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Comparison Of Intravenous Ondansetron And Combination Of Intravenous Ondansetron With Intravenous Dexamethasone As Prophylaxis For Prevention Of Postoperative Nausea And Vomiting In Adults Undergoing Elective Laparoscopic Surgery.

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Abstract

Background: Postoperative nausea and vomiting (PONV) remain a frequent and distressing complication after laparoscopic surgery. Because multiple emetogenic pathways contribute to PONV, combining antiemetics with different mechanisms may provide better prophylaxis than single-agent therapy. ***Methods:*** In this single-centre comparative study, 160 adults aged 18–55 years with American Society of Anesthesiologists physical status I–II undergoing elective laparoscopic surgery under general anaesthesia were allocated to two groups (80 each). Group A received intravenous ondansetron 4 mg, while Group B received intravenous ondansetron 4 mg plus dexamethasone 8 mg immediately before induction. PONV was assessed over 24 hours at 0–2, 2–6, and 6–24 hours. Nausea severity was measured using a 0–10 visual analogue scale (VAS); vomiting episodes, rescue antiemetic requirement, haemodynamic parameters, and adverse effects were recorded. ***Results:*** Overall PONV occurred in 30/80 (37.5%) patients in Group A and 14/80 (17.5%) in Group B (p=0.006). PONV was lower with combination therapy at 0–2 hours (18 vs 8; p=0.03) and 2–6 hours (14 vs 6; p=0.04), but not significantly different at 6–24 hours (10 vs 4; p=0.09). Mean nausea VAS scores were lower in Group B at 0–2 hours (4.2±1.3 vs 2.1±1.0; p<0.001), 2–6 hours (3.6±1.2 vs 1.8±0.9; p<0.001), and 6–24 hours (2.4±1.1 vs 1.2±0.8; p=0.002). Rescue antiemetics were required in 26/80 (32.5%) versus 10/80 (12.5%) patients (p=0.003). Adverse effects were infrequent and comparable. ***Conclusions:*** Adding dexamethasone 8 mg to ondansetron 4 mg significantly reduced the overall and early incidence of PONV, nausea severity, vomiting episodes, and rescue antiemetic use during the first 24 postoperative hours without an observed increase in adverse effects.

Summary Points:

- PONV occurred in 37.5% of patients receiving ondansetron alone versus 17.5% receiving ondansetron plus dexamethasone.
- The benefit of combination prophylaxis was most evident during the first 6 postoperative hours.
- Combination therapy reduced nausea VAS scores, vomiting episodes, and rescue antiemetic requirement.

Keywords: dexamethasone; laparoscopic surgery; ondansetron; postoperative nausea and vomiting; prophylaxis.

INTRODUCTION

Postoperative nausea and vomiting are among the most common unpleasant consequences of anaesthesia and surgery and remains an important determinant of patient satisfaction, quality of recovery, unplanned delay in discharge, and healthcare utilisation. The overall incidence is commonly reported at approximately 20–30% in general surgical populations and can be substantially higher in susceptible patients and after laparoscopic procedures [1–3].

The pathophysiology of PONV is multifactorial. Inputs from the gastrointestinal tract, vestibular system, chemoreceptor trigger zone, and higher cortical centres converge on central emetic pathways. Serotonergic, dopaminergic, histaminergic, muscarinic, and neurokinin pathways are involved [4,5]. Patient-related and perioperative risk factors are therefore important when selecting prophylaxis. The simplified Apfel score, based on female sex, non-smoking status, history of motion sickness or previous PONV, and postoperative opioid use, is widely used for risk stratification [6].

Ondansetron, a selective 5-hydroxytryptamine type-3 receptor antagonist, is a commonly used prophylactic antiemetic. Dexamethasone has antiemetic activity through mechanisms that are not fully defined and may complement serotonergic blockade. Current PONV guidance supports multimodal prophylaxis in patients with relevant risk factors [7]. Previous comparative studies and meta-analyses suggest that combining dexamethasone with ondansetron can improve antiemetic efficacy, although reported effect sizes vary across surgical populations and dosing regimens [1,2,8].

The present study compared intravenous ondansetron alone with intravenous ondansetron plus dexamethasone for prophylaxis of PONV in adults undergoing elective laparoscopic surgery. The primary objective was to compare the overall incidence of PONV during the first 24 postoperative hours. Secondary objectives included time-wise PONV, nausea severity, vomiting episodes, rescue antiemetic requirement, haemodynamic stability, and adverse effects.

MATERIALS AND METHODS

Study setting and design

This single-centre analytical comparative study was conducted in the Department of Anaesthesiology of a tertiary-care teaching hospital in Indore, India, over 18 months from 1 June 2024 to 30 November 2025, after Institutional Ethics Committee approval. Written informed consent was obtained from all participants. The thesis describes the design as analytical cross-sectional and states that participants were assigned to groups by an alternate allocation method.

Participants

A total of 160 patients aged 18–55 years, weighing 30–75 kg, with American Society of Anesthesiologists physical status I or II and scheduled for elective laparoscopic surgery under general anaesthesia were included. The thesis lists refusal to participate, use of opioids, steroids, or antiemetics within 24 hours before surgery, and history of motion sickness or previous PONV among the exclusion criteria.

Sample size and allocation

Sample size was calculated for comparison of two independent proportions using expected proportions of 0.92 and 0.76, a two-sided significance level of 0.05, and 80% power. The calculated requirement was 79 patients per group; the final study sample was 160 patients, with 80 patients in each group.

Group A received intravenous ondansetron 4 mg. Group B received intravenous ondansetron 4 mg plus dexamethasone 8 mg. Study drugs were administered immediately before induction of anaesthesia.

Anaesthetic technique

Patients fasted for at least 6 hours. Intravenous access was secured and normal saline infusion commenced. Anaesthesia was induced with propofol 2–3 mg/kg, and cisatracurium 0.15–0.2 mg/kg was used to facilitate tracheal intubation. Anaesthesia was maintained with oxygen, nitrous oxide, sevoflurane (0.5–4%), and controlled ventilation with end-tidal carbon dioxide monitoring. Neuromuscular blockade was reversed with neostigmine and glycopyrrolate, and patients were extubated after adequate recovery.

Outcome assessment

Patients were assessed for PONV during 0–2, 2–6, and 6–24 hours postoperatively. PONV was detected by spontaneous complaint or direct questioning. Nausea severity was recorded on a 10-cm VAS, where 0 represented no nausea and 10 the worst imaginable nausea. Vomiting episodes and the requirement for rescue antiemetic therapy were recorded. The Apfel risk score was assessed preoperatively. Haemodynamic parameters and adverse effects, including headache and dizziness, were also documented.

Statistical analysis

Data were entered into Microsoft Excel. Qualitative variables were expressed as frequency and percentage, and quantitative variables as mean±standard deviation. The thesis specifies use of an independent-samples t-test for comparison of means and considers $p<0.05$ statistically significant. Categorical outcomes are presented with p-values in the thesis; the exact categorical test and statistical software are not specified and should be verified before journal submission.

RESULTS

All 160 participants were analysed, with 80 patients in each group. Baseline age, sex, weight, American Society of Anesthesiologists physical status, Apfel score distribution, type of laparoscopic surgery, duration of surgery, and measured haemodynamic variables were comparable between groups.

Table 1. Baseline and perioperative comparability.

Characteristic	Group A: Ondansetron	Group B: Ondansetron + dexamethasone	p-value
Mean age, years	38.6 ± 9.2	37.9 ± 8.8	0.62
Male sex, n (%)	34 (42.5)	36 (45.0)	0.74
Female sex, n (%)	46 (57.5)	44 (55.0)	0.74
Apfel score distribution	Comparable	Comparable	0.92
Type of surgery	Comparable	Comparable	0.91
Duration of surgery	Comparable	Comparable	0.88

Primary outcome: overall PONV

Overall PONV during the first 24 hours occurred in 30 patients (37.5%) in Group A compared with 14 patients (17.5%) in Group B (p=0.006), an absolute reduction of 20 percentage points.

Table 2. Overall incidence of postoperative nausea and vomiting.

Outcome	Group A, n (%)	Group B, n (%)	p-value
PONV present	30 (37.5)	14 (17.5)	0.006
PONV absent	50 (62.5)	66 (82.5)	

Time-wise PONV and nausea severity

The incidence of PONV was significantly lower in the combination group during the first 6 postoperative hours. The difference was not statistically significant during 6–24 hours. Nausea VAS scores were lower in Group B at all three assessment intervals.

Table 3. Time-wise PONV and nausea VAS scores. VAS p-values were <0.001, <0.001, and 0.002, respectively.

Interval	PONV A (n)	PONV B (n)	p	VAS A mean±SD	VAS B mean±SD
0–2 h	18	8	0.03	4.2±1.3	2.1±1.0
2–6 h	14	6	0.04	3.6±1.2	1.8±0.9
6–24 h	10	4	0.09	2.4±1.1	1.2±0.8

Vomiting, rescue antiemetic use, and safety

Vomiting episodes were less frequent in Group B (p=0.01). Rescue antiemetic therapy was required in 26 patients (32.5%) in Group A and 10 patients (12.5%) in Group B (p=0.003). Headache occurred in four patients in Group A and three in Group B; dizziness occurred in three and two patients, respectively. The difference in adverse effects was not statistically significant (p=0.65).

Table 4. Vomiting, rescue antiemetic requirement, and adverse effects. *Overall comparison of adverse effects as reported in the thesis.

Outcome	Group A, n (%)	Group B, n (%)	p-value
No vomiting	52 (65.0)	68 (85.0)	0.01
1–2 vomiting episodes	20 (25.0)	10 (12.5)	
>2 vomiting episodes	8 (10.0)	2 (2.5)	
Rescue antiemetic required	26 (32.5)	10 (12.5)	0.003
Headache	4 (5.0)	3 (3.75)	0.65*
Dizziness	3 (3.75)	2 (2.5)	0.65*

DISCUSSION

This study found that prophylaxis with ondansetron 4 mg plus dexamethasone 8 mg was more effective than ondansetron 4 mg alone in adults undergoing elective laparoscopic surgery. The principal finding was a lower overall 24-hour incidence of PONV with combination therapy (17.5% vs 37.5%). The reduction was most apparent during the early postoperative period, and was accompanied by lower nausea VAS scores, fewer vomiting episodes, and less frequent rescue antiemetic use. The findings are biologically plausible because ondansetron and dexamethasone act through different antiemetic mechanisms. Ondansetron blocks 5-hydroxytryptamine type-3 receptors centrally and on vagal afferents, while

dexamethasone is thought to exert antiemetic effects through central and peripheral mechanisms that may include modulation of inflammatory mediators and serotonergic activity. Multimodal prophylaxis therefore targets more than one component of the emetic pathway [4,5,7].

The magnitude and direction of effect are consistent with Bhattarai et al., who reported a higher complete response with combined ondansetron and dexamethasone than with ondansetron alone in elective laparoscopic surgery [1]. Meta-analytic evidence has also supported improved control of PONV when dexamethasone is incorporated into antiemetic strategies, although comparisons vary according to the drugs, doses, timing, and baseline risk studied [2,8]. A more recent comparative study by Poornima et al. similarly reported improved complete response and reductions in delayed nausea and vomiting with ondansetron plus dexamethasone [9]. The present data suggest that the advantage of combination prophylaxis is greatest during the first 6 hours after surgery. PONV was significantly less frequent in Group B at 0–2 and 2–6 hours, while the 6–24-hour difference did not reach statistical significance. Despite this, nausea VAS scores remained significantly lower in the combination group throughout all measured intervals. This distinction is clinically relevant: incidence and symptom severity represent related but different outcomes, and a regimen may reduce the burden of symptoms even when the number of patients experiencing any PONV converges later in recovery.

Rescue antiemetic requirement fell from 32.5% with ondansetron alone to 12.5% with combination prophylaxis. Reduced need for additional treatment is important because breakthrough PONV can delay recovery and increase patient discomfort and resource use. The combination did not appear to compromise haemodynamic stability and was not associated with an observed increase in headache or dizziness. Risk stratification remains important. The thesis reports a significant association between higher Apfel scores and PONV ($p=0.008$), consistent with the established predictive value of recognised patient-level risk factors [6]. However, one methodological inconsistency requires clarification before publication: the Methods section lists previous PONV or motion sickness as an exclusion criterion, while the dataset and results contain this variable and report its distribution. The final submitted manuscript should reflect the actual protocol and enrolled population.

CONCLUSION

In adults undergoing elective laparoscopic surgery, intravenous ondansetron 4 mg combined with dexamethasone 8 mg was associated with a lower 24-hour incidence of PONV than ondansetron 4 mg alone. Combination prophylaxis also reduced early PONV, nausea severity, vomiting episodes, and rescue antiemetic requirement, with no observed increase in common adverse effects. These findings support multimodal antiemetic prophylaxis, particularly when clinically appropriate after individual PONV risk assessment.

REFERENCES

1. Bhattarai B, Shrestha S, Singh J. Comparison of ondansetron and combination of ondansetron and dexamethasone as a prophylaxis for postoperative nausea and vomiting in adults undergoing elective laparoscopic surgery. J Emerg Trauma Shock. 2011;4(2):168-172.
2. Maitra S, Som A, Baidya DK, Bhattacharjee S. Comparison of ondansetron and dexamethasone for prophylaxis of postoperative nausea and vomiting in patients undergoing laparoscopic surgeries: a meta-analysis of randomized controlled trials. Anesthesiol Res Pract. 2016;2016:1-8.
3. Kovac AL. Prevention and treatment of postoperative nausea and vomiting. Drugs. 2000;59:213-243.
4. Horn CC. The medical implications of gastrointestinal vagal afferent pathways in nausea and vomiting. Curr Pharm Des. 2014;20(16):2703-2712.
5. Gan TJ. Mechanisms underlying postoperative nausea and vomiting and neurotransmitter receptor antagonist-based pharmacotherapy. CNS Drugs. 2007;21(10):813-833.
6. Apfel CC, Heidrich FM, Jukar-Rao S, Jalota L, Hornuss C, Whelan RP, et al. Evidence-based analysis of risk factors for postoperative nausea and vomiting. Br J Anaesth. 2012;109(5):742-753.
7. Gan TJ, Belani KG, Bergese S, Chung F, Diemunsch P, Habib AS, et al. Fourth consensus guidelines for the management of postoperative nausea and vomiting. Anesth Analg. 2020;131(2):411-448.
8. Wang XX, Zhou Q, Pan DB, Deng HW, Zhou AG, Huang FR, et al. Dexamethasone versus ondansetron in the prevention of postoperative nausea and vomiting in patients undergoing laparoscopic surgery: a meta-analysis of randomized controlled trials. BMC Anesthesiol. 2015;15:118.
9. Poornima HP, Chandrashekar MR, Reddy NV. A comparative study of ondansetron with ondansetron and dexamethasone in prevention of postoperative nausea and vomiting (PONV) in laparoscopic surgeries. J Popul Ther Clin Pharmacol. 2024;31(10):320-328.