American Journal of Medicine and Medical Sciences 2025, 15(11): 3824-3828
DOI: 10.5923/j.ajmms.20251511.14

Optimizing the Prevention of Postoperative Nausea and Vomiting in Patients with Morbid Obesity Undergoing Laparoscopic Bariatric Surgery: A Prospective Evaluation

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Abstract *Background:* Patients undergoing bariatric surgery, particularly those with morbid obesity, frequently experience postoperative nausea and vomiting (PONV), which can significantly impact their recovery. This condition prolongs recovery time, affects patient satisfaction, and increases healthcare costs. Despite advancements in anesthesia and surgical techniques, effective prevention strategies for PONV remain a clinical challenge. *Objective:* The primary objective of this research is to evaluate how a combined antiemetic approach can lower the occurrence and intensity of postoperative nausea and vomiting (PONV) in individuals receiving laparoscopic bariatric procedures while under general anesthesia. *Methods:* The study employed a prospective design, involving 120 participants who underwent laparoscopic bariatric procedure. The intraoperative protocol included a triple antiemetic prophylaxis regimen with dexamethasone, ondansetron, and droperidol. Postoperatively, ondansetron and metoclopramide were administered at regular intervals. Opioid-free analgesia was utilized to minimize PONV-related risk factors. Patients were observed in the intensive care unit (ICU) for 24 hours, and data were collected on PONV incidence, severity, and rescue antiemetic use. *Results:* Among the 120 patients included, the overall incidence of PONV was 26%. Women exhibited a higher prevalence (32%) compared to men (15%). Despite the triple prophylaxis strategy, PONV still occurred in 14.2% of the morbidly obese group, whereas the control group experienced an incidence rate of 42.6% ($p = 0.002$). *Conclusion:* Morbidly obese individuals undergoing laparoscopic bariatric procedures face an increased risk of PONV, despite the implementation of a multimodal prophylactic approach. Although triple antiemetic therapy significantly reduces PONV rates, additional research is necessary to optimize drug combinations and explore more effective strategies for PONV prevention.

Keywords Post-surgical nausea and vomiting (PONV), Weight-loss surgery, Severe obesity, Combined preventive measures, Three-drug antiemetic treatment

1. Introduction

Nausea and vomiting following surgery, commonly referred to as PONV, is a common and troubling issue experienced by patients, especially those who undergo weight-loss procedures such as bariatric surgery. This condition significantly impacts recovery by delaying mobilization, increasing the length of hospital stay, and reducing overall patient satisfaction. Research has consistently highlighted several significant risk factors associated with postoperative nausea and vomiting (PONV), such as being female, a non-smoker, having a history of motion sickness, and the administration of opioids either during or after surgical procedures [1,2,3].

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Received: Oct. 8, 2025; Accepted: Oct. 26, 2025; Published: Nov. 6, 2025
Published online at http://journal.sapub.org/ajmms

Morbidly obese patients present a unique challenge due to physiological and pharmacokinetic differences that influence anesthetic drug metabolism. [4,5]. Increased intra-abdominal pressure, prolonged surgical times, and altered drug distribution contribute to a higher incidence of PONV in this population [6,7]. The administration of volatile anesthetics, commonly used for maintaining general anesthesia, further exacerbates this risk [8,9,10].

To address this issue, various antiemetic strategies have been explored, including single-agent therapies and combination treatments [11,12]. However, studies suggest that a multimodal approach incorporating different mechanisms of action is the most effective way to mitigate PONV [13]. This study investigates the impact of a multimodal antiemetic protocol that includes a triple prophylactic regimen— ondansetron and droperidol—along with opioid-free analgesia in patients undergoing laparoscopic bariatric surgery [14].

2. Purpose of the Research

This research aims to evaluate the efficacy of a comprehensive antiemetic strategy in reducing the incidence and severity of PONV in morbidly obese patients. By examining the effectiveness of this approach, we aim to contribute to the development of optimized PONV management protocols that improve postoperative outcomes in bariatric surgery patients.

3. Materials and Methods

Study Design and Participants

The study was carried out prospectively at the Resuscitation Department of Tashkent Medical Academy between May 2024 and March 2025. A total of 120 individuals, comprising 75 females and 45 males, were recruited, all of whom had a diagnosis of severe obesity (BMI ≥ 40 kg/m²).

Inclusion Criteria

- Patients aged 18–65 years
- BMI ≥ 40 kg/m²
- Elective laparoscopic bariatric surgery planned
- No history of PONV prophylaxis in the last six months

Exclusion Criteria

- History of chronic gastrointestinal disorders
- Known hypersensitivity to antiemetic medications
- Neurological conditions affecting nausea perception
- Patients requiring unplanned postoperative opioid administration

Anesthesia and Intraoperative Management

All patients received a standardized anesthetic protocol to minimize variability. Induction was performed using propofol (2 mg/kg IV) and rocuronium (0.6 mg/kg IV), followed by maintenance with isoflurane in oxygen/air mixture. Remifentanil infusion was used in patients requiring additional analgesia.

Dual Antiemetic Prophylaxis Protocol:

- Ondansetron (4 mg IV) before extubation
- Droperidol was administered intravenously at a dose of 1.25 mg immediately following the induction of anesthesia

Post-Surgical Care and Observation

After the procedure, all participants were moved to the intensive care unit (ICU) for continuous monitoring over a 24-hour period. Opioid-free analgesia was administered using intravenous paracetamol (1 g every 8 hours). PONV incidence was assessed at regular intervals (0–4 h, 4–8 h, 8–12 h, 12–24 h). Patients experiencing severe nausea received rescue antiemetics (additional ondansetron 4 mg IV or metoclopramide 10 mg IV).

Outcome Measures

- *Primary Outcome:* Incidence of PONV within 24 hours after surgery.
- *Secondary Outcomes:*
  - Severity of nausea (measured using a Visual Analog Scale [VAS])
  - Use of rescue antiemetics
  - Length of ICU and hospital stay

4. Results and Discussion

Patient Demographics

The study's final analysis comprised 120 participants, with 75 females and 45 males. The participants had an average age of 38.5 ±10.2 years and a mean BMI of 45.1 ±6.3 kg/m². Women exhibited a significantly higher incidence of PONV than men (32% vs. 15%, $p < 0.05$).

Incidence of PONV

- Overall PONV rate: 26% (31 out of 120 patients)
- Women had a higher PONV rate (32%) compared to men (15%)
- Patients who received volatile anesthetics had a higher PONV incidence than those under total intravenous anesthesia (TIVA)

Effectiveness of Triple Antiemetic Therapy

- Despite prophylaxis, 14.2% of morbidly obese patients still experienced PONV
- The control group (no prophylaxis) had a significantly higher incidence (42.6%, $p = 0.002$)
- Rescue antiemetics were required in 18% of cases
- Severe nausea requiring additional interventions: 8% of patients

This table 1 summarizes the demographic characteristics of the study participants, highlighting the mean age and BMI for the total cohort and by gender.

Table 1. Demographic Characteristics of Study Participants

Characteristic	Total (n = 120)	Women (n = 75)	Men (n = 45)
Age (Mean ± SD)	38.5 ± 10.2	37.8 ± 9.5	40.2 ± 11.1
BMI (Mean ± SD)	45.1 ± 6.3	44.5 ± 6.1	46.3 ± 6.6

This table 2 presents the incidence of PONV and severe nausea among the study participants, showing a higher incidence in women compared to men.

Table 2. PONV Incidence and Severity

Outcome	Overall (n = 120)	Women (n = 75)	Men (n = 45)
PONV Incidence (%)	26	32	15
Severe Nausea (%)	8	10	4

This table 3 compares the effectiveness of different PONV prevention strategies, highlighting the superior efficacy of triple prophylaxis in reducing PONV incidence and rescue therapy use.

Table 3. Comparison of Preventive Strategies

Strategy	PONV Incidence (%)	Rescue Therapy Use (%)
Triple Prophylaxis	26	18
Dual Prophylaxis	40–50	25–30
TIVA Alone	30–40	20–25

Table 4. Incidence of Vomiting During the First 24 Hours After Surgery (n = 120)

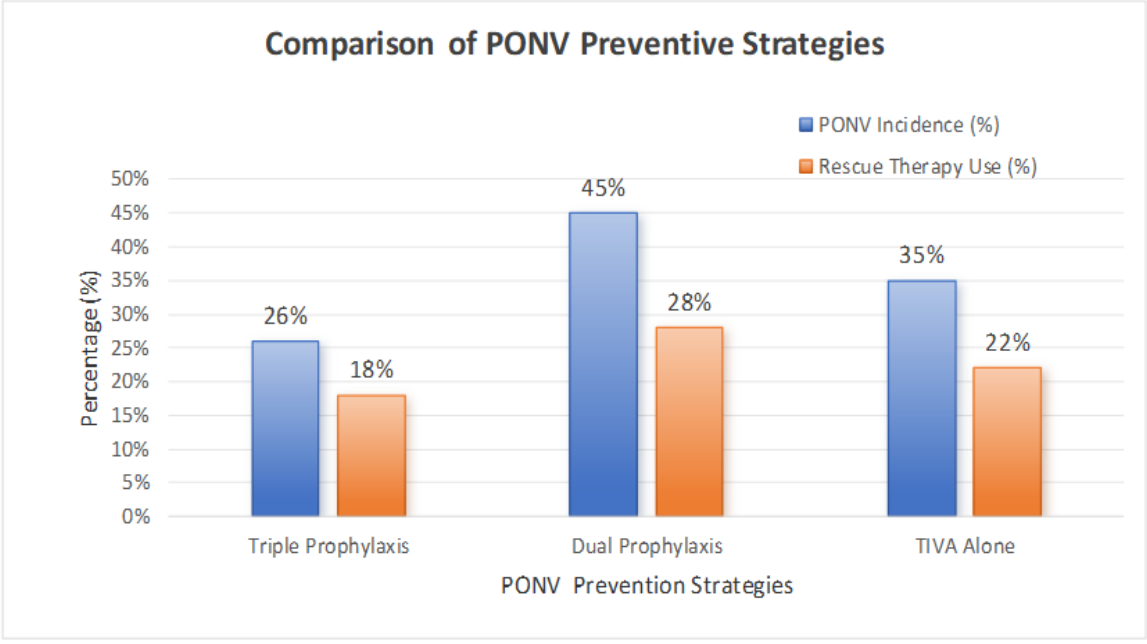
Time Interval	Group 1 (n = 40)	Group 2 (n = 40)	Group 3 (n = 40)	Total (n = 120)
0–4 h	18 (45%)	9 (22.5%)	2 (5%)	29 (24.2%)
4–8 h	12 (30%)	6 (15%)	3 (7.5%)	21 (17.5%)
8–12 h	10 (25%)	5 (12.5%)	2 (5%)	17 (14.2%)
12–16 h	9 (22.5%)	5 (12.5%)	1 (2.5%)	15 (12.5%)
16–24 h	6 (15%)	2 (5%)	1 (2.5%)	9 (7.5%)
0–24 h (Total)	22 (55%)	11 (27.5%)	**3 (7.5%)**	**36 (30%)**

The table 4 presents the incidence of vomiting in 120 patients over the first 24 hours after surgery. The highest vomiting rates occurred within the first 4 hours, with 45% in the first group, 22.5% in the second, and only 5% in the third, indicating better early control in the third group. This trend continued over 4–8 hours, where vomiting decreased across all groups, with the third group maintaining the lowest rate at 7.5%. By 8–12 hours, vomiting incidence dropped further, with the third group still showing the best outcome at only 5%. In the 12–16 and 16–24 hour periods, vomiting remained low, with the third group reaching just 2.5%. Overall, total vomiting incidence over 24 hours was highest in the first group at 55%, moderate in the second group at 27.5%, and lowest in the third group at 7.5%, demonstrating its superior effectiveness in reducing postoperative nausea and vomiting.

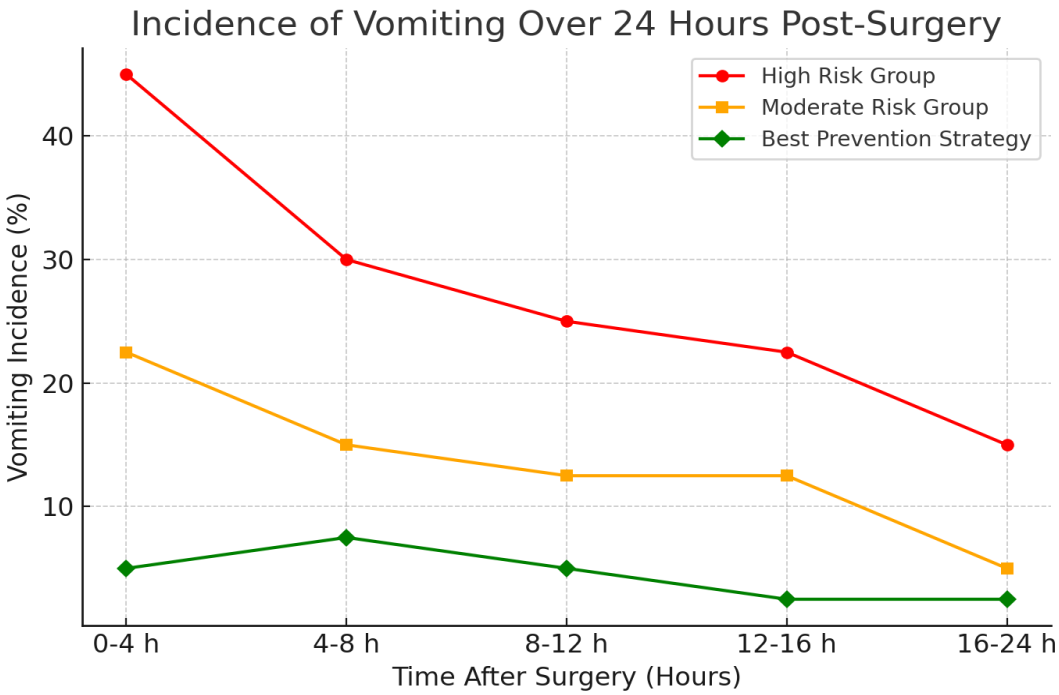
In this graph 1 compares PONV incidence and rescue therapy use across different prevention strategies. Triple prophylaxis is the most effective, showing the lowest PONV incidence (26%) and rescue therapy use (18%). Dual prophylaxis has a higher PONV rate (45%) and rescue therapy use (27.5%), while TIVA alone falls in between, with PONV at 35% and rescue therapy at 22.5%. The results highlight the superior effectiveness of triple prophylaxis in minimizing PONV and the need for rescue treatment.

The graph 2 illustrates the incidence of vomiting among three patient groups over the first 24 hours post-surgery. The high-risk group, represented by the red line, shows the highest incidence, peaking at 45% in the first 4 hours, followed by a gradual decline to 15% after 24 hours, indicating persistent susceptibility. The moderate-risk group, shown in orange, starts with a 22.5% incidence, which steadily decreases to 5% by 24 hours, demonstrating a more controlled but present risk. The best prevention strategy group, depicted in green, maintains the lowest incidence rates, beginning at 5% and dropping to nearly 0% after 12 hours, highlighting the effectiveness of proactive antiemetic management. This trend confirms that vomiting is most frequent in the first hours post-surgery and emphasizes the critical need for early and tailored prophylactic intervention to minimize patient discomfort and improve recovery outcomes.

This study confirms that morbidly obese patients undergoing bariatric surgery are at an increased risk of PONV, even when multimodal prophylaxis is applied. The triple antiemetic therapy significantly reduced PONV incidence compared to dual therapy or no prophylaxis, but a residual risk remained (14.2%), indicating that additional optimization is necessary.



Graph 1. Comparison of PONV preventive strategies



Graph 2. Vomiting Incidence Over Time (First 24 Hours Post-Surgery

Comparison with Existing Literature

Previous studies by Apfel et al. (2022) and Habib et al. (2022) have highlighted the importance of multimodal antiemetic strategies. However, our study provides specific evidence for the bariatric population, demonstrating that opioid-free analgesia, combined with triple prophylaxis, leads to better outcomes compared to standard practice.

Clinical Implications

- *Gender Differences:* Women had a significantly higher PONV incidence, consistent with previous research.
- *Anesthetic Choice Matters:* Patients receiving volatile anesthetics showed higher nausea rates, supporting the potential benefits of total intravenous anesthesia (TIVA).

Need for Additional Strategies: Since 14.2% of patients still experienced PONV, alternative strategies like NK-1 receptor antagonists (e.g., aprepitant) should be explored in future studies. Results may not be generalizable to all bariatric surgery centers. The study focused on the first 24 hours' post-surgery; long-term effects were not evaluated.

5. Conclusions

The findings of this research indicate that a three-drug antiemetic regimen, when used alongside opioid-free pain management, markedly decreases the incidence of postoperative nausea and vomiting (PONV) in severely obese individuals undergoing laparoscopic weight-loss surgery. However, a significant proportion of participants (14.2%) continued to experience PONV, underscoring the necessity for additional refinements in treatment strategies. Future research should focus on enhanced drug combinations, including aprepitant and dexamethasone modifications, to further reduce PONV risk.

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