

## ORIGINAL RESEARCH

## TCM / PERIOPERATIVE MEDICINE

# A comparative study of intravenous ondansetron and P-6 acupressure for the reduction of postoperative nausea and vomiting in patients undergoing elective laparoscopic colorectal cancer surgeries

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## Abstract

**Background & Objective:** Post-operative nausea and vomiting is one of the major problems faced by the anesthesiologists in patients recovering from anesthesia and surgery. A variety of antiemetics have been tried to prevent and control it with variable success. Traditional Chinese Medicine advocates stimulation of P-6, or Neiguan, acupressure point. The aim of this study was to compare the efficacy of intravenous ondansetron with P-6 acupressure stimulation in prevention of post-operative nausea and vomiting after elective laparoscopic colorectal surgery.

**Methodology:** After approval from the Scientific Review Committee (SRC) and Institutional Review Board (IRB), 80 patients of ASA II and III, aged 18 to 60 y, planned for elective laparoscopic colorectal surgery under general anesthesia were randomly allocated into two groups by the lottery method. Group A (n = 40) received inj. ondansetron 0.15 mg/kg IV and in Group B (n = 40) acupressure was applied on pressure point P-6. Both groups received IV dexamethasone 0.15 mg/kg intraoperatively. Balanced general anesthesia was given and intraoperative vitals were recorded at regular intervals. The incidence and severity of nausea and vomiting was recorded during first 24 h postoperatively.

**Results:** No significant difference in the number of patients having nausea and vomiting or the severity of vomiting during 24 h post-operative period was found between the two groups ( $p > 0.05$ ).

**Conclusion:** In this study we did not find a statistically significant difference between P-6 acupressure stimulation and intravenous ondansetron in the prevention of post-operative nausea and vomiting after elective laparoscopic colorectal surgery.

**Abbreviations:** PONV - Post-operative nausea and vomiting

**Key words:** P-6 acupressure point; Acupressure; Ondansetron; Laparoscopic colorectal surgery; Post-operative, nausea and vomiting

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## 1. Introduction

Postoperative nausea and vomiting (PONV) is considerably distressing to patients undergoing elective cancer surgeries. Incidence of PONV varies from 30% to 50% in patients undergoing elective surgeries and more than 70% in high-risk patients.<sup>1</sup> The pathophysiology of PONV is complex but some of the causes includes hypotension, visceral stimulation, and the use of general anesthesia.<sup>2</sup> Multimodal regimens used to manage PONV, include pharmacological and non-pharmacological interventions. Pharmacological agents like Metoclopramide and 5-hydroxytryptamine (5-HT<sub>3</sub>) antagonists including ondansetron, are the current treatment of choice for PONV prophylaxis and treatment. Pericardium 6 (P-6) acupressure point stimulation is one of the non-pharmacological methods for prevention of PONV.<sup>3</sup> There is a renewed interest in this non pharmacological intervention as it can easily be available and is simple to apply. Because of the simplicity of application, it can be used conveniently even at the remote centers of the country. P-6 pressure stimulation, can play a role in reducing nausea and vomiting.

Acupressure is a way of applying pressure to specific parts or points on the body along certain pathways called 'meridians'.<sup>4,5</sup> Acupressure can be applied by a practitioner or by the patient. Some passive devices have been developed, such as wrist bands that allow people to apply pressure at a specific location for a particular outcome. For example, wrist bands can apply pressure to the P-6 acupressure point which is specific for nausea and vomiting. The P-6 point is located three fingerbreadths from the wrist crease on the volar surface of the arm, between the palmaris longus and flexor carpi radialis muscles<sup>6</sup>.

Most acupressure points are located near nervous tissue or structures. Researchers suggest that applying pressure at these points may block transmission of pain signals through certain neural gates<sup>7</sup>. And reducing pain in postoperative period reduces PONV as well. There are other theories which assume that acupressure results in the release of endorphins, opioids, and/or neurotransmitters which naturally reduce pain and affect mood<sup>8</sup>. White et al. have shown the efficacy of acupressure device comparable to intravenous ondansetron and also demonstrated effectiveness of

acupressure as a part of multimodal management of PONV. They have recommended more clinical trials to establish effects of acupressure alone in the management of postoperative nausea and vomiting<sup>9</sup>. In this study comparison is made of the effect of P-6 stimulation and intravenous ondansetron for PONV prevention in elective laparoscopic colorectal cancer surgeries at Shaukat Khanum Memorial Cancer Hospital & Research Center, Lahore.

## 2. Methodology

After approval from the Scientific Review Committee (SRC) and Institutional Review Board (IRB), this single blind randomized control study was conducted from September 2019 to September 2020 at Shaukat Khanum Memorial Cancer Hospital & Research Center Lahore. Total 80 patients, 18-60 y of age, and American Society of Anesthesiologists (ASA) II and III were enrolled.

Patients with history of PONV during previous anesthesia, body mass index > 35 kg/m<sup>2</sup>, history of smoking, use of emetogenic/antiemetic medications within 24 h before surgery, history of emetic episodes after administration of antibiotics, expected use of mechanical ventilation, cognitive impairment that could affect patient's ability to complete the outcome assessment, previous history of stroke or epilepsy, pregnancy, unable to cooperate with use of acupressure technique and ASA IV patients were excluded from the study. An informed written consent was taken from all of the participants and detailed information on the effects and uses of acupressure technique was provided to them.

P-6 stimulation was achieved by applying pressure over the wrist area where P-6 is located, by using PressureRight<sup>®</sup> wrist band device 30 min before the surgery (Figures 1 & 2). The device was kept tied on wrist for the next 24 h. This wrist band was composed of an adhesive tape and a convex button like plastic part which was placed on the P-6 area so that it could press the point. The whole circumference of the forearm was not under pressure, to avoid tourniquet effect. Patients of Group A received inj. ondansetron 0.15 mg/kg IV during the surgery. Both groups of patients received inj. dexamethasone 0.15 mg IV. Patients in both groups had a soft cotton bandage applied over their wrist band to make the band invisible to the patients. The purpose of

application of cotton bandage was to blind the patient and the observer of group allocation.



**Figure 1: Locating the site of P6 (Picture by: Tariq H. Khan)**



**Figure 2: Applying PressureRight® band to both fore-arms (Picture by: Tariq H. Khan)**

The anesthesiologist of the case, the surgeons, and the attending staff were aware of the group allocation; however, the observers remained blinded to group allocation and they collected data of physiological and subjective outcomes. The cotton bandage applied over the wrists of the patients of both groups was not removed by the staff and the investigators.

Randomization of the two groups was done by lottery method. Data was recorded on a special performa. Data from both groups was compared in terms of presence and absence of PONV and the severity on the basis of scoring system. PONV was defined as any nausea (feeling of impending vomiting), and vomiting (expulsion of gastric contents) occurring in first 24 h after surgery. The severity of vomiting as well as nausea was determined on a three-point scale; 1–mild, 2–moderate, and 3–severe.<sup>10,11</sup> This severity was based purely on the subjective feeling of the patients responding to three-point scoring for vomiting.

### 3. Statistical analysis

The data was compiled in a Microsoft Excel spread sheet. The sample size was calculated using Lambda-Willis formula based on data of previous studies. With the power of study 80% and alpha error 5%, the sample size was calculated to be 40 for each group. Data was analyzed with Statistical Package for the Social Sciences IBM version 24.0. Continuous variables were analyzed with the unpaired t test and categorical variables were analyzed with the Chi-Square Test and Fisher Exact Test. Statistical significance was taken as  $p < 0.05$ .

### 4. Results

There were no dropouts so all 80 patients were analyzed for results. The demographic profiles of both the groups were comparable as shown in Table 1.

**Table 1: Comparative demographic data**

Variable	Group A (n = 40)	Group B (n = 40)	P-value
Age (y)	41.4 ± 4.42	42.3 ± 4.11	0.625
Weight (kg)	65.49 ± 3.35	66.35 ± 3.61	0.355
Height (cm)	166.21 ± 5.35	161.35 ± 7.61	0.521

*Data presented as Mean ± SD*

The number of patients reporting nausea or vomiting during the first 24-hour interval post-operatively in both the groups is shown in Table 2.

There was no significant difference in number of patients with PONV in both the groups ( $p > 0.05$ ). In both groups majority of patients reported severity of the vomiting as mild (Table 2).

### 5. Discussion

General anesthesia and laparoscopic surgery are invariably associated with post-operative nausea and vomiting. Both pharmacological and non-pharmacological methods are being used to prevent and treat this untoward effect. This study compared the efficacy of intravenous ondansetron with P-6 acupressure

**Table 2: Comparative frequency and severity of PONV**

Parameter	Group A (n = 40)	Group B (n = 40)	P-value
Frequency of PONV	8 (20)	9 (22.5)	$P > 0.05$
Vomiting Severity			
Mild	4 (10)	4 (10)	
Moderate	3 (7.5)	4 (10)	
Severe	1 (2.5)	1 (2.5)	

*Data presented as n (%)*

stimulation in prevention of post-operative nausea and vomiting after laparoscopic colorectal surgery and we did not find a statistically significant difference between the two.

Acupressure, as previously mentioned, is among the non-pharmacological methods which has been used to prevent as well as treat PONV. Previous studies have shown its efficacy in the management of PONV alone and as component of multimodal analgesia.<sup>12,13</sup> In many studies, the effect of acupressure at P-6 was confirmed in various medical interventions.<sup>14</sup> Acupressure can provide relief but due to lack of provider's skill, and lack of patient awareness, this method has been less frequently used.<sup>14</sup> Lee et al. recommended that the use of acupressure wristbands may be effective in preventing PONV after short surgical procedures and when applied prior to the exposure to the emetic stimulus such as an aesthetic agent.<sup>7</sup> In his study, the incidence of PONV was 23% in the P-6 stimulation group and 41% in placebo group ( $P = 0.0058$ ). White et al. compared acupressure with ondansetron and found that both modalities had similar effect on preventing PONV.<sup>4</sup> However, the combination of acupressure and ondansetron was better than ondansetron alone in preventing nausea and vomiting; 20% vs. 50% ( $P < 0.05$ ) for nausea and 0% vs. 20% ( $P < 0.05$ ) for vomiting, respectively. Our study showed equivalent efficacy in both groups, although the selection of patients was tightly restricted regarding the age, weight and the surgical procedure.

## 6. Limitations

Although the sample size of our study was calculated on the scientific basis, a large sample might affect the results. Secondly, the use of inj. dexamethasone in both groups might have affected the true results. Further studies may be undertaken without the use of dexamethasone.

## 7. Conclusion

In our study we did not find a statistically significant difference between P-6 acupressure stimulation and intravenous ondansetron in the prevention of post-operative nausea and vomiting after elective laparoscopic colorectal surgery.

## 8. Conflict of interest

None declared by the authors. No internal or external funding was involved in the study.

## 9. Data availability

The numerical data of the trial is available with the institution and can be provided upon a reasonable request.

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## 11. Authors' contribution

DI, SUR, ADA: Conducted the study, literature search, data analysis

ARG, RSD: Study design, supervision of the trial, final review

THK: Facilitated the acquisition of PreesurRight® devices, study proposal, final draft review and correction; pictures.

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