Prediction of Post Operative Nausea and Vomiting using Anxiety Sensitivity Index- A Prospective Observational Study

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Abstract

Background: Post-operative nausea and vomiting (PONV) affects 20-30% of surgical patients. Current prediction models using Apfel score may not capture psychological risk factors. This study investigated anxiety sensitivity as a potential predictor of PONV. **Methods:** This prospective observational study enrolled 77 ASA I-II female non-smoking patients aged 18-70 years undergoing elective surgery under general anesthesia. Preoperatively, patients completed the Anxiety Sensitivity Index-3 (ASI-3) questionnaire measuring somatic, cognitive, and social concerns. Standardized general anesthesia was administered, and PONV prophylaxis included ondansetron 4mg. PONV was assessed over 24 hours using a numerical rating scale (0-10). **Results:** PONV occurred in 41.5% of patients. ASI-3 scores were significantly higher in PONV group (17.8 ± 10.4 vs 15.1 ± 13.2, p=0.042). Multivariate analysis showed ASI-3 scores >7 increased PONV risk (OR 4.92, 95% CI 1.73-13.85, p=0.002). Other significant predictors included lack of prophylaxis (OR 3.65, p=0.011), postoperative opioids (OR 3.58, p=0.006), and age (OR 1.03, p=0.038). **Conclusion:** Anxiety sensitivity independently predicts PONV risk. Incorporating ASI-3 assessment into preoperative screening could enhance PONV prediction and prevention strategies.

Keywords: Postoperative Nausea and Vomiting; Anxiety; Risk Assessment; Anesthesia, General; Antiemetics; Prospective Studies; Risk Factors; Patient Outcome Assessment; Preoperative Care; Surveys and Questionnaires

Introduction:

Post-operative nausea and vomiting (PONV) remains one of the most distressing complications following surgery, affecting approximately 20-30% of all surgical patients

and up to 80% in high-risk populations [1]. This "big little problem" not only causes significant patient discomfort but also leads to increased healthcare costs, delayed discharge, and potential surgical complications. The annual cost burden of PONV management in healthcare systems worldwide is estimated to exceed $100 million [2,3].

While current prediction models incorporate well-established risk factors such as female gender, non-smoking status, history of motion sickness, and use of postoperative opioids (Apfel score), they often fall short in accurately identifying all at-risk patients[3]. Recent research has highlighted the significant influence of psychological factors on post-operative outcomes, suggesting a more complex interplay between mind and body during the perioperative period [5].

Anxiety sensitivity, distinct from general anxiety, refers to an individual's fear of anxiety-related sensations based on beliefs about their harmful consequences. This psychological construct has been linked to enhanced physiological stress responses and increased symptom reporting across various medical conditions [6]. However, its specific role in PONV prediction remains largely unexplored, representing a significant gap in current knowledge.

This prospective observational study aims to investigate the potential utility of the Anxiety Sensitivity Index (ASI) as a predictor of PONV. The ASI, a well-validated 16-item self-report measure, assesses fears of anxiety-related sensations across physical, psychological, and social domains [7]. By examining the relationship between preoperative ASI scores and PONV incidence, this research seeks to enhance current risk prediction models and potentially identify patients who might benefit from targeted prophylactic interventions.

The findings could have significant implications for perioperative care, potentially leading to more personalized PONV prevention strategies and improved patient outcomes. This study represents a novel approach to PONV risk assessment by incorporating psychological factors that have been traditionally overlooked in surgical planning.

Methodlogy:

This prospective observational study was conducted at R.L. Jalappa Hospital and Research Centre, Tamaka, Kolar, following institutional ethical clearance. The study enrolled 77 patients over three months, calculated using a prevalence rate of 41.5% from previous research.

Participants included ASA grade I and II patients aged 18-70 years scheduled for elective surgery under general anesthesia. The study specifically included non-smoking females with a history of motion sickness or PONV who were expected to receive postoperative opioids. These criteria aligned with Apfel score risk factors. Patients

requiring ICU admission, emergency surgeries, regional anesthesia, or total intravenous anesthesia were excluded.

During pre-anesthetic evaluation, participants completed the ASI-3 questionnaire, an 18-item self-reporting tool measuring anxiety sensitivity across three subscales: Somatic Concerns, Cognitive Concerns, and Social Concerns. Each item was scored on a four-point Likert scale (0-4 points), yielding a total score range of 0-72 points. Written informed consent was obtained during this evaluation.

Intraoperatively, standardized general anesthesia was administered using inhalational agents (sevoflurane or isoflurane). The research team documented details regarding anesthesia technique, intraoperative and postoperative opioid administration, surgical procedure, and duration.

For PONV prophylaxis, ondansetron 4mg was administered intravenously at surgery conclusion. PONV assessment occurred over the first 24 postoperative hours using a numerical rating scale from 0-10 (0 = no nausea, 10 = maximum nausea). Any score above 0 or instances of retching/vomiting were classified as PONV.

Data collection included demographic information, ASI-3 scores, perioperative details, and PONV assessments. The relationship between preoperative ASI-3 scores and postoperative PONV incidence was analyzed to evaluate the predictive value of anxiety sensitivity in PONV risk assessment.

Results:

The study included 77 patients with demographics and clinical characteristics shown in Table 1. Of these, 32 patients (41.5%) experienced PONV within 24 hours post-surgery.

PONV group patients were significantly younger (47.3 vs 52.4 years, p=0.032) and more likely to receive postoperative opioids (81.3% vs 55.6%, p=0.004). Only 12.5% of PONV patients received prophylaxis compared to 31.1% in the non-PONV group (p=0.018).

Table 1: Demographics and Clinical Characteristics (N=77)

Characteristic	All Patient	PONV (n=32	No PONV (n=45	P-value
Age (years), mean ± SD	50.2 ± 13.5	47.3 ± 12.4	52.4 ± 14.1	**0.032***
Duration of anesthesia (min)	165 ± 92	162 ± 68	167 ± 105	0.378
PONV history, n (%)	15 (19.5)	6 (18.8)	9 (20.0)	0.975
Motion sickness history, n (%	26 (33.8)	13 (40.6)	13 (28.9)	0.214
PONV prophylaxis, n (%)	18 (23.4)	4 (12.5)	14 (31.1)	**0.018***
Laparoscopic surgery, n (%)	14 (18.2)	9 (28.1)	5 (11.1)	**0.022***
Postoperative opioids, n (%)	51 (66.2)	26 (81.3)	25 (55.6)	**0.004***

ASI-3 scores (Table 2) showed significantly higher total scores in PONV patients (17.8 vs 15.1, p=0.042). The cognitive concerns subscale showed particular significance (7.0 vs 5.7, p=0.031), while somatic and social concerns weren't statistically different between groups.

Table 2: ASI-3 Scores Distribution

ASI-3 Component	PONV (n=32	No PONV (n=45	P-valu
Total score	17.8 ± 10.4	15.1 ± 13.2	**0.042***
Somatic concerns	6.3 ± 4.7	5.5 ± 5.2	0.231
Social concerns	4.5 ± 3.8	3.9 ± 4.4	0.092
Cognitive concern	7.0 ± 3.8	5.7 ± 4.8	**0.031***

Multivariate analysis (Table 3) revealed that ASI-3 scores >7 points increased PONV risk nearly five-fold (OR 4.92, p=0.002). Other significant risk factors included lack of prophylaxis (OR 3.65, p=0.011) and postoperative opioid use (OR 3.58, p=0.006). Age remained significant but with modest impact (OR 1.03, p=0.038).

Table 3: Multivariate Analysis - Risk Factors for PONV

Risk Factor	Odds Rati	95% CI	P-valu
ASI-3 score >7 points	4.92	1.73-13.8	**0.002***
No PONV prophylaxi	3.65	1.35-9.8	**0.011***
Postoperative opioid	3.58	1.44-8.9	**0.006***
Age (per year)	1.03	1.00-1.0	**0.038***
Laparoscopic surgery	2.64	0.90-7.7	0.076

Discussion:

Recent studies have explored psychological factors in PONV prediction, showing varying results. Van den Bosch et al.[8] found only weak correlations between preoperative anxiety and PONV, while Roh et al.[1] demonstrated significant associations in ambulatory surgery patients.

Previous studies examining the relationship between anxiety sensitivity, measured by ASI-3, and PONV have shown varying results. In our study, when evaluating the relationship between preoperative anxiety sensitivity and PONV while accounting for

established predictors, we found a strong correlation between ASI-3 scores and PONV incidence (OR 4.92, 95% CI 1.73-13.85, p=0.002). This contrasts with Van den Bosch et al.'s findings of only weak correlations using general anxiety measures.[9] However, our results align with Gan's comprehensive review of PONV risk factors, which identified psychological factors as potential predictors.[10]

Similar to Roh et al.'s study using the Amsterdam Preoperative Anxiety and Information Scale, our research demonstrated a positive correlation between anxiety sensitivity and PONV in adult patients undergoing surgery under general anesthesia. [11] However, our study specifically focused on high-risk patients (non-smoking females) and utilized the ASI-3 tool, which measures specific anxiety-related concerns rather than general preoperative anxiety.

Comparison with previous studies presents challenges due to variations in PONV definitions, anxiety measurement tools, anesthetic techniques, and study populations. Our study standardized these variables by using consistent anesthetic protocols, a validated anxiety sensitivity measurement tool (ASI-3), and clear PONV assessment criteria in a specific high-risk population.[12-14]

The strong correlation between ASI-3 scores and PONV (OR 4.92) extends beyond traditional anxiety measures studied by Laufenberg-Feldmann et al.[15], who reported an OR of 4.95 for anxiety sensitivity. This suggests anxiety sensitivity might be more predictive than general anxiety states.

The ASI-3's cognitive concerns subscale showed particular significance, supporting Apfel's [15] hypothesis about the mind-body connection in PONV development. This could inform more targeted prophylaxis strategies, as suggested by recent guidelines. The strong correlation between ASI-3 scores and PONV (OR 4.92) extends beyond traditional anxiety measures studied by Laufenberg-Feldmann et al.[15], who reported an OR of 4.95 for anxiety sensitivity. This suggests anxiety sensitivity might be more predictive than general anxiety states.
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Conclusion:

This study demonstrates that anxiety sensitivity, as measured by ASI-3, is a significant independent predictor of PONV in high-risk patients. The nearly five-fold increase in PONV risk with elevated ASI-3 scores suggests that incorporating psychological assessment into pre-operative screening could enhance PONV prediction and prevention strategies. This finding, combined with traditional risk factors, could lead to more personalized and effective PONV prophylaxis protocols.

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