

## Introduction

- Postoperative nausea and vomiting (PONV) is a common and unpleasant complication of general anesthesia.
- Incidences in the general and high-risk populations have been documented to range from 30 to 80%, respectively and create a negative impact on patient satisfaction, prolonged hospital stays and increased healthcare costs.<sup>1-5</sup>
- Current guidelines identify numerous risk factors that can increase a patient's likelihood of developing PONV.<sup>5, 6</sup>
- Nausea and vomiting during pregnancy (NVP) are also common with prevalence ranging from 50 to 80%.<sup>7</sup>
- However, following the discovery of the teratogenic effects of thalidomide, physicians have become more cautious in prescribing antiemetics for pregnant women.<sup>7</sup>
- Safety concerns for maternal and fetal wellbeing may prevent postoperative utilization of effective antiemetic medications in pregnant women.
- While studies exist that explore the incidence of PONV in gravid and non-gravid patients separately, limited studies exist to compare the two cohorts to identify if pregnancy can be an individual risk factor in PONV development.

## Objectives

- To understand if pregnancy is an individual risk factor for PONV.
- To test the hypothesis that anesthesiologists are more conservative with PONV prophylaxis in the gravid population despite a higher incidence of PONV in this group.

## Methods

- **Design and Setting:** This is a retrospective case-control cohort study with 1:2 matching conducted at an academic medical center with a high-volume surgical practice.
- **Patient Selection:** Electronic search from 2010 to 2020 to identify adult patients who were pregnant at the time of non-obstetric, non-cardiac procedures requiring general anesthesia. Each gravid patient was matched with two non-gravid controls based on age, year of surgery, and exact surgical procedure.
- **Data Abstraction:** The electronic medical and perioperative records of subjects were abstracted for demographic information and characteristics which could predispose towards PONV. The PACU records were reviewed for any documentation indicating PONV or the use of rescue antiemetics. The duration of PACU stay and length of hospitalization was determined. The obstetric course of gravid patients were reviewed for the incidence of maternal and fetal complications.

- **Statistical Methods:** In all cases, two-sided tests were performed with p-values <0.05 considered statistically significant.

## Results

- 240 gravid women underwent non-obstetric procedures under general anesthesia and were compared with 480 matched, non-gravid women.
- The number of prophylactic antiemetics were less among gravid (median 1 [1, 2]) than non-gravid (2 [2, 2]) women (P<0.001).
- Compared to non-gravid women, gravid women were at increased risk of PONV (adjusted OR 1.69 [95%CI 1.07, 2.64], P=0.024) and had longer hospital stays (P<0.001), despite having shorter surgical durations (P=0.015).

Table 1. Baseline patient and procedural characteristics

Variable	Non-gravid (N=480)	Gravid (N=240)	p
Patient characteristics			
Age, years	30 (26, 33)	29 (25, 33)	0.18
Body mass index, kg/m <sup>2</sup>	27.9 (22.8, 33.4)	28.4 (24.3, 33.7)	0.08
History of anxiety, n (%)	216 (45%)	116 (48%)	0.40
History of migraine, n (%)	146 (30%)	74 (31%)	0.91
History of PONV, n (%)	164 (34%)	90 (38%)	0.38
Home use antiemetics, n (%)	64 (13%)	12 (5%)	<.001
Smoking, n (%)	57 (12%)	36 (15%)	0.24
Procedural characteristics			
Surgery			>.99
General	260 (54%)	130 (54%)	
Gynecologic/urologic	128 (27%)	64 (27%)	
Neurosurgical/spine	30 (6%)	15 (6%)	
Orthopedic/plastics	28 (6%)	14 (6%)	
Head/neck	28 (6%)	14 (6%)	
Vascular	6 (1%)	3 (1%)	
Emergent surgery, n (%)	75 (16%)	49 (20%)	0.11
Propofol infusion, n (%)	402 (84%)	214 (89%)	0.05
Anesthetic gas, n (%)	138 (29%)	53 (22%)	0.06
Nitrous oxide, n (%)	140 (29%)	53 (22%)	0.043
Number of anti-emetics, count	2 (2, 2)	1 (1, 2)	<.001
Surgery duration, minutes	75 (50, 113)	68 (46, 96)	0.015
Perioperative opioids, mg IVME	30 (25, 40)	35 (25, 45)	0.07
Crystalloids, ml	900 (651, 1303)	1001 (800, 1500)	<.001

Table 1 identifies baseline patient and procedural characteristics.

- Gravid patients had more propofol infusions and less intraoperative antiemetics.

Figure 1. Prophylactic antiemetics administered

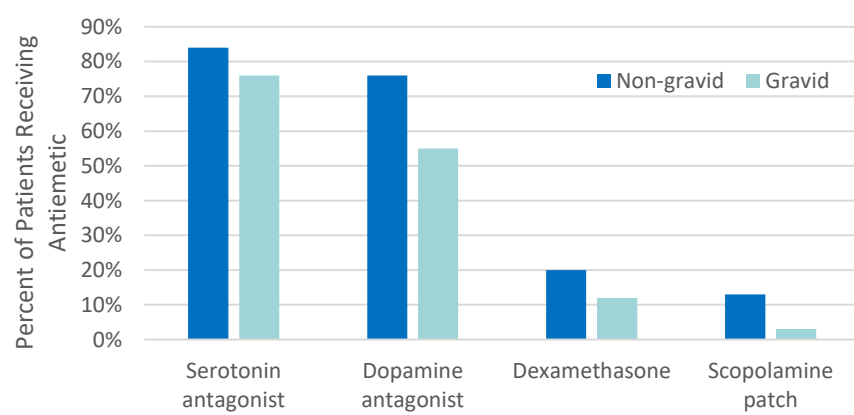


Table 2. Prophylactic antiemetics administered

Variable	Non-gravid (N=480)	Gravid (N=240)	p
Serotonin (5-HT3) antagonists*, n (%)	404 (84%)	183 (76%)	0.010
Dopamine antagonists**, n (%)	365 (76%)	131 (55%)	<.001
Dexamethasone, n (%)	95 (20%)	28 (12%)	0.006
Scopolamine patch, n (%)	61 (13%)	7 (3%)	<.001

Figure 1 and Table 2 identify prophylactic antiemetics administered following general anesthesia.

- Significantly less prophylactic antiemetics were administered for gravid patients.

Table 3. Perioperative outcomes

Outcome	Non-gravid (N=480)	Gravid (N=240)	Unadjusted			Adjusted		
			Est.	(95% CI)	p	Est.	(95% CI)	p
PONV, n (%)	74 (15%) <sup>1</sup>	51 (21%) <sup>2</sup>	1.48	(1.00, 2.20)	0.052	1.69	(1.07, 2.64)	0.024
PACU length of stay, minutes	65.5±39.4	68.4±44.2	2.9	(-3.6, 9.5)	0.381	3.9	(-2.6, 10.4)	0.239
Hospital length of stay, n (%)					<.001			<.001
0 days	250 (52%)	67 (28%)	reference			reference		
1 day	127 (26%)	95 (40%)	2.79	(1.91, 4.08)		3.07	(2.08, 4.54)	
2 days	38 (8%)	39 (16%)	3.83	(2.27, 6.45)		1.88	(1.23, 2.87)	
3 or more days	65 (14%)	39 (16%)	2.39	(1.39, 3.62)		1.33	(0.80, 2.22)	

Table 3 identifies perioperative outcomes following general anesthesia.

- Gravid patients had significantly greater PONV and longer lengths of stay in both the PACU and the hospital.

## Discussion

- **Gravid patients have a greater risk for PONV compared to similarly aged women undergoing the same procedure.**
  - Pre-existing NVP and physiologic changes during pregnancy could account for this difference.
  - Trend toward greater opioid use for pain control could increase PONV risk.
- **Anesthesiologists administer fewer prophylactic antiemetics to gravid patients during surgery.**
  - Potentially due to provider hesitancy due to conflicting evidence of antiemetic adverse effects on fetal wellbeing.
  - PONV may be dismissed as NVP.
  - Patients may have declined medications due to fear of potential effects on fetus.
- Limitations of this study are as follows:
  - This was a retrospective study.
  - Discrepancies in PONV documentation.
  - Change in electronic medical records.
  - Rescue antiemetics may not quantify PONV severity or declined medications.
  - Did not account for post-discharge nausea and vomiting.
  - Conducted at academic medical center and may not be applicable to community practice.

## Conclusion

- The risk of PONV development is increased by the interplay of multiple patient- and procedure-related factors.
- Rates of PONV are higher in the surgical gravid women than non-gravid women, even when adjusted for number of antiemetics.
- More studies are required in the gravid population to elucidate whether this is due to the physiologic changes during pregnancy.
- Studies are needed to develop safe antiemetic protocols for this subset of patients.

## References

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