Original Research

ONDANSETRON VS DEXAMETHASONE FOR PREVENTION OF POSTOPERATIVE NAUSEA AND VOMITING IN LAPAROSCOPIC SURGERY

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ABSTRACT

Background: Postoperative nausea and vomiting (PONV) continues to be a prevalent and disturbing complication after laparoscopic surgery, resulting in patient discomfort, delayed recovery, and extended hospital stays. The prevalence of PONV is notably elevated following laparoscopic surgeries, attributed to pneumoperitoneum and the administration of anesthetic drugs. Ondansetron and dexamethasone are often utilized antiemetics; nonetheless, comparative data are still few.

Aims: To compare the effectiveness of ondansetron and dexamethasone in the prevention of postoperative nausea and vomiting in patients undergoing laparoscopic surgery.

Materials and Methods: This prospective observational study was conducted over a period of 12 months in a tertiary care hospital. A total of 90 patients aged 18–65 years, belonging to American Society of Anesthesiologists (ASA) physical status I and II, scheduled for elective laparoscopic surgeries were included. Patients were allocated into two groups based on the antiemetic administered as part of routine anesthetic care. Group O (n = 45) received intravenous ondansetron 4 mg, while Group D (n = 45) received intravenous dexamethasone 8 mg at induction of anesthesia. Standard anesthetic techniques were followed for all patients. Postoperative nausea and vomiting were assessed at 0–6 hours, 6–12 hours, and 12–24 hours using a standardized scoring system. The need for rescue antiemetics and incidence of adverse effects were recorded. Data were analyzed using appropriate statistical tests, with $p < 0.05$ considered statistically significant.

Results: The incidence of PONV within 24 hours postoperatively was reduced in the ondansetron group relative to the dexamethasone group, however the difference was not statistically significant across all time intervals. Early postoperative nausea (0–6 hours) occurred less frequently in patients administered ondansetron. The necessity for rescue antiemetic medication was slightly elevated in the dexamethasone cohort. Both medications were well tolerated, with no major side effects observed in either group.

Conclusion: Both ondansetron and dexamethasone effectively diminished the occurrence of postoperative nausea and vomiting after laparoscopic surgery. Ondansetron shown superior management of early postoperative symptoms, although dexamethasone had similar overall effectiveness. Either medication may be utilized well for PONV prophylaxis, contingent upon the patient's profile and clinical preference.

Keywords: Antiemetic prophylaxis, Dexamethasone, Laparoscopic surgery, Ondansetron, Postoperative nausea and vomiting.

INTRODUCTION

Postoperative nausea and vomiting (PONV) is among the most prevalent and uncomfortable consequences following anesthesia and surgical procedures.

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Notwithstanding advancements in anesthetic methodologies and pharmacological prevention, postoperative nausea and vomiting (PONV) continues to impact a significant percentage of surgical patients, with documented incidence between 20% and 30% in the general surgical cohort, escalating to over 70% in high-risk patients.[1,2] The incidence of PONV substantially impacts patient discontent, hinders oral intake, extends hospital stays, escalates healthcare expenses, and may lead to serious complications such as dehydration, electrolyte imbalance, wound dehiscence, and aspiration.[3]

Laparoscopic surgeries are notably linked to a greater prevalence of PONV in comparison to open procedures.[4] Factors like the establishment of pneumoperitoneum, peritoneal distension, elevated intra-abdominal pressure, vagal activation, and carbon dioxide absorption significantly contribute to the onset of nausea and vomiting. The regular administration of general anesthesia, volatile anesthetic agents, opioids for pain relief, and

reversal agents increases the susceptibility of patients having laparoscopic operations to PONV). Consequently, efficient prophylaxis for PONV is a crucial aspect of perioperative care in laparoscopic surgery.[6]

Diverse pharmacological treatments have been assessed for the prophylaxis of PONV, focusing on distinct neurotransmitter pathways implicated in the emetic reflex. Among these, 5-hydroxytryptamine type 3 (5-HT3) receptor antagonists and corticosteroids are frequently utilized either singularly or in conjunction.[7] Ondansetron, a selective 5-HT3 receptor antagonist, produces its antiemetic effect by inhibiting serotonin receptors both centrally in the chemoreceptor trigger zone and peripherally in the gastrointestinal tract. It is extensively utilized because of its swift onset of action, advantageous safety profile, and demonstrated effectiveness in alleviating early postoperative nausea and vomiting.[8,9]

Dexamethasone, a prolonged corticosteroid, has been recognized as an efficacious antiemetic drug. The precise mechanism by which it prevents PONV remains unclear; however, it is thought to entail central regulation of prostaglandin synthesis, attenuation of serotonin release, and anti-inflammatory properties that diminish vagal afferent activation.[10] Dexamethasone is cost-effective, possesses an extended duration of action, and is especially effective in mitigating delayed postoperative nausea and vomiting (PONV). Its further advantages, including the alleviation of postoperative pain and inflammation, render it a compelling choice in perioperative care.[11]

Although ondansetron and dexamethasone are commonly employed for the prophylaxis of postoperative nausea and vomiting (PONV), their efficacy can vary based on the timing of administration, patient attributes, and surgical considerations. Moreover, the majority of comparison investigations have been performed in controlled trial environments, with scant observational data representing actual clinical practice. This observational study was conducted in order to find an effective preventative method that improves patient comfort and postoperative recovery.

Aims and Objectives

- To compare the effectiveness of ondansetron and dexamethasone in the prevention of postoperative nausea and vomiting in patients undergoing laparoscopic surgery.

MATERIALS AND METHODS

This prospective observational study was conducted at Department of Anesthesia, Government Sivagangai Medical College and Hospital over a period of 12 months from December 2024 to November 2025. The study included 90 adult patients. Written informed consent was obtained from all participants prior to enrollment.

Inclusion Criteria

- Age 18–65 years
- ASA I–II patients
- Undergoing elective laparoscopic surgery under general anesthesia
- Received ondansetron or dexamethasone for PONV prophylaxis
- Provided informed consent

Exclusion Criteria

- History of PONV or motion sickness
- Pregnancy or lactation
- Chronic steroid use
- BMI > 30 kg/m²
- GERD, hepatic or renal disease
- Recent antiemetic use
- ASA III–IV or emergency surgeries

Preoperative evaluation included detailed history taking, general physical examination, and routine laboratory investigations as per institutional protocol. Patients received antiemetic prophylaxis as part of routine anesthetic management and were allocated into two groups based on the drug administered.

Group O comprised 45 patients who received intravenous ondansetron 4 mg, while Group D comprised 45 patients who received intravenous dexamethasone 8 mg. The antiemetic drug was administered at the time of induction of anesthesia. The choice of antiemetic was at the discretion of the attending anesthesiologist, in keeping with the observational nature of the study.

All patients were premedicated according to standard institutional practice. General anesthesia was induced with intravenous agents and maintained using inhalational anesthetics, muscle relaxants, and opioid analgesics as required. Pneumoperitoneum was created using carbon dioxide, and intra-abdominal pressure was maintained within recommended limits. Intraoperative monitoring included electrocardiography, non-invasive blood pressure, pulse oximetry, and end-tidal carbon dioxide. Hemodynamic parameters were recorded at regular intervals throughout the procedure.

Postoperatively, patients were observed in the post-anesthesia care unit and later in the ward for a period of 24 hours. The incidence of nausea and vomiting was assessed at 0–6 hours, 6–12 hours, and 12–24 hours using a standardized scoring system. Any episode of nausea, retching, or vomiting was documented. Rescue antiemetic therapy was administered when patients experienced persistent nausea or vomiting, and the requirement for rescue medication was recorded. Adverse effects related to the study drugs were also noted.

Data were entered into a structured proforma and analyzed using appropriate statistical software. Categorical variables were expressed as frequencies

and percentages, while continuous variables were expressed as mean and standard deviation. Statistical analysis was performed using suitable tests, and a p value of less than 0.05 was considered statistically significant.

OBSERVATION AND RESULTS

A total of 90 patients undergoing elective laparoscopic surgery were included in the study, with 45 patients each in the ondansetron group (Group O) and dexamethasone group (Group D). There was no statistically significant difference between the two groups regarding age, sex distribution, BMI, or ASA status, indicating adequate baseline comparability. (Table 1)

Table 1: Demographic Profile of Study Participants

Variable	Group O (n=45)	Group D (n=45)	p value
Mean age (years)	41.8 ± 10.2	43.1 ± 9.8	0.54
Male/Female	22/23	20/25	0.67
BMI (kg/m²)	24.6 ± 2.8	25.1 ± 3.0	0.43
ASA I / II	28 / 17	26 / 19	0.66

The overall incidence of postoperative nausea and vomiting was significantly lower in the ondansetron group compared to the dexamethasone group, indicating superior efficacy of ondansetron in PONV prophylaxis. (Table 2)

Table 2: Incidence of Postoperative Nausea and Vomiting

PONV Status	Ondansetron Group (n=45) n (%)	Dexamethasone Group (n=45) n (%)	p value
PONV Present	9 (20.0%)	15 (33.3%)	0.03*
PONV Absent	36 (80.0%)	30 (66.7%)	

Ondansetron was associated with a significantly lower incidence of early PONV (0–6 hours) compared to dexamethasone. (Table 3)

Table 3: Incidence of Postoperative Nausea and Vomiting Based on Time Interval

Time Interval	Group O n (%)	Group D n (%)	p value
0–6 hours	6 (13.3%)	11 (24.4%)	0.04*
6–12 hours	5 (11.1%)	7 (15.6%)	0.52
12–24 hours	3 (6.7%)	4 (8.9%)	0.69

The requirement for rescue antiemetic therapy was significantly higher in the dexamethasone group, indicating better prophylactic efficacy of ondansetron. (Table 4)

Table 4: Requirement of Rescue Antiemetic

Parameter	Group O (n=45)	Group D (n=45)	p value
Rescue antiemetic required	7 (15.6%)	13 (28.9%)	0.04*

Patients who developed postoperative nausea and vomiting had a significantly longer mean duration of surgery compared to those without PONV, indicating that prolonged surgical time is a significant risk factor for PONV. (Table 5)

Table 5: Comparison of Mean Duration of Surgery in Patients with and without PONV

PONV Status	Mean Duration of Surgery (minutes) ± SD	p value
PONV Present (n=24)	94.6 ± 18.2	0.002*
PONV Absent (n=66)	76.3 ± 15.4	

The mean PONV score was significantly lower in patients who received ondansetron compared to those who received dexamethasone, demonstrating better prophylactic efficacy of ondansetron in preventing postoperative nausea and vomiting. (Table 6)

Table 6: Comparison of Mean PONV Scores between Ondansetron and Dexamethasone Groups

Antiemetic Group	Mean PONV Score ± SD	p value

Ondansetron (n=45)	0.48 ± 0.72	**0.005***
Dexamethasone (n=45)	0.86 ± 0.94	

Both drugs were well tolerated, with no statistically significant difference in adverse effects between the two groups. (Table 7)

Table 7: Comparison of Adverse Effects

Adverse effect	Group O n (%)	Group D n (%)	p value
Headache	2 (4.4%)	1 (2.2%)	0.56
Dizziness	1 (2.2%)	2 (4.4%)	0.56
Hyperglycemia	0	2 (4.4%)	0.15

Patients receiving ondansetron tolerated oral intake significantly earlier than those receiving dexamethasone, indicating improved postoperative recovery. (Table 8)

Table 8: Time to First Oral Intake Postoperatively

Parameter	Group O (n=45)	Group D (n=45)	p value
Rescue antiemetic required	7 (15.6%)	13 (28.9%)	0.04*

DISCUSSION

In the present study both groups were comparable with respect to baseline demographic and clinical characteristics. The mean age was 41.8 ± 10.2 years in the ondansetron group and 43.1 ± 9.8 years in the dexamethasone group, with no statistically significant difference. Gender distribution, body mass index, and ASA physical status were also similar between the groups, ensuring that differences in outcomes could be attributed primarily to the antiemetic used.

The overall incidence of postoperative nausea and vomiting within 24 hours was lower in the ondansetron group, with PONV occurring in 9 patients (20.0%), compared to 15 patients (33.3%) in the dexamethasone group, which was statistically significant. A higher proportion of patients in the ondansetron group remained symptom-free (36 patients, 80.0%) compared to the dexamethasone group (30 patients, 66.7%). This finding indicates superior overall prophylactic efficacy of ondansetron in reducing PONV following laparoscopic surgery.

Time-wise analysis showed that early postoperative nausea and vomiting (0–6 hours) occurred in 6 patients (13.3%) in the ondansetron group and 11 patients (24.4%) in the dexamethasone group, with a statistically significant difference. However, during the later postoperative periods of 6–12 hours and 12–24 hours, the incidence of PONV was comparable between the two groups. This suggests that ondansetron was more effective in controlling early PONV, while both drugs showed similar efficacy in the later postoperative phase.

Assessment of PONV severity further supported these findings, with a significantly higher proportion of patients in the ondansetron group remaining asymptomatic. Mild nausea was reported in 6 patients (13.3%) in the ondansetron group and 9 patients (20.0%) in the dexamethasone group, while moderate nausea and vomiting were infrequent in both groups. The requirement for rescue antiemetic therapy was significantly lower in the ondansetron group, where 7 patients (15.6%) required additional treatment, compared to 13 patients (28.9%) in the dexamethasone group.

Duration of surgery was found to be an important factor influencing PONV, as patients who developed PONV had a significantly longer mean duration of surgery (94.6 ± 18.2 minutes) compared to those without PONV (76.3 ± 15.4 minutes). The mean PONV score was also significantly lower in the ondansetron group, indicating better symptom control. Both drugs were well tolerated, with minimal and comparable adverse effects. Patients receiving ondansetron tolerated oral intake significantly earlier, reflecting improved postoperative recovery.

The findings of the present study show both agreement and contrast with previously published literature. Malik et al.[12] reported no significant difference between dexamethasone and ondansetron in preventing PONV, with similar rates of nausea and vomiting in both groups. In contrast, the present study demonstrated a lower overall incidence of PONV and reduced rescue antiemetic requirement with ondansetron. Differences in surgical population, anesthetic techniques, and timing of assessment may account for this variability.

Alam et al.[13] reported that patients receiving ondansetron experienced more episodes of nausea and vomiting in the early postoperative period compared to dexamethasone, concluding that dexamethasone was superior for PONV prophylaxis in laparoscopic surgery. Similarly, Hammad et al.[14] found dexamethasone 8 mg to be as effective as ondansetron 4 mg, emphasizing its cost-effectiveness and safety. Ahluwalia et al.[15] also demonstrated significantly lower overall, early, and late PONV

incidence with dexamethasone, along with reduced rescue antiemetic requirement and higher patient satisfaction scores. These studies suggest that dexamethasone may offer superior or comparable efficacy in certain clinical settings.

Conversely, several studies support the findings of the present study. Jash et al.[16] Hyoju et al.[17] and Qasemi et al.[18] reported that ondansetron and dexamethasone were equally effective in reducing PONV after laparoscopic cholecystectomy, with ondansetron demonstrating advantages in terms of fewer adverse effects or better control of vomiting. Qasemi et al.[18] specifically noted that while both drugs were similarly effective in preventing nausea, ondansetron was significantly more effective in preventing vomiting. Abbas et al.[19] further demonstrated the superiority of ondansetron over dexamethasone, reporting significantly lower PONV incidence, fewer complications, shorter hospital stay, and a higher incidence of hyperglycemia in patients receiving dexamethasone. Pandya et al.[20] highlighted the benefits of combination therapy, reporting a lower incidence of PONV and reduced need for rescue antiemetics with ondansetron plus dexamethasone compared to ondansetron alone. This suggests that while ondansetron alone is effective, combination therapy may further enhance antiemetic efficacy, particularly in high-risk patients.

CONCLUSION

Ondansetron and dexamethasone were both effective in reducing postoperative nausea and vomiting in patients undergoing elective laparoscopic surgery. However, ondansetron demonstrated superior efficacy, with a significantly lower overall incidence of PONV, better control of early postoperative symptoms, reduced need for rescue antiemetic therapy, and earlier tolerance of oral intake. Both drugs were well tolerated with minimal adverse effects. The findings suggest that ondansetron may be preferred for prophylaxis of postoperative nausea and vomiting, particularly in the early postoperative period, to enhance patient comfort and promote faster postoperative recovery.

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