale, where no nausea was given 0 points, whereas worst ever nausea was given ten points. Rescue antiemetic was administered if the VRS score was three or above. Vomiting/retching was scored as 0 for none, and 1 standing for at least one attack.

Patients were visited and informed about the study, and their written informed consent was obtained. A 20-gauge intravenous (IV) cannula was inserted into the hand dorsum or antecubital area, and a balanced crystalloid solution infusion was started. An eight-hour fasting period was provided, and all patients were premedicated with midazolam 1 mg intravenously. The acupressure wristbands were introduced to the patients, and it was emphasized that they would have to wear the wristbands for 24-hour. All patients underwent standard anesthesia protocol under standard ASA monitorization. Heart rate (HR), noninvasive blood pressure, peripheral oxygen saturation (SpO2), end-tidal carbon dioxide tension (EtCO2), CO2 insufflation pressures were noted every 5 minutes, then every 10 minutes. Hypotension was defined as systolic blood pressure (SBP) under 90 mm Hg or decline higher than 20% from the basal value. In case of hypotension, infusion solutions were increased first, and if the patient was not responsive, ephedrine 5 mg IV titration was administered. Bradycardia was defined as HR below 50 beats/min and was treated with atropine 0.5 mg intravenously. An IV anesthesia induction protocol was used for the patients based on their lean body weight, consisting of propofol 2 mg/kg, fentanyl 1 µg/kg, rocuronium 0.6 mg/kg. Volatile-narcotic-based anesthesia maintenance was selected, with 2% sevoflurane in 1:1 proportion of oxygen (O2) and nitrogen (N2), and remifentanil 0.2 µg/kg/min infusion. Prophylactic antiemetic was not used. For analgesia, acetaminophen 1 g and tramadol 0.5 mg/kg were infused intravenously. At the end of the operation, sevoflurane and remifentanil infusions were discontinued, and ventilation was sustained with 100% O2. Neuromuscular blockade was antagonized with sugammadex 2 mg/kg IV bolus just before extubation. Side effects, if any, were recorded. In the postoperative period, the patients were observed in the recovery room for 2 hours. Hemodynamic parameters were recorded every 5 minutes for the first 15 minutes and every 15 minutes thereafter. Nausea scores were also recorded. Rescue antiemesis with metoclopramide 20 mg IV was provided for the cases with a VRS score of > 3 for

retching or vomiting. The patients that required antiemetics and rescue antiemetic doses applied in 24 hours were also recorded. Furthermore, the incidence of PONV was recorded at the 0, 2, 6, and 24th hours in the postoperative period.

The Statistical Package for the Social Sciences (SPSS) 25.0 (IBM Corporation, Armonk, New York, USA) was used for the analysis of study data. The Shapiro-Wilk test was used to define the normal distribution of data, and Levene's test for the homogeneity of variance. For comparison of quantitative data among more than two groups, the One-Way ANOVA was used as a parametric test and the Kruskal-Wallis H Test was used as a non-parametric test with Monte Carlo Simulation results. For intergroup comparison of more than two repeated measurements of dependent variables, the Friedman and Cochran's Q Tests were used with Monte Carlo Simulation results, whereas the Dunn's Test was used for Post Hoc analysis. For comparison of categorical variables, the Pearson's Chi-Square and Fisher-Freeman-Holton Tests were used with the Monte Carlo Simulation technique, and column ratios were compared and expressed with Benjamini-Hochberg-corrected P values. Quantitative variables were expressed as mean ± standard deviation (SD) and median range (minimum-maximum) and categorical variables were expressed as numbers (n) and percentage (%). Variables were analyzed in a 95% confidence interval (CI), and the P-value under 0.05 was considered statistically significant. Power analysis was not performed. Instead, similar studies in the literature (with patient numbers of 150-210) were considered as references, and as a result, a total of 150 patients were decided to be recruited into the study.

RESULTS

A total of 150 patients were recruited, and all patients successfully completed the study. Patients' demographic variables are presented in Table 1, along with their ASA status, history of PONV and motion sickness, smoking, menstruation status, as well as the duration of anesthesia and surgery. No significant difference was detected among the three groups regarding the above-listed variables except for the ASA status, which was significantly different among the groups ($p < 0.05$). However, the number of ASA III patients was statistically significantly higher in the pre-induction group. This group was comparable with the other two regarding PONV risk factors, and this maldistribution of the patients was considered to be incidental and to have no effects on the results.

Risk factors for PONV, including female sex, menstruation, motion sickness were evenly distributed among the groups.

We investigated the effect of acupressure applied in three different perioperative periods, i.e. before induction, after induction, and after the completion of surgery on PONV. In previous studies, acupressure has been shown to have beneficial effects on PONV in high-risk patients comparable with IV ondansetron and metoclopramide, so we did not use a control group in our study (14,15).

Postoperative nausea scores (according to VRS) of the patients, measured at the 0th, 2nd, 6th, and 24th hours are presented in Table 2. In group 2, the 6th-hour VRS score (0.3) was lower than that in group 3 (0.8), and this difference was statistically significant ($p = 0.046$). No other significant difference was observed.

Data regarding postoperative vomiting/retching for patients are presented in Table 3. No significant difference was observed among the three groups.

Regarding the postoperative antiemetic requirement, the 6th-hour values (7) of group 2 were significantly lower compared to group 3 (19) ($p = 0.021$). No significant difference was detected for the other values.

No adverse effects related to the wristband, such as local irritation, erythema, contact dermatitis, or wrist pain, were observed. Similarly, no hemodynamic complications, such as hypotension or hypertension, bradycardia, or tachycardia were observed.

Table 1: Demographic Data, Asa Status, History of PONV and Motion Sickness, Smoking, Menstruation Status, Anesthesia and Surgery Durations of the Patients

		Group 1 (n = 50)	Group 2 (n = 50)	Group 3 (n = 50)	P
Sex	Male	17 (34.0)	17 (34.0)	8 (16.0)	0.082
	Female	33 (66.0)	33 (66.0)	42 (84.0)	
Age (years)		13.01 ± 50.74	13.85 ± 47.68	12.99 ± 51.36	0.336
Height (cm)		163.5 (153-182)	163.0 (150-182)	160.0 (147-180)	0.384
Weight (kg)		79.0 (50-130)	75.5 (50-130)	78.0 (50-100)	0.356
ASA	I	5 (10.0)	8 (16.0)	12 (24.0)	<0.001*
	II	39 (78.0)	42 (84.0)	38 (76.0)	
	III	6 (12.0)**	0 (0.0)	0 (0.0)	
History of PONV	Yes	6 (12.0)	5 (10.0)	2 (4.0)	0.483
	No	44 (88.0)	45 (90.0)	48 (96.0)	
History of motion sickness	Yes	7 (14.0)	5 (10.0)	4 (8.0)	0.721
	No	43 (86.0)	45 (90.0)	46 (92.0)	
Smoking	Yes	20 (40.0)	17 (34.0)	10 (20.0)	0.084
	No	30 (60.0)	33 (66.0)	40 (80.0)	
Menstruation	Yes	7 (14.0)	6 (12.0)	5 (10.0)	0.095
	No	43 (86.0)	44 (88.0)	45 (90.0)	
Anesthesia duration (min)		82.5 (55-135)	96.5 (60-130)	90.0 (50-122)	0.153
Surgery duration (min)		68.5 (30-120)	80.0 (40-100)	70.5 (20-105)	0.083

Note: Categorical data are presented as number (%); numerical data are presented as mean ± SD or median (minimum-maximum). *P < 0.05. **Compared with the Groups 2 and 3. cm: centimeter, kg: kilogram, ASA: American Socity of Anesthesiologists, PONV: postoperative nausea and vomiting, min: minute

Table 2: Postoperative Nausea Scores of the Patients

Postoperative nausea		Group 1 (n = 50)	Group 2 (n = 50)	Group 3 (n = 50)	P
Postoperative time (hours)	**0**	0,2 (0-8)	0,9 (0-8)	0,4 (0-7)	0.428
	2nd	0,4 (0-7)	0,1 (0-7)	0,2 (0-7)	0.096
	6th	0,7 (0-8)	0,3 (0-8)**	0,8 (0-7)	0.046*
	24th	0,2 (0-6)	0,1 (0-4)	0,1 (0-6)	0.362

Note: Data are presented as median (minimum-maximum) *P < 0.05. **Compared with the Group 3.

Table 3: Postoperative Vomiting/Retching Data of the Patients

Postoperative vomiting/retching		**Group 1** (n = 50)	**Group 2** (n = 50)	**Group 3** (n = 50)	**P** (intergroup)
Postoperative time (hours)	**0**	2 (4.0)	5 (10.0)	3 (6.0)	0.617
	2nd	5 (10.0)	2 (4.0)	5 (10.0)	0.485
	6th	5 (10.0)	6 (12.0)	8 (16.0)	0.736
	24th	3 (6.0)	0 (0.0)	1 (2.0)	0.312
P (intragroup)		0.648	0.061	0.091	

Note: Data are presented as the number of patients with the group's percentage in the parentheses.

Table 4: Postoperative Antiemetic Requirement Data of the Patients

Postoperative antiemetic requirement		**Group 1** (n = 50)	**Group 2** (n = 50)	**Group 3** (n = 50)	**P**
Postoperative time (hours)	**0**	4 (8)	12 (24)	7 (14)	0.098
	2nd	9 (18)	5 (10)	7 (14)	0.564
	6th	14 (28)	7 (14)**	19 (38)	0.021*
	24th	5 (10)	2 (4)	4 (8)	0.633

Note: Data are presented as the number of patients with the percentage of the group in the parentheses. *P < 0.05. **Compared with Group 3.

DISCUSSION

PONV is a complication, which is associated with undesired effects, decreases patient comfort, and causes the extension of hospital stay. Treating PONV is a must. The application of acupressure to the P6 point is one of the cheap, easily applicable non-pharmacological methods used for the treatment of PONV. PONV has been widely used for the past 20 years with proven effectiveness reported in different studies. P6 acupressure is used prophylactically alone or in combination with different pharmacological methods (13,16,17). Acupressure is thought to decrease PONV through β-endorphin secretion in the cerebrospinal fluid (CSF) or changes in serotonin transmission via serotonergic and noradrenergic fiber activation (18,19).

This study examined the effect of the timing of acupressure when administered for preventing postoperative nausea and vomiting and improving patient satisfaction.

In our study, when VRS scores and antiemetic needs were analyzed, no significant difference was detected among the three groups at the 0th, 2nd, and 24th hours. However, these values were significantly lower in the post-induction group as compared with the post-surgical group at the 6th hour. White et al. investigated the effects of acupressure applied in combination with ondansetron in the preoperative, perioperative, and postoperative periods on PONV and demonstrated lower VRS scores for nausea and vomiting in the perioperative and postoperative applications.

White et al. used acustimulation in combination with an antiemetic agent and reported it to be effective. We applied acupressure alone and observed that it was effective. They concluded that applying acupressure only in the preoperative period was not effective, but that application for postoperative 72 hours was beneficial in terms of PONV management. In our study, it may be concluded from the fact that VRS scores and antiemetic needs were lower in the post-induction group compared with the post-surgical group that P6 acupressure should be applied and started before the emetogenic stimulus onsets and continued thereafter. This may yield better effects on the PONV. In contrast to White et al.'s 72-hour application, we sustained acupressure application for 24 hours in our study (13).

Arnberger et al. applied acustimulation at the P6 acupuncture point while monitoring the neuromuscular blockade and demonstrated significant a reduction in nausea in the early period (in the first 6 hours), which is similar to our study. However, regarding the need for rescue antiemetics, no significant difference was detected compared to the control group (20). In Arnberger et al., in contrast with ours, the wristbands were applied unilaterally, and they performed electrical P6 point acustimulation instead of acupressure.

Laparoscopic cholecystectomy is associated with increased risk for PONV, and applying acupuncture to P6 has been indicated to be effective. In the present study, we aimed to determine the ideal timing of acupuncture studying whether the application is more effective before or after surgery or before or after induction. Previous studies have made comparisons either between pre- and post-induction periods or pre -and post-operative periods, but there is no comprehensive study like ours in the literature. For this reason, we think that our study will shed light on the literature.

Arnberger et al. reported that P6 acupressure was effective on postoperative nausea rather than postoperative vomiting. We, on the other hand, found that it was effective on both nausea and vomiting. In Arnberger et al., P6 acupuncture was observed to be effective during the postoperative 24 hours and reduced nausea especially in the early period, and our study also supports their findings.

In the research that they conducted on patients undergoing laparoscopic gynecological surgery and studied the effects of P6 acupressure on PONV in the first 24-hour, Alkaissi et al. demonstrated a significant difference in the overall and late (3-24 hour) PONV compared to the control group but no difference was found between the groups regarding early (0-3 hour) PONV. Moreover, no difference was found regarding retching and rescue antiemetic need in that study (21). In our study, we have demonstrated the beneficial effects of P6 acupressure on early nausea and that patients had a lower need for rescue antiemetic agents in the early period.

Frey et al. investigated the effect of acustimulation on PONV in pre-induction and post-induction groups in their study which included 200 patients undergoing laparoscopic cholecystectomy. They demonstrated positive effects of acustimulation versus placebo on early PONV (0-2 hours) in the high-risk patient group. However, no difference was detected regarding PONV in the late period. Furthermore, there was no significant difference between the groups in that study regarding the need for rescue antiemetics. Additionally, no difference was found regarding the pre-induction or post-induction applications (22). Similarly, we did not find any difference between pre- and post-induction groups in our study.

Frey et al. revealed a favorable effect of acupuncture in reducing PONV for 0 to 2 hours, but they did not observe such effect from 2 to 24 hours. Similar to Arnberger et al., Frey et al. reported that P6 acupuncture was effective on nausea rather than vomiting and retching. However, we observed that P6 acupuncture impacted both nausea and vomiting, and retching. Frey et al.'s patient population included patients who had three risk factors for developing PONV, i.e. vaginal surgery, female sex, and postoperative morphine use. Our patient population, on the other hand, included patients with two risk factors, namely laparoscopic cholecystectomy and postoperative tramadol use. Our study shows that regardless of gender, acupuncture is an efficient method in the high-risk patient population, but we believe that there is a need for more studies to be conducted o high-risk patients. We think that the fact that Frey et al.'s study population had higher risk factors, they were able to seize more comprehensive results. Arnberger et al. and Frey et al. reported that acupuncture was effective during the first 24 hours with the highest efficiency at the early period. Nevertheless, although we also observed that acupuncture was effective in the early period, we did not find a statistically significant decrease in the effectiveness thereafter.

PONV is defined as a complication that occurs 24 hours after surgery. Gilbert et al. studied the effects of a 2-hour acupressure wristband applied in the recovery unit for 24-hour PONV but found no difference with the control group (23). It may be due to the short application durations and application of the wristbands to only one wrist. It may be also because the application was started after the onset of the emetogenic stimulus. Furthermore, high-risk group analysis was not performed in that study.

Yentis et al. applied 5-minute-acupuncture, 5 minutes before versus 5 minutes after induction,

but found no difference between the groups regarding PONV (24). Short application durations may have resulted in negative effects. In our study, we applied the wristbands 5 minutes before induction in the pre-induction group and found no significant difference between pre- and post-induction groups. Wristbands were applied for 24 hours to the patients and the patients were followed up. The application durations vary between 2 and 72 hours in different studies in the literature (13,23). We preferred 24 hours for treatment time as suggested by Apfel et al. in their review (25). White et al. studied the effect of acustimulation on PONV and demonstrated a significant difference between the groups at the postoperative 4-24 hours, but they showed no difference at 24-72 hours regarding PONV and antiemetic need. This result may be due to the decreased incidence of PONV after 24 hours (13). Yentis et al. applied P6 point acustimulation and followed up the patients for PONV for 6 hours and found no difference between the groups. However, in their study acustimulation duration was short, sample size small, and follow-up time was limited and these factors may have affected the results (24). Agarwal et al. applied acustimulation to patients undergoing endoscopic urological surgery 30 minutes before the operation and obtained similar results with the control group (26). In Agarwal et al., the patients were followed up only for 6 hours, so there was no long-term comparison.

With improvements in postoperative pain relief and a corresponding increase in the use of opioids, there has been increasing attention paid to postoperative nausea and vomiting.

Although Dundee suggested that in order for P6 acustimulation to be effective, it must precede the emetic stimulus, others have found that it is effective even if applied postoperatively (27). In their recent, double-blind, randomized, placebo-controlled study, Alkaissi et al. found that P6 acupuncture was effective in reducing the incidence of postoperative nausea and vomiting in day cases undergoing gynecological laparoscopic surgery when acupuncture was administered after induction of anesthesia, but before the start of surgery and before administration of morphine (21).

Like the other aforementioned studies, our study demonstrated that acupuncture is more effective when applied before the emetogenic stimulus. Nunley et al. stated that pre-induction application of P6 acupressure is as effective as other pharmacological treatment modalities (18). In our study, we investigated the difference between pre-induction and post-induction applications, and found lower values in the pre-induction group, although the difference was not statistically significant. These results were comparable with the findings that Frey et al. obtained from patients undergoing laparoscopic cholecystectomy and vaginal hysterectomy patients (23,28).

Despite limited data concerning the comparison of unilateral and bilateral P6 acupressure, depending on the examples of bilateral application in the literature, we preferred bilateral application in our study (17,18). No adverse effects were observed in the patients due to the wristbands.

In conclusion, although we were able to show that acupressure is effective in decreasing postoperative nausea and vomiting and the need for antiemetic agents in the early period, if applied before the surgical stimulus, the optimum timing of P6 acupressure is still a matter of debate. Therefore, more studies can be conducted on different surgical populations regarding the application time of P6 acupressure.

Ethics Committee Approval: Marmara University Pendik Training and Research Hospital with the decision of the Ethic Committee (number 09.2017.13 dated 21.09.2017).

Authors Contributions: Concept: M.Ç., Design: M.Ç., Supervision: P.S.B., Resources: M.Ç., G.Ç., Materials: G.Ç., Data Collection:G.Ç., Analysis: G.Ç., M.Ç., Literature search: G.Ç.,P.S.B., Writing: G.Ç., M.Ç., Review: M.Ç.,P.S.B.,

Conflict of Interest: There is no conflict of interest.

Funding: No financial support was received.

Informed Consent: This is a retrospective study.

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