

# The Effect of Acupressure at PC6 and REN12 on Vomiting in Patients Undergoing Inguinal Hernia Repair: A Double-Blind Randomized Clinical Trial

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## Abstract

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**BACKGROUND:** Inguinal hernia surgery is one of the most commonly performed surgeries with complications such as postoperative nausea and vomiting (PONV).

**AIM:** This study aimed to evaluate the effect of acupressure at PC6 and REN 12 points on vomiting of patients undergoing inguinal hernia repair.

**MATERIAL AND METHODS:** This is a double-blind, randomised clinical trial performed on 60 patients undergoing inguinal hernia repair. Using permutation blocks, patients were allocated in two groups (acupressure at PC6 and REN12 points). After the surgery and full patient consciousness, acupressure was applied on PC6 and REN 12 points separately in each group for 5 minutes; 2, 4 and 6 hours later, acupressure was repeated on those points. Two hours after each acupressure, frequency and severity of vomiting were determined.

**RESULTS:** The results showed that there was no significant difference between the frequency of vomiting before the intervention and 2 hours after the intervention in the two intervention groups ( $P \geq 0.05$ ). Additionally, none of the two intervention groups experienced vomiting at 4, 6, and 8 hours after the intervention.

**CONCLUSION:** It seems that acupressure at PC6 and REN 12 points are not effective in reducing the frequency and severity of vomiting in patients after inguinal hernia surgery.

## Introduction

Groin area is one of the potential weak regions of the abdominal wall and the most common site for abdominal hernia [1], [2]. Involvement is seen at all ages in both genders; however, the incidence of groin hernia in men is about 12-25 times greater than women [3], [4]. Annually, around 20 million people undergo inguinal hernia repair, which is one of the most commonly performed surgeries by general surgeons [5], [6]. In patients undergoing inguinal

hernia repair, postoperative nausea and vomiting (PONV) is a common and distressing problem after surgery [7], [8]. Due to dehydration, water and electrolytes imbalance, aspiration and pain in the surgical site, this complication leads to impaired recovery, increased cost of treatment, and patient's discomfort [3], [9]. Although PONV is usually self-limiting, it may lead to rare but dangerous side effects such as abdominal visceral outflow [4], [9], bleeding, oesophageal rupture [10], wound dehiscence, pulmonary aspiration and pneumonia [11], dehydration, and electrolyte imbalances [12]. These symptoms are particularly problematic in outpatients

because they lead to a delayed discharge of patients or re-admission at the night of surgery [13]. Sixty per cent of patients report nausea and vomiting as the most disturbing postoperative complication [14], [15]. Note that anti-nausea prevention is not appropriate for all patients. Metoclopramide and Ondansetron are commonly used drugs to treat nausea and vomiting. Metoclopramide is associated with drowsiness, extrapyramidal symptoms, headache and diarrhea. Ondansetron also causes headaches, diarrhea, and transient increases in liver enzymes [7].

Acupressure is one of the therapeutic and non-pharmacologic approaches which can be used by physicians, nurses and even patients themselves. Acupressure is a non-invasive, safe, inexpensive, easy to run, cost-effective and simple technique to treat many diseases [16], [17], [18]. Pericardium-6 (PC6) point or Neiguan is one of the main acupuncture and acupressure points. This point is located at the anterior forearm, two inches above the transverse wrist crease, approximately the size of the width of three fingers, between flexor tendons of Palmaris longus and Carpi radialis about 6 mm in depth and is used in Chinese medicine to reduce nausea and vomiting and other stomach problems [19], [20], [21]. Neiguan is the most widely used point in acupressure for treatment of nausea and vomiting [22]. REN 12 is another common point for acupressure. REN 12 point or Zhongwan is located on the midline line between umbilical cord and lower end of the chest and is one of the points used in cases of nausea and vomiting, constipation, stomach pain, heartburn, gastric reflux, emotional disorders, abdominal cramp etc [23], [24], [25], [26].

Acupressure has been used to prevent nausea and vomiting, post-operative control pain, reduce the need for analgesics, and reduce side effects of opiates after surgery of upper and lower parts of the abdomen, and control anxiety and behavioural disorders [7]. Its effectiveness has been confirmed by numerous studies; however, its efficacy has not been evaluated on PONV after inguinal hernia repair, particularly using two PC6 and REN12 points. Thus, this study aimed to determine the effect of acupressure at PC6 and REN12 in the prevention of vomiting in patients undergoing inguinal hernia repair.

## Methods

This double-blind, randomised clinical trial has been conducted in all-male hospitalised patients in the surgery ward of 9th Dey Hospital of Torbat Heidarieh from December to March 2016, who were scheduled for inguinal hernia repair under general anaesthesia. This study was approved by the Ethics Committee of Gonabad University of Medical Sciences (IR.GMU.REC.1395.70) and registered at the Iranian

Clinical Trials database (IRCT2016111530915N1). Before initiating the project, the author received theoretic training on acupressure PC6 and REN 12 points through studying valid resources and viewing the images and videos related to acupressure practice as well as practical skills from the Chinese medicine specialist and his capability for reflexology massage was verified. The double blindness of this study means that none of the patients and assistants involved in the task of collecting data was unaware of the type of groups.

Inclusion criteria were age 18 to 60 years, definitive diagnosis of inguinal hernia based on patient records, grade I or II of American Society of Anesthesiologists' (ASA) physical status, absence of anatomical problems at PC6 and REN 12 points, no history of using acupressure or acupuncture, no anti-nausea and H2 antagonist and sedative drugs used by the patient in the postoperative period, no history of diseases associated with acute and chronic nausea and vomiting (gastrointestinal disorders, ear disorders, etc.) and no substance or drug abuse by the patient. Exclusion criteria were the reluctance to continue to participate in the study for any reason and the occurrence of any acute medical conditions during the study.

According to a similar study [25], the sample size was estimated of 25 for each group using the comparison of means formula for nausea severity and taking into account 95% confidence interval and 80% test power. Considering the probability of 15% drop, 28 samples were appropriate for each group. However, this study considered 30 samples for each group (60 in total).

Samples were selected using convenient sampling from patients who were referred to 9th Dey Hospital of Torbat Heidarieh for elective inguinal hernia repair, and all were anaesthetised by the same procedure. Before each recruitment, the patient was informed that he is free to participate in the study and informed consent was obtained from all patients. To eliminate the effect of patient movement on nausea and vomiting, all patients were moved in the same manner by a well-trained group. If patients had severe nausea and vomiting, an anti-nausea drug prescribed by a physician was used, and it was recorded in the demographic questionnaire. After obtaining informed consent from qualified patients, patients were randomly assigned to two intervention groups (acupressure PC6 point and acupressure REN 12 point) using permutation blocks. After the surgery, once the effect of relaxing drugs was neutralised and the tracheal tube was removed, the patient was completely conscious (awareness of people, place and time); then, demographic information questionnaire and the questionnaires related to nausea and vomiting were filled by the researcher by interviewing the patient. The patient was placed in a supine position and exposed for acupressure. Acupressure was applied on PC6 and REN 12 points

separately in each group for 5 minutes. At 2, 4, and 6 hours after applying acupressure, acupressure was repeated on those points [27], [28]. Two hours after each acupressure performed by the researcher, another colleague who did not know the location of points used, examined the incidence, frequency and severity of vomiting. The time and frequency of vomiting were recorded in the relevant tables by asking the patient. Vomiting was evaluated by counting its frequency so that for grading the severity of vomiting, more than five times of vomiting was considered as severe, between three to five times was moderate, and less than three times was mild vomiting. The instrument used was a researcher-made questionnaire consisting of two parts: the first part included demographic data including age, weight, height, body mass index (BMI), vital signs, duration of anaesthesia, anaesthetic drugs and surgical cutting size, and the second part included the number of vomiting which has been occurred for the patients.

Data were analysed by SPSS version 20 using descriptive statistics, independent t-test and Mann-Whitney test.

## Results

The study was conducted on 60 patients in two groups. Demographic and clinical data of subjects are listed in Table 1. The results showed that the groups were identical in terms of these variables.

**Table 1: Demographic and clinical characteristics of two groups of PC6 and REN12 group**

Variable	Group		Test Result (Independent t-test)
	PC6	REN 12	
	Mean ± SD	Mean ± SD	
Age (year)	35.2 ±11.42	34.2±10.73	0.61
BMI	25.45±2.26	25.41±2.83	0.13
Duration of anaesthesia (min)	59.5±4.22	58.00±4.84	0.60
Heart rate (per minute)	79.77±3.86	79.17±3.88	0.83
Maximum blood pressure (mm Hg)	119.17±6.58	116.83±6.88	0.59
Minimum blood pressure (mm Hg)	77.00±6.51	74.83±5.49	0.31
Respiration (per minute)	15.73±0.91	15.70±1.05	0.19
Temperature (°C)	37.08±0.12	37.08±0.09	0.50

Based on the results of independent t-test, there was no significant difference in the severity and frequency of vomiting before the intervention and 2 hours after the intervention between two intervention groups ( $P \geq 0.05$ ). It should be noted that none of the two intervention groups had vomiting complications at 4, 6, and 8 hours after the intervention (Table 2).

**Table 2: Frequency of vomiting in patients in groups PC6 and REN12 at different times**

Time	PC6 (mean ± SD)	REN12 (mean ± SD)	Test result*
Before the intervention	0.03±2.03	0.07±0.05	0.56
2h after the intervention	0.00±0.00	0.03±0.03	0.32

\*Independent t-test.

Independent t-test showed no significant difference in the frequency of vomiting at different times between two groups of PC6 and REN12 before the intervention and 2 hours after the intervention ( $P \geq 0.05$ ) (Table 2). Moreover, none of the two intervention groups had vomiting complications at 4, 6, and 8 hours after the intervention.

## Discussion

The results of this study showed that acupressure on PC6 and REN 12 points could not reduce the frequency and severity of vomiting in patients undergoing inguinal hernia surgery. Adib-Hajbaghery et al. showed that acupressure on PC6 point had no significant effect on pain reduction after an appendectomy; however, it is effective in reducing the severity of nausea and vomiting in patients receiving acupressure treatment, which supports the result of this study [7]. In a study, acupressure and Ondansetron were used for nausea and vomiting after laparoscopic cholecystectomy. The results showed a positive effect of acupressure in reducing the severity of nausea in the first 6 hours after laparoscopic cholecystectomy, which was similar to the effect of Ondansetron, suggesting that acupressure is as effective as drug treatment [29]. In the present study, nausea was reduced after 6 hours of acupressure on PC6 point, which indicates that the results are consistent with the mentioned studies. However, different studies reported different effects of stimulating this point on the reduction of postoperative nausea and vomiting. Evaluating the effect of acupressure on the incidence of postoperative nausea and vomiting in cholecystectomy showed that this procedure had no positive effect [30]. Additionally, acupressure was not effective in reducing nausea and vomiting after strabismus surgery [31], [32]. In the majority of studies in which acupressure PC6 point did not have a significant and positive effect in reducing nausea and vomiting, short duration of acupressure is one of the main reasons for its ineffectiveness [33], [34].

In the present study, the positive effect of acupressure occurred while anti-nausea and anti-vomiting Ondansetron drugs were not used in the treatment of patients, indicating the strong effect of this treatment in reducing nausea and vomiting. Through a clinical trial, Harmon et al. used non-pharmacological methods such as acupressure on PC6 point [32] and indicated a reduction in the severity of nausea after laparoscopic surgery in the test group compared to the control group. In the present study, acupressure in the form of two groups of PC6 and REN12 points reduced the frequency of nausea in patients after inguinal hernia surgery. In both groups, nausea was reduced over time at 4, 6,

and 8 hours after the acupressure; this reduction was more significant at the PC6 point. Additionally, acupressure on PC6 and REN12 points reduced vomiting to zero 2 hours after the acupressure. The results obtained from this study support the results of other studies on acupressure in reducing the frequency and severity of postoperative nausea and vomiting.

Moreover, acupressure on PC6 point was more effective in reducing the severity of nausea than acupressure on REN 12 point in the patients treated. Stimulation of PC6 point may release a neurochemical substance which does not induce vomiting in the brain [35]. Like acupuncture, acupressure restores energy, improves the function of the gastrointestinal tract and relieves symptoms and signs of nausea and vomiting by releasing monoamines and endorphin and beta-endorphin [36], [37], [38], [39], [40].

For evaluation of the effect of acupuncture by combining different points in chemotherapy-induced nausea and vomiting, Gao et al. treated 240 patients randomly assigned to four groups. The control group only received standard anti-nausea and vomiting drugs, while the three acupuncture groups received four electric acupuncture treatments at various points, including REN 12, and standard anti-nausea and anti-vomiting drugs (antagonist-5-hydroxytryptamine-3 (5-HT<sub>3</sub>), Ramostron, tropisetron and dexamethasone once a day. The results of this study showed the effectiveness and safety of electrical acupuncture in combining different splenic points on the management of chemotherapy-induced nausea and vomiting [38]. Gottschling et al. used acupuncture for reduction of nausea and vomiting induced by chemotherapy in pediatric oncology through a randomised, multicenter crossover study on twenty-three children aged 6 to 18 years undergoing chemotherapy for treatment of severe malignant tumours in five treatment centres in Germany. Patients were randomly assigned to receive acupuncture on PC6, ST36, and REN12 and LI4 points simultaneously with standard anti-nausea drugs (Ondansetron, Tropisetron, dexamethasone and phenothiazines) during the second or third period of one chemotherapy cycle and forty-six chemotherapy courses with or without acupuncture were compared. The need for anti-nausea drugs was significantly lower in acupuncture courses than in control courses, and the incidence of vomiting was significantly lower in each acupuncture course. The results of this study showed that acupuncture is effective in preventing nausea and vomiting in children with pediatric cancer [38]. In the present study, acupressure on the REN 12 point at 4, 6 and 8 hours after intervention reduced the frequency of nausea compared to the time before the intervention, which is consistent with Gao and Gottschling [38], although the effectiveness of acupressure on the REN 12 point was lower than acupressure on the PC6 point. Additionally, vomiting decreased 2 hours after applying acupressure on the REN 12 point.

This study has some limitations. Nausea is a mental finding and is reported by the patient; moreover, everyone has a different judgment of the severity of nausea. This was one of the limitations of this study which could affect the results. Given the fact that the results of this study are related to a limited number of patients undergoing inguinal hernia surgery, further studies are required on the effectiveness of this intervention. Therefore, further research seems necessary in this field.

In conclusion, according to the results of this study, it seems that acupressure at PC6 and REN 12 points are not effective in reducing the frequency and severity of vomiting in patients after inguinal hernia surgery.

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