ORIGINAL ARTICLE

Inhaled Isopropyl Alcohol and Intravenous Ondansetron for Postoperative Nausea and Vomiting in Patients Undergoing Laparoscopic Surgery: A Cross-Sectional Study

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Abstract

Introduction: Post-operative nausea and vomiting are frequently encountered complications in the post operative care unit. Effective treatment is promptly warranted to decrease morbidity of patients. Female gender, nonsmoker, young age, laparoscopic gastrointestinal surgeries are major risk factors. Ondansetron is commonly used for its prevention and treatment. However, inhaled isopropyl alcohol can also be used and has recently been in practice. In this study we compared inhaled isopropyl alcohol and intravenous ondansetron for the effective treatment of post operative nausea and vomiting after laparoscopic surgery among female patients.

Methods: The present study conducted at Lumbini Medical College and Teaching Hospital included 76 female patients, aged between 18 to 60 years, classified as American Society of Anesthesiologist physical status classification I–II, who were scheduled for laparoscopic surgery. At the time of preoperative evaluation, patients were divided into two groups, i.e., Group I and Group O, each consisting of 38 patients. Post surgery, patients who experienced post operative nausea and vomiting in the recovery room either received inhalational treatment with 70% isopropyl alcohol (Group I) or 4mg intravenous ondansetron (Group O). Nausea levels were monitored using a verbal numeric rating scale (VNRS) at regular time intervals. The treatment was considered successful if the patient's nausea and vomiting score decreased by 50% or more.

Results: Among 76 patients, 29(38.16%) developed post-operative nausea and vomiting. Both groups had similar baseline characteristics and initial post operative nausea and vomiting severity with p-value>0.05. Group I experienced faster symptom relief, achieving 50% reduction in symptoms in 4.69 ± 2.02 minutes compared to 7.73 ± 2.59 minutes in the Group O ($p<0.05$).

Conclusions: Inhaled 70% isopropyl alcohol provided faster relief from postoperative nausea and vomiting when compared to intravenous ondansetron.

Keywords: *laparoscopy; ondansetron; postoperative nausea and vomiting.*

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Introduction

Any episode of retching, nausea or vomiting within 48 hours after surgery is considered as postoperative nausea and vomiting (PONV).[1] The incidence of PONV ranges between 30% and 40% after surgery which can increase up to 51.20% within 24 hours and have 5.6 times higher incidence among females.[2] This risk is further heightened with laparoscopic, gynecological, or abdominal surgeries ranging up to 60% without prophylaxis.[3,4]

Ondansetron is a 5-hydroxytryptamine 3 (5-HT3) receptor antagonist which is mostly used to prevent and treat PONV perioperatively. Common side effects associated with ondansetron are headache, sedation, dizziness, and QT wave prolongation in electrocardiogram (ECG).[5,6] Inhaled isopropyl alcohol (IPA) has been recently studied as an effective alternative to ondansetron for the treatment of PONV, holding some advantages like: ease of use, rapid onset, and high efficacy and some studies found it to be more effective than oral or intravenous (IV) antiemetic.[7-9] This study aimed to compare the efficacy of treatment with inhaled isopropyl alcohol and IV ondansetron for a 50% reduction in symptoms of PONV among female patients undergoing laparoscopic surgery in a tertiary center in Nepal.

Methods

A cross-sectional study was conducted from 22nd December 2024 to 21st March 2025 in the post-anesthesia care unit (PACU) of Lumbini Medical College and Teaching Hospital, a tertiary care center in Tansen, Palpa, Nepal. A total of 76 female patients, aged 18 to 60 years and classified as American Society of Anesthesiologists (ASA) Grade I or II, were scheduled for elective laparoscopic abdominal surgeries. Patients with known allergies to IPA or ondansetron, pregnant women, and patients with pre-existing cardiovascular disease were excluded from study. Ethical approval was granted by the hospital's review committee (Ref no: IRC-LMC-24/N-24). Following a proper explanation regarding benefits and possible complications of surgical and anesthetic procedures, written informed consent was obtained.

Preoperative evaluation was done for all patients, and at the time of assessment, the first 38 patients were categorized as Group I and the next 38 patients were categorized as Group O using a convenient sampling technique. Standard pre-medication, lorazepam 2 mg to allevate anxiety and pantoprazole 40 mg were given to all patients the night before surgery as per institutional protocol. On the day of the surgery, patients received general anesthesia following a standard protocol and were monitored continuously for vital signs intraoperatively. After completion of surgery, patients were shifted to post-anesthesia care unit (PACU) and vitals were monitored continuously. Vomiting or retching was considered to be an emetic episode if they have been separated by at least 1 minute to constitute separate events.[10] Nausea was defined as a subjective, unpleasant sensation associated with the awareness of the urge to vomit.[11] On complain of nausea, verbal numeric rating scale (VNRS) was employed to quantify the severity. Patients were rated on a scale of 0 to 10, where 0 denoted no nausea and 10 denoted extremely severe nausea.[12]

Patients in Group I received inhaled 70% IPA, and those in Group O received 4 mg iv ondansetron as treatment for PONV. A repeat dose of IV ondansetron was allowed after 15 minutes if needed (maximum 8 mg). Inhalation of 70% (IPA) was done using a pre-soaked pad placed under the nose, instructed to take three deep breaths. IPA could be repeated every 15 minutes, up to three times. If either of the treatments failed, further management was left to the anesthesia provider's discretion.

For those patients who had PONV in PACU, VNRS scores were recorded before giving treatment and at every 5-minute interval till symptoms resolved and thereafter every 15 minutes.

Statistical analysis was performed using Statistical Package for the Social Sciences version 25. Continuous variables like age, surgery time, anesthesia time, and VNRS were expressed as mean ± standard deviation and compared using the independent t-test based on data distribution. A p-value of <0.05 was considered as statistically significant.

Results

Among 76 female patients, who underwent laparoscopic surgery, 29(38.16%) developed postoperative nausea and vomiting, of whom 16 were from Group I and 13 from Group O. The demographic and intraoperative characteristics of the patients in the IPA and ondansetron groups were compared (Table 1). There were no statistically significant differences observed between the two groups in terms of age, duration of surgery and anesthesia, intraoperative fentanyl consumption, and the time to first PONV complaint in the PACU, with all p-values exceeding 0.05.

Table 1: Demographics, characteristics of surgery and anesthesia of patients (n=76).

Characterstics	IPA (n=38)	Ondansetron (n=38)	p-value	t-value
Age (Years)	35.39 ± 9.95	37.08 ± 8.70	0.435	-0.785
Surgery Time (Minutes)	50.79 ± 7.98	49.61 ± 8.84	0.542	0.613
Anesthesia Time (Minutes)	61.32 ± 8.40	60.24 ± 9.36	0.599	0.529
Intraoperative fentanyl (microgram)	92.63 ± 17.03	91.32 ± 19.05	0.752	0.317

The severity of PONV symptoms was assessed at multiple time intervals following the initial complaint. As shown in Table 2, there was no significant difference between the IPA and Ondansetron groups at the time of complaint (p = 0.93). However, the IPA group showed significantly lower symptom scores at 5, 10, and 15 minutes (p = 0.012, p = 0.003, and p = 0.023, respectively), indicating faster symptom relief. At 30 and 45 minutes, the differences were not statistically significant (p = 0.274 and p = 0.608, respectively), and at 1 hour, symptoms had been resolved completely in both the groups.

Table 2: Table showing mean time to first complain of PONV and mean VNRS for PONV (n=76).

	Characterstics	IPA (n=16)	Ondansetron (n=13)	p- value	t-value
	Time to first complain of PONV after shifting to PACU	8.13 ± 3.07	7.77 ± 3.63	0.777	0.286
VNRS for PONV	At time of complain	8.19 ± 1.38	8.23 ± 1.09	0.930	-0.092
	At 5 minutes	3.25 ± 1.91	5.23 ± 2.05	0.012*	-2.686
	At 10 minutes	0.69 ± 1.01	2.62 ± 1.86	0.003*	-3.569
	At 15 minutes	0.31 ± 0.60	1.30 ± 1.31	0.023*	-2.705
	At 30 minutes	0.25 ± 0.58	0.62 ± 1.04	0.274	-1.196
	At 45 minutes	0.13 ± 0.50	0.23 ± 0.60	0.608	-0.519

*Statistical significance

Time to achieve a 50% reduction in symptoms was significantly shorter in the IPA group compared to the Ondansetron group (4.69 ± 2.02 minutes vs. 7.73 ± 2.59 minutes, p = 0.001), suggesting more rapid clinical efficacy of IPA (Figure 1). Student's t test was applied (p-value= 0.001, t-value= -3.557).

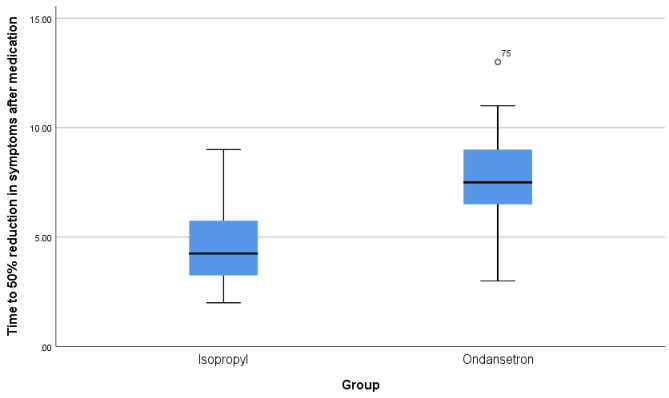

Figure 1: Time in minutes from initiation of therapy to 50% reduction of PONV among patients undergoing laparoscopic surgeries.

Discussion

In this study we compared inhaled 70% isopropyl alcohol and intravenous ondansetron in terms of resolving postoperative nausea and vomiting. According to our findings, inhalation of isopropyl alcohol was found to be more efficient in resolving postoperative nausea and vomiting, particularly within 15 minutes from the initiation of treatment. The data demonstrated that patients in the IPA group experienced a significant decrease in nausea scores at 5 minutes compared to the ondansetron group. This trend continued at 10 minutes and 15 minutes.

Inhaled isopropyl alcohol was found to achieve rapid relief of nausea compared with placebo during a 10-minute period in a study in an emergency department with complaints of nausea with an NRS score of 3 in the isopropyl group versus a VNRS scale of 6 in the placebo group.[13] In another study, isopropyl alcohol was compared with oral 4 mg ondansetron among patients visiting the emergency room with complaints of nausea and found isopropyl alcohol to be more effective.[14] A similar study on postoperative patients to treat PONV after surgery found that the median VNRS score at the 5th, 10th, and 15th minutes after treatment with inhaled isopropyl alcohol was

lower than patients treated with IV ondansetron, with a p-value < 0.05.[15] All these findings were in accordance with the results of our study.

A study compared inhaled IPA or saline-soaked gauze for the treatment of nausea in the emergency room.[16] A numerical rating scale (0-10) was used to rate nausea in sixty-two patients who got IPA and fifty-six who received saline at baseline and two, four, and ten minutes after inhalation. At every time point, the IPA group's nausea scores decreased noticeably more than those of the placebo group. Rescue antiemetics were also needed by fewer patients in the isopropyl alcohol group (28 vs. 42; P = 0.04), similar to our findings. Another study compared intravenous ondansetron adjacent to aromatherapy with normal saline-soaked gauze and intravenous saline adjacent to aromatherapy with isopropyl alcohol.[17] It found nausea scores were significantly lower in the isopropyl alcohol group at 30 minutes (p = 0.015), vomiting was significantly higher (p < 0.001), but no significant differences were seen at 10 minutes (p > 0.05).

PONV are more prevalent among females patients undergoing laparoscopic surgical procedures with intraoperative opioid use.[18,19] Ondansetron works by blocking the serotonin receptor at central or peripheral nervous system or both.[20] IPA is also being used to treat PONV and is believed to have an effect on neural pathways controlling emesis; however, the exact mechanism of action is still unknown.[7,21,22] So, we compared IPA with the standard drug ondansetron for the treatment of PONV.

Limitation of this study is that it was performed in a single center with a small number of female patients, but children and the male population and those with extremes of age groups are yet to be explored, and it also reveals the potential opportunity for further research.

Conclusions

Inhalation of 70% isopropyl alcohol offers more rapid relief from PONV compared to intravenous ondansetron in female patients undergoing laparoscopic surgery. Isopropyl alcohol could be a good alternative to other common medications to treat PONV where early therapeutic effect is needed. It can be a mode of treatment in post-operative care units, emergency departments, and surgeries with high risk for PONV.

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