Prevalence and Risk Factors for Postoperative Nausea and Vomiting in Patients Undergoing Major Gynecological Surgery

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ABSTRACT

Background

Postoperative nausea and vomiting (PONV) is a common and distressing complication after surgery that may lead to dehydration, electrolyte imbalance, wound dehiscence, delayed recovery, prolonged hospital stays. Patients undergoing gynecological surgery are at higher risk of postoperative nausea and vomiting due to female gender, hormonal influences, pelvic procedures and the frequent use of general anesthesia

Objective

To identify the prevalence and assess risk factors of postoperative nausea and vomiting in patients undergoing major gynecological surgery in our population.

Method

This was an observational and analytical study conducted in 328 patients undergoing major gynecological surgery under anesthesia from October 2024 to February 2025. The enrolled patients were followed up in postoperative ward and were assessed for the presence of postoperative nausea and vomiting for 24 hours. The data was analyzed using IBM SPSS version 21. Frequencies and proportion were used to analyze the prevalence of postoperative nausea and vomiting. Chi-square test, cross-tabulation and binary logistic regression test were used to identify the association of the risk factors with postoperative nausea and vomiting.

Result

The prevalence of postoperative nausea was 48.2 %, while 15.9% of patients experienced retching and 33.5% experienced vomiting. The overall prevalence of postoperative nausea and vomiting was 54.3%. There was a significant association between the type of anesthesia and the occurrence of postoperative nausea and vomiting (p=0.006). Patients receiving CSE had 1.99 times higher odds of developing postoperative nausea and vomiting compared to general anesthesia. However, there was no statistically significant (AOR: 1.99, 95% CI: 0.55-7.22, p =0.294).

Conclusion

The prevalence of postoperative nausea and vomiting was higher in patients undergoing major gynecological surgery in patients receiving combined spinal epidural anesthesia.

KEY WORDS

Gynecologic surgical procedure, Postoperative nausea and vomiting, Prevalence, Risk factors

INTRODUCTION

Postoperative nausea and vomiting (PONV) is one of the common and distressing symptoms that patients experience within 24 hours after surgery.[1,2] Despite advances in anesthesia and antiemetic therapy, the incidence of PONV remains high and estimated to be 20-30% in normal population and up to 80% in high risk patients.[3] It can lead to patients discomfort and may result into complication such as electrolyte imbalance, wound dehiscence, delayed recovery, prolonged hospital stay, increased financial burden, dehydration, bleeding, wound gapping and aspiration pneumonitis.[4]

Patients undergoing gynecological surgery are more prone to have PONV due to combination of different factors such as female gender, hormonal influences, pelvic procedures and the frequent use of general anesthesia.[5] Manipulation of visceral organs increase the risk of PONV through vagal stimulation. To date the prevalence of PONV in gynecological patients has not been studied in our setting. The aim of this study was to identify the prevalence and assess risk factors of PONV undergoing major gynecological surgey in our population.

METHODS

This was an observational analytical study conducted at Paropakar Maternity and Women's Hospital from 15 October 2024 to 28 February 2025. Ethical approval was obtained from Institutional Review Committee of the hospital (Reference Number 65/263). Three hundred and twenty-eight patients undergoing major gynecological surgery under anesthesia, aged between 18-80 years were enrolled in the study. Patients with medical illnesses predisposing to nausea and vomiting, such as chronic kidney disease, migraine headache, cancer, emergency surgery, American Society of Anesthesiology (ASA) physical status more than III, preoperative antiemetic use and pregnant women were excluded from the study.

Pre anesthesia checkup was done one day prior to the surgery and patients were counselled about the study and written informed consent was taken. The anesthesia was administered to the patients according to the standard practices of the anesthesiologists. The enrolled patients were followed up in postoperative ward and were assessed for the presence of postoperative nausea, retching and vomiting for 24 hours. The patients were considered as having nausea if she felt desire to vomit which was not associated with expulsive muscular movement, retching was the episode where no gastric content was expelled and vomiting was the forceful expulsion of even a small amount of upper gastrointestinal contents through the mouth.[6] Retching and vomiting were collectively termed as vomiting. Presence of any one was taken as an outcome of PONV. The variables analyzed were the age, smoking history, history of PONV or motion sickness, types of major gynecological surgery, use of intraoperative opioids, duration of surgery, types of anesthesia (general anesthesia, spinal anesthesia, combined spinal epidural anesthesia) given and use of prophylactic antiemetic.

Sample size was calculated using the Cochran formula, considering a 95% confidence level, an estimated prevalence of PONV of 25.6% based on a study done by Sinha et al7 and margin of error (d) of 5%. The formula used was $n = Z^2p(1–p)/d^2$. Where Z= 1.96 at 95% confidence interval, p = 0.256, d=0.05. The calculated sample size was 298. After adding a 10% dropout rate, the final sample size was 328.

The data were collected, entered in MS Excel and analyzed using IBM SPSS statistics version 21. The prevalence of PONV was calculated using proportion (frequencies and percentage). Chi square test was initially performed to assess the association between PONV and potential risk factors. Variables were further analyzed using binary logistic regression to identify independent predictors of PONV. Crude odds ratio (COR), adjusted odds ratios (AOR) with 95% confidence interval (CI) were reported. A p-value < 0.05 was considered statistically significant in all analysis.

RESULTS

A total 328 patients were enrolled in the study. The mean age of the patients was 45.05 ± 13.12 years. The baseline demographic and clinical characteristics of the patients were shown in table 1.

In our study, the prevalence of postoperative nausea was 48.2 %, while 15.9% of patients experienced retching and 33.5% had vomiting. The overall prevalence of Postoperative nausea and vomiting (PONV) was 54.3% (Table 2).

There was no statistically significant association between age, history of smoking, history of PONV, use of intraoperative opioids and prophylactic use of antiemetics and the occurrence of PONV. Although there were higher odds of PONV in patients with history of motion sickness (COR: 1.49; 95% CI: 0.93–2.39), the association was not statistically significant (Table 3).

There was significant association between type of anesthesia and the occurrence of PONV (p value =0.006) (Table 4). Patients receiving CSE had 1.99 times higher odds of developing PONV compared to GA. However, there was no statistically significant (AOR: 1.99, 95% CI: 0.55-7.22, p =0.294) (Table 5).

Patients with history of PONV, those undergoing lower abdominal surgery and vaginal surgery had higher odds of developing PONV compared to patients undergoing laparoscopic surgery, with adjusted odds ratio (AOR:1.17, 95% CI 0.33-4.20 and AOR:1.34, 95% CI 0.32-5.57 respectively); however, the associations were not statistically significant. Similarly, patients whose surgeries lasted > 120 minutes had 1.25 times increased odds of

Table 1. Baseline demographic and clinical characteristics of patients (n=328)

Variables	Frequency (n=328)	Percentage (%)
Age (years) mean ± SD	45.05 ± 13.12	
Age (years		
≤ 45	191	58.2
> 45	137	41.8
History of smoking		
No	278	84.8
Yes	50	15.2
History of PONV		
No	316	96.3
Yes	12	3.7
History of motion sickness		
No	223	68
Yes	105	32
Use of intraoperative opioids		
No	4	1.2
Yes	324	98.8
Use of Prophylactic antiemetic		
No	34	10.4
Yes	294	89.6

†PONV: Postoperative Nausea and Vomiting
*frequency and proportion were used for analysis

Table 2. Prevalence of Postoperative nausea, vomiting, retching and postoperative nausea and vomiting (n=328)

Variables	PONV number (%)	
	No	Yes
Prevalence of PONV	150 (45.7)	178 (54.3)
Prevalence of nausea	170 (51.8)	158 (48.2)
Prevalence of retching	276(84.1)	52(15.9)
Prevalence of vomiting	218(66.5)	110(33.5)

† PONV: Postoperative Nausea and Vomiting
* Frequency and proportion were used for analysis

developing PONV compared to those undergoing surgery ≤ 120 minutes (AOR: 1.25, 95% CI: 0.78–2.02, p = 0.35). However, this association was not statistically significant. Other variables including age, history of smoking, PONV or motion sickness, intraoperative opioids use, prophylactic antiemetics used, type of surgery did not show a significant association with the occurrence of PONV (Table 5).

DISCUSSIONS

In our study, 328 patients undergoing major gynecological surgery were enrolled. The overall prevalence of PONV was 54.3% with nausea, retching and vomiting being 48.2%, 15.9% and 33.5% respectively. There was statistically significant association between the type of anesthesia and occurrence of PONV (p=0.006). However, when analyzing individual categories compared to general anesthesia, neither SAB nor CSE anesthesia showed a significant association with PONV. Type of surgery and duration of surgery did not show significant association with the occurrence of PONV as p value were 0.294 and 0.107 respectively.

Table 3. Association between demographic data and clinical characteristic and occurrence of PONV (n=328)

Variables	PONV Number (%)		p-value	Crude odds ratio (COR)	CI 95%
	No	Yes			
Age in years					
≤ 45 (Ref)	89 (46.6)	102(53.4)	0.710	1.08	0.70-1.69
> 45	61 (44.5)	76(55.5)			
History of smoking					
No (Ref)	130(46.8)	148(53.2)	0.377	1.31	0.71-2.43
Yes	20(40)	30 (60)			
History of PONV					
No (ref)	144(45.6)	172(54.4)	0.762	0.83	0.26-2.65
Yes	6(50)	6(50)			
History of motion sickness					
No (Ref)	109(48.9)	114(51.1)	0.095	1.49	0.93-2.39
Yes	41(39)	64(61)			
Use of intraoperative opioids					
No (Ref)	3(75)	1(25)	0.250**	3.61	0.37-35.09
Yes	147(45.4)	177(54.6)			
Use of antiemetics					
No (Ref)	16(47.1)	18(52.9)	0.870	1.06	0.52-2.16
Yes	134(45.6)	160(54.4)			

*Crosstab and Chi Square test were used to calculate p value and logistic regression for COR and 95% CI
**Fisher's exact test was applied. A p value <0.05 was considered statistically significant.
†COR: crude Odds Ratios, %: percentage, PONV: Postoperative Nausea and Vomiting, CI: Confidence Interval, Ref: Reference group

The overall prevalence of PONV was relatively high in our study. This could be due to several factors; including the female patients, gynecological surgery and uses of intraoperative opioids in most of the patients. Similar to our study, Teshome et al. reported an incidence of PONV was 51.2% among patients who underwent general anesthesia.[8] In contrast to our study, Sinha et al. reported the prevalence of PONV of 25.6% in patients undergoing non cardiac surgery under anesthesia with nausea, retching and vomiting being 13.7%, 4.5% and 7.5% respectively.[7] Their study included patients undergoing different types of surgery whereas our study focused on gynecological surgery, which has a higher risk of PONV.[9] They had given multiple prophylactic antiemetics based on the risk score whereas in our study we didn't administered antiemetics according to the Apfel risk score nine which might be the reason for the higher prevalence in our study. Similarly,

Table 4. Association between Surgical, Anesthetic characteristic and duration of surgery and occurrence of PONV (n=328)

Variables		PONV N=328 (%)		p-value	Crude OR
	No	Yes	Total		95% CI
Type of Surgery					
Laparoscopic surgery	49(32.7)	45(25.3)	94(28.7)		
Lower abdominal surgery	65(43.3)	90(50.6)	155(47.3)	0.294	
Vaginal surgery	36(24)	43(24.2)	79(24.1)		
Type of Anesthesia					
General Anesthesia (GA)	54(36)	51(28.7)	105(32)		
Subarachnoid block (SAB)	71(47.3)	70(39.3)	141(43)	**0.006**	
Combined spinal Anesthesia (SAB)	25(16.7)	57(32)	82(25)		
Duration of surgery					
≤ 120 min (Ref)	99(66)	102(57.3)	201(61.3)	0.107	1.45 (0.92-2.26)
>120 min	51 (34)	76(42.7)	127(38.7)		

Table 5. Binary logistic regression analysis of factors associated with PONV (n=328)

Variables	B	SE	AOR	(95% CI)	p-value
Age group (Ref: ≤ 45 years)	0.004	0.238	1.004	0.63-1.60	0.98
History of smoking (Ref: No)	-0.23	0.33	0.79	0.41-1.52	0.49
History of PONV (Ref: No)	0.43	0.61	1.53	0.46-5.06	0.48
History of motion sickness (Ref: No)	-0.42	0.25	0.65	0.40-1.06	0.09
Use of intraoperative Opioids (Ref: No)	-1.23	1.18	0.29	0.03-2.93	0.29
Types of surgery Lower abdominal surgery (Ref: laparoscopic surgery)	0.16	0.65	1.17	0.33-4.20	0.80
Vaginal surgery (Ref: Laparoscopic surgery)	0.29	0.72	1.34	0.32-5.57	0.72
Type of Anesthesia SAB (Ref: GA)	-1.39	0.66	0.87	0.23-3.19	0.83
CSE (Ref: GA)	0.69	0.65	1.99	0.55-7.22	0.29
Duration of surgery (Ref: ≤ 120 min)	0.23	0.24	1.25	0.78-2.02	0.35

†SAB: Subarachnoid block, CSE: Combined Spinal Epidural, PONV: Postoperative Nausea and Vomiting. AOR: Adjusted odd ratios CI: Confidence Interval, B: regression coefficient, SE: Standard Error, Ref: Reference

Temesgen et al. also found a lower incidence of PONV of 29.1% with 24.53% of patients experienced nausea and 4.5% vomiting.[10] The difference in prevalence might be due to different types of surgery and anesthesia techniques used including GA, spinal and peripheral block as well as they administered metoclopramide as a premedication in many patients whereas we had administered dexamethasone and ondansetron in few patients and ondansetron, or granisetron alone in most of the patients at the end of surgery. Timerga et al., Kothapalli et al., Ju et al., and Thapa et al. reported a lower incidence of PONV of 35.4%, 41%, 22.8% and 14% respectively.[3,11-13] The variation in PONV in different studies may be explained by differences in the types of surgeries performed whereas we had administered dexamethasone and ondansetron in few patients and ondansetron, or granisetron alone in most of the patients at the end of surgery. Ma et al. reported that the incidence of vomiting was 44.1% in patients undergoing gynecological laparoscopic surgery who received only a single antiemetic, compared to 18.3% to those who received multimodal antiemetics therapy.[14] The high prevalence of PONV observed in our study highlights the importance of routine risk assessment and appropriate prophylactic antiemetic in gynecological patients.

In our study, general anesthesia (GA), subarachnoid block (SAB) and combined spinal epidural (CSE) were the anesthetic techniques administered for major gynecological surgeries. There was statistically significant association between type of anesthesia and the incidence of PONV (p=0.006). CSE is often administered in longer and complicated procedures, which may increase the duration of anesthesia and surgical stress. In our setting patients receiving CSE were administered intrathecal fentanyl along with epidural morphine. This can contribute to a higher incidence of PONV through direct stimulation of the chemoreceptor trigger zone (CTZ) and delayed gastric emptying.[15] Our findings was similar to the study done by Timerga et al.[3] In contrast to our study, Sinha et al. reported a significant association of PONV with GA (p ≤ 0.001).[7] Similarly, Temesgen et al. also found a significant association between GA and the occurrence of PONV.[10] They had used halothane and isoflurane as inhalational agents while in our study only isoflurane was used.

However, we could not find any significant association between the age, history of smoking, history of PONV or motion sickness, intraoperative opioids and prophylactic antiemetic used, types of surgery and duration of surgery and the occurrence of PONV. Although patient with previous history of PONV and those receiving intraoperative opioids had higher odds of developing PONV, the associations were not statistically significant. This may be due to small number of patients in certain groups and use of prophylactic antiemetics may reduce the emetogenic effects of opioids.

Limitation of this study, postoperative factors such as pain severity and fasting status were not assessed, which may have influenced the occurrence of PONV. Although prophylactic antiemetics were administered, the choice and timing of antiemetics were not standarized, which may cause variability in the incidence of PONV. This was a single-center observational study, the findings may not

be generalizable to all the settings. Furthermore, follow-up was limited to the first 24 postoperative hours, and delayed PONV may have been missed.

Recommendation: The high prevalence of PONV in this study highlights the need for the routine risk assessment and appropriate prophylactic antiemetics in patients undergoing major gynecological surgery. Further multicenter studies with larger sample sizes and standardized anesthetic and antiemetic protocols are recommended to evaluate risk factors and optimize preventive strategies for PONV.

CONCLUSION

In our study, the prevalence of PONV was 54.3 %. Among the potential risk factors assessed, the type of anesthesia was significantly associated with the occurrence of PONV, with the higher incidence observed in patients who received combined spinal epidural anesthesia. Although prophylactic antiemetics were administered in this study, the prevalence of PONV remained high. Therefore, it is recommended that prophylactic antiemetics be administered based on standardized risk score stratification to prevent PONV.

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