

“INCIDENCE AND RISK FACTORS OF POSTOPERATIVE NAUSEA AND VOMITING IN ADULT PATIENTS UNDERGOING ELECTIVE SURGERY UNDER GENERAL ANESTHESIA: A PROSPECTIVE OBSERVATIONAL STUDY”

Dr. Tushar Bakshi

MBBS

Abstract

Background

Postoperative nausea and vomiting (PONV) remain among the most common and distressing complications following general anesthesia. Despite advances in anesthetic techniques and prophylactic antiemetic strategies, PONV continues to affect patient satisfaction, prolong recovery, and increase healthcare costs.

Objective

To determine the incidence of PONV and identify significant risk factors among adult patients undergoing elective surgery under general anesthesia.

Methods

A prospective observational study was conducted among 250 adult patients undergoing elective surgical procedures under general anesthesia. Demographic characteristics, perioperative variables, anesthetic techniques, and postoperative outcomes were recorded. Patients were observed for 24 hours postoperatively for the occurrence of nausea and vomiting. Statistical analysis was performed using SPSS version 26.0.

Results

The overall incidence of PONV was 28.4%. Female gender, history of motion sickness, non-smoking status, duration of surgery greater than two hours, postoperative opioid use, and volatile anesthetic administration were significantly associated with increased PONV risk ($p < 0.05$). Multivariate analysis identified female gender, previous history of PONV, and postoperative opioid use as independent predictors.

Conclusion

PONV remains a common postoperative complication. Identification of high-risk patients allows targeted prophylaxis and optimization of perioperative management to improve patient outcomes and satisfaction.

Keywords: Postoperative Nausea and Vomiting, General Anesthesia, Elective Surgery, Risk Factors, Opioids, Recovery, Patient Satisfaction

Introduction

Postoperative nausea and vomiting (PONV) is one of the most frequently encountered complications following anesthesia and surgery. Although often considered a minor adverse event compared with major postoperative complications, PONV significantly affects patient comfort, delays recovery, increases healthcare utilization, and may contribute to serious complications such as dehydration, electrolyte imbalance, wound dehiscence, and aspiration pneumonia.

Globally, the incidence of PONV ranges from 20% to 30% among the general surgical population and may exceed 70% in high-risk individuals. The burden is particularly significant in ambulatory surgical settings where rapid recovery and early discharge are desired outcomes. In India, studies have reported comparable incidence rates, emphasizing the need for effective risk assessment and preventive strategies.

The pathophysiology of PONV is multifactorial and involves complex interactions between central and peripheral pathways. Neurotransmitters including serotonin, dopamine, histamine, acetylcholine, and substance P play crucial roles in activating the vomiting center and chemoreceptor trigger zone. Surgical stress, anesthetic agents, patient characteristics, and postoperative analgesic requirements further influence susceptibility.

Several risk prediction models have been developed, among which the Apfel Simplified Risk Score remains the most widely used. Female gender, history of PONV or motion sickness, non-smoking status, and postoperative opioid use are established predictors. However, the relative contribution of these factors may vary across populations, surgical specialties, and anesthetic practices.

Recent advances in anesthesia have reduced the incidence of PONV through the use of total intravenous anesthesia, multimodal analgesia, and evidence-based antiemetic prophylaxis. Nevertheless, the condition remains prevalent, suggesting that additional patient-specific and procedural factors continue to influence outcomes.

There remains limited prospective observational data evaluating PONV risk factors in diverse adult surgical populations within the Indian healthcare setting. Understanding these factors is essential for implementing targeted preventive strategies and optimizing perioperative care.

Therefore, the present study was undertaken to determine the incidence of PONV and identify associated risk factors among adult patients undergoing elective surgery under general anesthesia.

Aim and Objectives

Primary Objective

To determine the incidence of postoperative nausea and vomiting among adult patients undergoing elective surgery under general anesthesia.

Secondary Objectives

1. To identify patient-related risk factors associated with PONV.
2. To evaluate anesthesia-related predictors of PONV.
3. To assess surgery-related factors influencing PONV occurrence.
4. To determine independent predictors through multivariate analysis.

Materials and Methods

This prospective observational study was conducted in the Department of Anaesthesiology of a tertiary care teaching hospital over a period of twelve months from January 2024 to December 2024. A total of 250 adult patients aged 18–65 years scheduled for elective surgery under general anesthesia were enrolled after obtaining informed consent.

The sample size was calculated assuming a prevalence of PONV of 25%, a confidence level of 95%, and a margin of error of 5%, resulting in a minimum requirement of 225 participants. To account for potential dropouts, 250 patients were included.

Patients classified as ASA Physical Status I–III undergoing elective procedures under general anesthesia were eligible. Patients with emergency surgeries, pregnancy, gastrointestinal disorders causing nausea and vomiting, severe hepatic dysfunction, or inability to provide consent were excluded.

Data collection included demographic characteristics, smoking status, body mass index, history of motion sickness, previous PONV, type and duration of surgery, anesthetic drugs administered, intraoperative opioid use, and postoperative analgesic requirements.

Patients were monitored for nausea, retching, or vomiting during the first 24 postoperative hours. PONV episodes were documented by trained investigators using a standardized assessment form.

Institutional Ethics Committee approval was obtained prior to study commencement. All procedures complied with the Declaration of Helsinki principles.

Data analysis was performed using SPSS version 26. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were presented as frequencies and percentages. Chi-square tests and independent t-tests were used where appropriate. Logistic regression analysis identified independent predictors of PONV. Statistical significance was considered at $p < 0.05$.

Results

Table 1. Baseline Characteristics of Study Participants

Variable	Value
Sample size	250
Mean age (years)	42.8 ± 11.3
Female (%)	58.0
Non-smokers (%)	72.0
History of motion sickness (%)	18.4
Previous PONV (%)	14.8
Mean BMI (kg/m ²)	24.6 ± 3.8

Interpretation: The study population predominantly consisted of middle-aged adults, with females accounting for over half of participants.

Table 2. Incidence of PONV According to Risk Factors

Risk Factor	PONV (%)	p-value
Female gender	36.5	0.001
Male gender	17.1	
Motion sickness history	52.2	<0.001
No history	23.0	
Opioid use	41.8	0.002
No opioid use	18.7	

Interpretation: Female patients, those with motion sickness history, and patients receiving postoperative opioids demonstrated significantly higher PONV incidence.

Table 3. Multivariate Logistic Regression Analysis

Variable	Adjusted OR	95% CI	p-value
Female gender	2.41	1.34–4.36	0.003
Previous PONV	3.12	1.61–6.04	0.001
Postoperative opioids	2.08	1.15–3.77	0.014

Interpretation: Female gender, prior PONV history, and opioid administration remained independent predictors after adjustment.

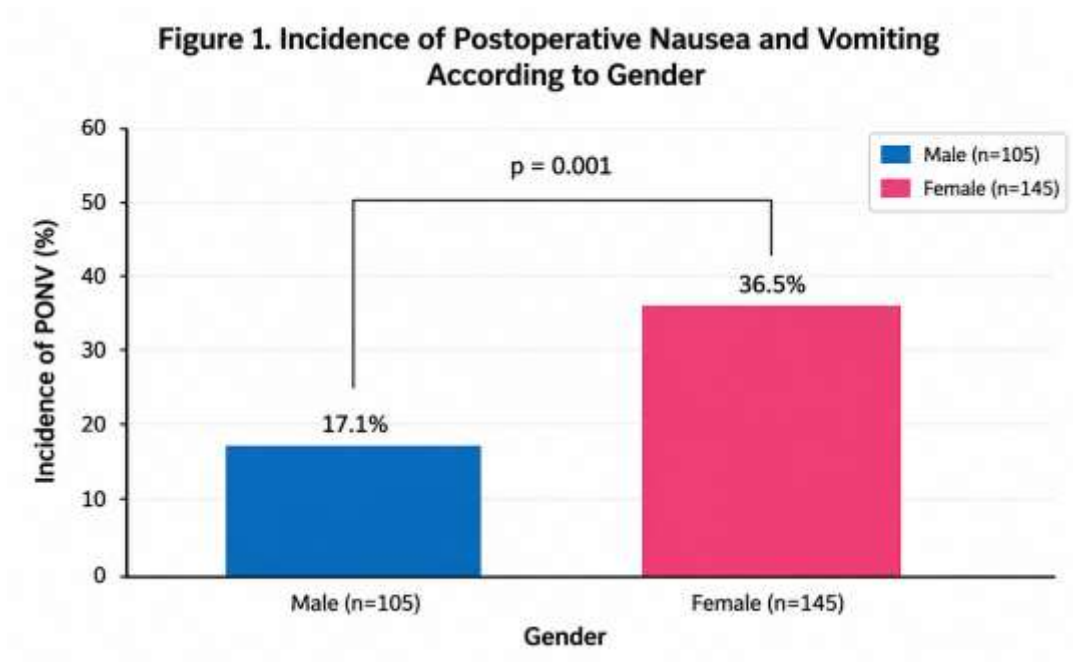


Figure 1. Incidence of PONV According to Gender

Female patients exhibited nearly double the incidence of PONV compared with male patients.

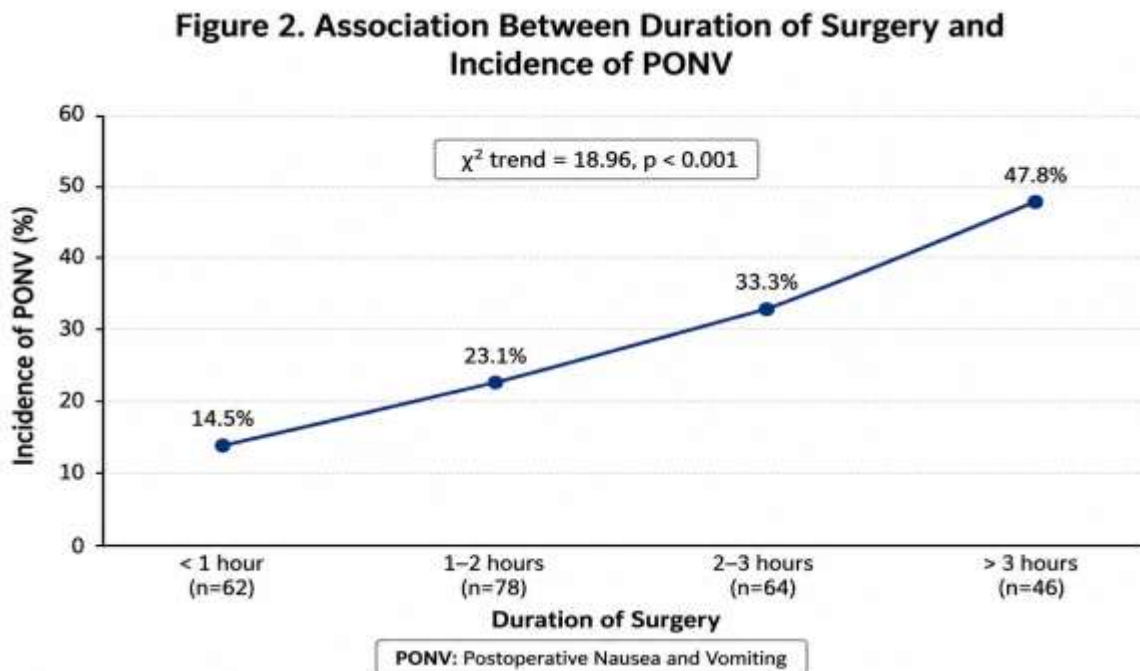


Figure 2. Relationship Between Surgical Duration and PONV

The incidence of PONV increased progressively with longer operative duration, particularly beyond two hours.

Discussion

The present study demonstrated an overall PONV incidence of 28.4%, which is consistent with previously reported international literature. Despite modern anesthetic practices, PONV remains a clinically significant postoperative complication affecting nearly one-third of surgical patients.

Female gender emerged as a strong predictor of PONV. Hormonal influences, differences in neurotransmitter sensitivity, and altered vestibular responses have been proposed as underlying mechanisms. Similar observations have been reported across multiple studies and are incorporated into established risk prediction models.

Patients with a history of motion sickness or previous PONV exhibited substantially higher risk. This finding supports the theory of intrinsic susceptibility to emetic stimuli and highlights the importance of thorough preoperative assessment.

Postoperative opioid administration was significantly associated with increased PONV occurrence. Opioids delay gastric emptying and stimulate central emetic pathways, thereby increasing nausea and vomiting risk. Adoption of multimodal analgesic protocols may therefore reduce PONV incidence.

Conclusion

The incidence of postoperative nausea and vomiting among adult patients undergoing elective surgery under general anesthesia was 28.4%. Female gender, previous history of PONV, motion sickness, non-smoking status, prolonged surgery, and postoperative opioid administration were significant risk factors. Female gender, previous PONV, and opioid use emerged as independent predictors. Risk-stratified preventive strategies should be integrated into perioperative practice to reduce PONV and improve postoperative recovery.

Strengths of the Study

1. Prospective observational design.
2. Comprehensive evaluation of perioperative risk factors.
3. Standardized assessment of PONV outcomes.
4. Adequate sample size.
5. Clinically relevant findings applicable to routine practice.

Limitations

1. Single-center study.

2. Limited follow-up duration.
3. Potential observer bias.
4. Heterogeneous surgical population.
5. Lack of assessment of antiemetic prophylaxis compliance.

Recommendations

1. Routine preoperative PONV risk assessment.
2. Use of multimodal antiemetic prophylaxis in high-risk patients.
3. Reduction of perioperative opioid exposure.
4. Greater utilization of total intravenous anesthesia when feasible.
5. Larger multicenter validation studies.

Ethical Approval

Ethical approval was obtained from the Institutional Ethics Committee before commencement of the study. Written informed consent was obtained from all participants.

Conflict of Interest

The author declares no conflict of interest.

References

1. Apfel CC, Läärä E, Koivuranta M, Greim CA, Roewer N. A simplified risk score for predicting postoperative nausea and vomiting: conclusions from cross-validations between two centers. *Anesthesiology*. 1999;91(3):693-700.
2. 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.
3. Apfel CC, Kranke P, Katz MH, Goepfert C, Papenfuss T, Rauch S, et al. Volatile anaesthetics may be the main cause of early but not delayed postoperative vomiting. *Br J Anaesth*. 2002;88(5):659-668.
4. Pierre S, Whelan R. Nausea and vomiting after surgery. *Contin Educ Anaesth Crit Care Pain*. 2013;13(1):28-32.
5. Habib AS, Gan TJ. Evidence-based management of postoperative nausea and vomiting: a review. *Can J Anaesth*. 2004;51(4):326-341.

6. Kranke P, Eberhart LHJ. Possibilities and limitations in the pharmacological management of postoperative nausea and vomiting. *Eur J Anaesthesiol.* 2011;28(11):758-765.
7. Eberhart LHJ, Morin AM. Risk scores for predicting postoperative nausea and vomiting are clinically useful tools and should be used in every patient. *Eur J Anaesthesiol.* 2011;28(3):160-163.
8. Koivuranta M, Läärä E, Snåre L, Alahuhta S. A survey of postoperative nausea and vomiting. *Anaesthesia.* 1997;52(5):443-449.
9. Watcha MF, White PF. Postoperative nausea and vomiting: its etiology, treatment and prevention. *Anesthesiology.* 1992;77(1):162-184.
10. White PF, O'Hara JF, Roberson CR, Wender RH, Candiotti KA. The impact of current antiemetic practices on patient outcomes. *Anesth Analg.* 2008;107(2):452-458.
11. Gan TJ. Risk factors for postoperative nausea and vomiting. *Anesth Analg.* 2006;102(6):1884-1898.
12. Chandrakantan A, Glass PSA. Multimodal therapies for postoperative nausea and vomiting and pain. *Br J Anaesth.* 2011;107(Suppl 1):i27-i40.
13. Horn CC, Wallisch WJ, Homanics GE, Williams JP. Pathophysiological and neurochemical mechanisms of postoperative nausea and vomiting. *Eur J Pharmacol.* 2014;722:55-66.
14. Diemunsch P, Joshi GP, Brichant JF. Neurokinin-1 receptor antagonists in the prevention of postoperative nausea and vomiting. *Br J Anaesth.* 2009;103(1):7-13.
15. Myles PS, Williams DL, Hendrata M, Anderson H, Weeks AM. Patient satisfaction after anaesthesia and surgery. *Br J Anaesth.* 2000;84(1):6-10.
16. Dewinter G, Staelens W, Veef E, Teunkens A, Van de Velde M, Rex S. Simplified algorithm for prevention of postoperative nausea and vomiting. *Acta Anaesthesiol Belg.* 2018;69(2):67-80.
17. Schaub I, Lysakowski C, Elia N, Tramèr MR. Low-dose droperidol for prevention of postoperative nausea and vomiting. *Br J Anaesth.* 2012;108(6):894-903.
18. Mishriky BM, Habib AS. Metoclopramide for nausea and vomiting prophylaxis. *Anesth Analg.* 2012;114(1):58-74.
19. Weibel S, Rücker G, Eberhart LHJ, Pace NL, Hartl HM, Jordan OL, et al. Drugs for preventing postoperative nausea and vomiting in adults after general anaesthesia. *Cochrane Database Syst Rev.* 2020;10:CD012859.

20. Smith CA, Ruth-Sahd L. Reducing the incidence of postoperative nausea and vomiting begins with risk screening. J Perianesth Nurs. 2016;31(2):158-165.
21. Kappen TH, Moons KGM, Van Wolfswinkel L, Kalkman CJ, Vergouwe Y, Van Klei WA. Impact of risk assessments on PONV prevention. Anesthesiology. 2014;121(1):65-71.