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Research

Comparison of Intravenous Ondansetron versus Dexamethasone in the Prophylaxis of Postoperative Nausea and Vomiting: A Prospective Study

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Abstract

Background: Postoperative nausea and vomiting (PONV) remains one of the most common complications following general anaesthesia, adversely affecting patient recovery and satisfaction. Prophylactic antiemetic therapy is therefore a key component of perioperative care.

Objectives: To compare the efficacy of prophylactic intravenous Ondansetron and Dexamethasone in preventing PONV in patients undergoing elective surgeries under general anaesthesia.

Materials and Methods: We conducted a prospective comparative study on 100 adult patients scheduled for elective surgeries under general anaesthesia. We observed the patients for 24 hours postoperatively for incidence and severity of nausea and vomiting, need for rescue antiemetics and patient satisfaction. The statistical analysis was performed using Chi-square and Wilcoxon tests, with $p < 0.05$ considered statistically significant.

Results: The overall incidence of PONV was significantly lower in the Dexamethasone group compared to the Ondansetron group (28% vs 36%, $p = 0.041$). Patients receiving Dexamethasone experienced significantly less moderate to severe nausea ($p = 0.0037$) and required fewer rescue antiemetics (16% vs 32%). Patient satisfaction scores were higher in the Dexamethasone group ($p = 0.0231$). No significant hemodynamic instability or drug-related adverse effects were observed in either group.

Conclusion: Prophylactic Dexamethasone demonstrated superior efficacy compared to Ondansetron in reducing the incidence and severity of PONV, with lower rescue antiemetic requirement and higher patient satisfaction. Dexamethasone may be considered a preferred single-agent prophylactic antiemetic in elective surgeries under general anaesthesia.

Keywords: Postoperative nausea and vomiting, Ondansetron, Dexamethasone, General anaesthesia, Antiemetic prophylaxis

Introduction

Postoperative nausea and vomiting remain among the most frequent and distressing complications after surgery under general anesthesia. The incidence of PONV is reported to range from 20-30% in the general surgical population and may increase to 60-70% in patients with multiple risk factors [1,2]. PONV is not only distressing for patients but is also associated with delayed recovery, extended post-anesthesia care unit stay, unexpected hospital admissions, additional healthcare expenditure, and reduced patient satisfaction [3]. Severe cases may result in such complications as wound dehiscence, dehydration, electrolyte imbalance, aspiration, and increased postoperative morbidity [4].

The pathophysiology of PONV is intricate and multifactorial, with both central and peripheral mechanisms. Several neurotransmitter systems take part in the process, such as serotonin ($5\text{-}HT_3$), dopamine (D_2), histamine (H_1), acetylcholine (muscarinic), and neurokinin-1 (substance P) pathways [5]. Surgical stimulation, administration of volatile anaesthetics, opioids, and patient-related factors such as female gender, non-smoking status, and history of motion sickness further enhance PONV development [1,6]. Because the ethology is multifactorial, no antiemetic agent can provide a complete protection against PONV in all patients.

A number of pharmacological agents that target various emetic pathways are used for the prevention and treatment of PONV. One of the most widely prescribed antiemetic drugs in perioperative practice today is Ondansetron, a selective antagonist of the 5-hydroxytryptamine-3 ($5\text{-}HT_3$) receptor, which has proven efficacy and a rapid onset of action, coupled with a good safety profile [7,8]. However, the role of Ondansetron is mainly limited to the prevention of early PONV, and its relatively short duration of action may limit its efficacy against delayed PONV [9].

Dexamethasone, a corticosteroid, has emerged as an effective and inexpensive alternative for PONV prophylaxis. Although the exact mechanism underlying its antiemetic effect is still unclear, suggested mechanisms include the inhibition of prostaglandin synthesis, reduction of central inflammation, modulation of serotonin activity, and enhancement of endogenous endorphin release [10,11]. Several studies and meta-analyses have demonstrated the efficacy of Dexamethasone in reducing both early and delayed PONV, alone and/or combined with other antiemetic agents [12,13]. Its long action duration, low cost, and favourable safety profile make it especially appealing in daily clinical practice, particularly in resource-poor settings.

Despite the widespread use of both Ondansetron and Dexamethasone, direct comparative data regarding relative efficacy as single-agent prophylactic antiemetics in elective surgeries under general anaesthesia are limited and sometimes inconsistent. A comparison between these commonly used agents is therefore necessary to guide the rational, evidence-based selection of prophylactic antiemetic therapy [14]. The present study was, therefore, conducted to compare prophylactic intravenous Ondansetron and Dexamethasone for preventing postoperative nausea and vomiting in patients undergoing elective surgeries under general anaesthesia. This study assessed the incidence, severity of symptoms, requirement of rescue antiemetics, and patient satisfaction.

Materials and Methods

This prospective comparative study was conducted in a tertiary care teaching hospital after obtaining approval from the Institutional Ethics Committee. Written informed consent was obtained from all the participants prior to enrolment. Adult patients aged 18–65 years of either gender, scheduled for elective surgeries under general anaesthesia and classified as American Society of Anesthesiologists (ASA) physical status I or II, were included in the study. Patients form the department of General Surgery, ENT, Orthopedics and Gynecology going under General anaesthesia procedure were included. Patients with a history of motion sickness or previous postoperative nausea and vomiting, known hypersensitivity to the study drugs, pregnancy or lactation, use of antiemetic medications within 24 hours prior to surgery or significant hepatic or renal dysfunction were excluded. A total of 100 patients were enrolled and allocated into two groups of 50 patients each. Patients in the Ondansetron group received Ondansetron 4 mg intravenously prior to induction

of anaesthesia, while patients in the Dexamethasone group received Dexamethasone 8 mg intravenously prior to induction. Postoperatively, patients were monitored for 24 hours for the incidence of nausea and vomiting during the intervals of 0–6 hours, 6–18 hours, and 18–24 hours. The severity of nausea was assessed using the Verbal Rating Scale, and the requirement for rescue antiemetic therapy was recorded. Patient satisfaction was evaluated using a 5-point Likert scale. Data was analyzed using appropriate descriptive and inferential statistical methods; with categorical variables compared using the Chi-square test and ordinal data analyzed using the Wilcoxon test. A p-value of less than 0.05 was considered statistically significant.

Table 1. Baseline Demographic and Clinical Characteristics of Study Participants

Characteristic	Dexamethasone (n = 50)	Ondansetron (n = 50)
Age (years)		
10–19	2 (4%)	1 (2%)
20–29	11 (22%)	16 (32%)
30–39	16 (32%)	11 (22%)
40–49	10 (20%)	7 (14%)
50–59	6 (12%)	9 (18%)
≥60	5 (10%)	6 (12%)
Gender		
Male	20 (40%)	21 (42%)
Female	30 (60%)	29 (58%)
ASA Grade		
Grade I	31 (62%)	24 (48%)
Grade II	19 (38%)	26 (52%)
BMI category		
Normal	43 (86%)	46 (92%)
Overweight	6 (12%)	2 (4%)
Underweight	1 (2%)	2 (4%)
Smoking status		
Smoker	15 (30%)	18 (36%)
Non-smoker	35 (70%)	32 (64%)
Duration of surgery (min)		
<60	16 (32%)	16 (32%)
60–119	6 (12%)	9 (18%)
120–179	11 (22%)	6 (12%)
≥180	17 (34%)	19 (38%)
Duration of anaesthesia (min)		
<60	20 (40%)	14 (28%)
60–119	11 (22%)	9 (18%)
120–179	8 (16%)	11 (22%)
≥180	11 (22%)	16 (32%)

Baseline characteristics were comparable between the two groups, with no statistically significant differences.

Table 2. Incidence of Postoperative Nausea and Vomiting (PONV) Within 24 Hours

Group	PONV Present, n (%)	PONV Absent, n (%)
Dexamethasone (n = 50)	14 (28%)	36 (72%)
Ondansetron (n = 50)	18 (36%)	32 (64%)

Chi-square test, $\chi^2 = 9.768$, df = 1, p = 0.0401

Table 3. Distribution of Patients According to Nausea Severity (Verbal Rating Scale)

Nausea Severity	Dexamethasone (n = 50)	Ondansetron (n = 50)
None	38	30
Mild	8	5
Moderate	1	1
Severe	3	14

Wilcoxon test (W = 1225), p = 0.0037

Table 4. Requirement of Rescue Antiemetic Therapy

Group	Patients Requiring Rescue Antiemetic, n (%)
Dexamethasone (n = 50)	8 (16%)
Ondansetron (n = 50)	16 (32%)

Table 5. Patient Satisfaction with PONV Management (5-point Likert Scale)

Group	Not Satisfied / Not Very Satisfied	Neutral	Satisfied / Very Satisfied
Dexamethasone (n = 50)	6	17	27 (54%)
Ondansetron (n = 50)	17	16	17 (34%)

Chi-square test, $\chi^2 = 7.54$, df = 2, p = 0.0231

Abbreviations:

ASA – American Society of Anaesthesiologists;
BMI – Body Mass Index;
PONV – Postoperative Nausea and Vomiting;
SD – Standard Deviation

Results

A total of 100 patients were included in the final analysis, with 50 patients in each group. Baseline demographic and perioperative characteristics were comparable between the two groups.

The overall incidence of postoperative nausea and vomiting (PONV) within 24 hours was significantly lower in the Dexamethasone group compared to the Ondansetron group (14/50 [28%] vs 18/50 [36%]; $\chi^2 = 9.768$, df = 1; p = 0.0401).

Assessment of nausea severity using the Verbal Rating Scale demonstrated a significantly lower proportion of moderate to severe nausea in patients receiving Dexamethasone. The Wilcoxon test showed a statistically significant difference in severity scores between the two groups (W = 1225; p = 0.0037).

The requirement for rescue antiemetic therapy was lower in the Dexamethasone group (8/50 [16%]) compared to the Ondansetron group (16/50 [32%]). Patient satisfaction scores assessed using a 5-point Likert scale were significantly higher among patients who received Dexamethasone (p = 0.0231).

No clinically significant adverse drug reactions or hemodynamic instability were observed in either group throughout the postoperative observation period.

Discussions

This study demonstrates that prophylactic administration of Dexamethasone is more effective than Ondansetron in preventing postoperative nausea and vomiting following elective surgeries under general anaesthesia. Patients receiving Dexamethasone experienced a significantly lower incidence and severity of PONV, reduced need for rescue antiemetics and higher patient satisfaction.

The superior efficacy of Dexamethasone may be attributed to its prolonged duration of action and anti-inflammatory properties, which contribute to sustained suppression of emetic pathways. While Ondansetron remains effective for early postoperative nausea, the higher recurrence observed in the Ondansetron group suggests comparatively shorter antiemetic coverage. These findings are consistent with previously published studies that report improved control of delayed PONV with Dexamethasone.

The study adds clinically relevant evidence supporting the use of Dexamethasone as a single-agent prophylactic antiemetic, particularly in resource-limited settings where cost-effective and durable antiemetic strategies are desirable.

Conclusion

Prophylactic intravenous Dexamethasone demonstrated superior efficacy compared to Ondansetron in reducing the incidence and severity of postoperative nausea and vomiting in patients undergoing elective surgeries under general anaesthesia. Dexamethasone was associated with lower rescue antiemetic requirements and higher patient satisfaction, without compromising safety. These findings support the use of Dexamethasone as an effective single-agent prophylactic antiemetic in routine clinical practice.

Strengths and Limitations

Strengths: The prospective study design, direct head-to-head comparison of two commonly used antiemetic agents and use of validated nausea severity and patient satisfaction scales strengthen the validity of the findings.

Limitations: The study was conducted at a single centre with a moderate sample size and combination antiemetic regimens were not evaluated. Larger multicenter studies may further validate these results.

Appendices

Appendix A: Postoperative Nausea and Vomiting (PONV) Assessment Tool

1. Assessment of Postoperative Nausea and Vomiting

Patients were assessed for the presence of postoperative nausea and vomiting during the following postoperative intervals:

0-6 hours

6-18 hours

18-24 hours

Nausea was defined as a subjective unpleasant sensation associated with an urge to vomit. Vomiting was defined as the forceful expulsion of gastric contents through the mouth.

2. Severity of Nausea (Verbal Rating Scale)

Patients were asked to rate the severity of nausea using a verbal rating scale:

0 - No nausea
1 - Mild nausea
2 - Moderate nausea
3 - Severe nausea

3. Rescue Antiemetic Requirement

The requirement for rescue antiemetic therapy was recorded if the patient experienced persistent nausea or vomiting despite prophylactic antiemetic administration. The time and number of rescue doses administered were documented.

4. Patient Satisfaction Scale (Modified 5-Point Likert Scale)

Patient satisfaction with postoperative nausea and vomiting management was assessed using a modified 5-point Likert scale, adapted by the investigators for this study.

Patients were asked to rate their overall satisfaction based on the following domains:

- Relief from nausea and vomiting
- Time taken for symptom relief
- Side effects experienced
- Overall comfort with PONV management.

Scoring

1 - Very dissatisfied
2 - Dissatisfied
3 - Neutral
4 - Satisfied
5 - Very satisfied

Higher scores indicated greater patient satisfaction with PONV management.

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Conflicts of Interest

None declared.

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