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Postoperative Nausea and Vomiting in Gynaecological Laparoscopic Surgeries: Risk Factors and Prevention Strategies

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Abstract: ***Background**: Postoperative nausea and vomiting (PONV) remain among the most common and distressing complications following anaesthesia, particularly in gynaecological laparoscopic procedures. These surgeries inherently involve patient-, surgical-, and anaesthetic-related risk factors that synergistically increase PONV incidence. **Objective**: To review current evidence on risk factors for PONV in gynaecological laparoscopic surgery and outline prevention strategies based on contemporary guidelines. **Methods**: Literature from PubMed, Scopus, and Cochrane databases (2000–2025) was reviewed, focusing on prospective trials, meta-analyses, and international consensus guidelines. **Results**: Female sex, non-smoking status, history of PONV or motion sickness, and perioperative opioid use are key patient-related predictors. Laparoscopic techniques increase risk through pneumoperitoneum-induced diaphragmatic irritation and increased intra-abdominal pressure. Anaesthetic factors such as volatile agents, nitrous oxide, and prolonged surgery further compound risk. Prevention strategies include risk stratification (e.g., Apfel score), minimisation of baseline risks (opioid-sparing, total intravenous anaesthesia [TIVA]), and multimodal antiemetic prophylaxis using agents from different pharmacological classes (5-HT3 antagonists, dexamethasone, NK1 antagonists, dopamine antagonists). Non-pharmacological measures such as adequate hydration, low-pressure pneumoperitoneum, and regional anaesthesia techniques contribute to PONV reduction. **Conclusion**: Gynaecological laparoscopic surgery constitutes a high-risk setting for PONV. Risk-based multimodal prevention offers the most effective approach, aligning with recent consensus guidelines.*

Keywords: Postoperative nausea and vomiting; PONV; gynaecological laparoscopy; laparoscopic surgery; Apfel score; antiemetic prophylaxis; multimodal prevention; total intravenous anaesthesia (TIVA); opioid-sparing analgesia; risk factors.

1. Introduction

Postoperative nausea and vomiting (PONV) affect up to 30% of all surgical patients and up to 80% of high-risk groups. Gynaecological laparoscopic surgery is a prime example of a high-risk scenario, combining multiple strong risk factors: female sex, use of general anaesthesia, and laparoscopic technique. The impact of PONV is significant — prolonging post-anaesthesia care unit (PACU) stays, delaying discharge in day-care settings, increasing unplanned admissions, and impairing patient satisfaction.

Despite advances in anaesthetic techniques, PONV prevention remains a clinical challenge. This paper reviews the epidemiology and pathophysiology of PONV in gynaecological laparoscopy, identifies modifiable and non-modifiable risk factors, and summarises evidence-based prevention strategies.

Pathophysiology of PONV in Laparoscopic Gynaecological Surgery

PONV results from activation of the vomiting centre in the medulla oblongata via multiple afferent pathways — vestibular, gastrointestinal, chemoreceptor trigger zone, and cortical inputs. In laparoscopy, CO_2 pneumoperitoneum and Trendelenburg positioning cause diaphragmatic stretch, vagal stimulation, and peritoneal irritation, enhancing emetogenic stimuli. Additionally, increased intra-abdominal pressure may impair gastric emptying and induce hormonal and neurotransmitter changes favouring nausea.

Risk Factors

- Patient-related: Female sex, history of PONV or motion sickness, non-smoker status, younger age (<50 years).
- Surgical: Laparoscopic approach (pneumoperitoneum, Trendelenburg), prolonged duration (>60 minutes), uterine or adnexal manipulation.
- Anaesthetic: Use of volatile inhalational agents and nitrous oxide, perioperative opioids, high-dose neostigmine.

Risk Stratification

The Apfel simplified risk score remains widely recommended: female gender, non-smoker, history of PONV/motion sickness, postoperative opioid use. Risk correlates with number of factors present: 0–1 low risk (~10%), 2 moderate (~40%), 3 high (~60%), 4 very high (~80%). Many gynaecological laparoscopy patients present with ≥3 factors.

Prevention Strategies

1) Reducing baseline risk: Prefer TIVA with propofol, avoid nitrous oxide, opioid-sparing analgesia, adequate hydration, low-pressure pneumoperitoneum.
2) Pharmacological prophylaxis: For moderate-to-high risk patients, use ≥2 agents from different classes: 5-HT3 antagonists, dexamethasone, NK1 antagonists, dopamine antagonists.
3) Non-pharmacological measures: Acupressure (PC6), gentle surgical handling, minimising peritoneal irritation.

Treatment of Established PONV

If prophylaxis fails, treat with an antiemetic from a different class than used for prophylaxis. Reassess for contributing factors such as pain, hypotension, or residual pneumoperitoneum.

2. Conclusion

Gynaecological laparoscopic procedures carry an inherently high risk for PONV due to overlapping patient, surgical, and anaesthetic factors. A proactive, risk-stratified, multimodal prevention strategy incorporating both pharmacological and non-pharmacological measures is essential for optimal outcomes.

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