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A Case of Intractable Postoperative Nausea and Vomiting (PONV)

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CASE DESCRIPTION

A 43-year-old female with prior history of intractable postoperative nausea and vomiting (PONV) under general anesthesia (GA) presented for open reduction and internal fixation of left patella for a malunion fracture. An ultrasound-guided femoral nerve block was placed prior to GA with 25cc of 0.25% bupivacaine. GA with LMA was maintained under total intravenous anesthesia with propofol, midazolam and fentanyl. Her PONV prophylaxis included scopolamine dermal patch, intravenous (IV) dexamethasone, and ondansetron. She was hydrated with two (2) liters of LR. She did not have PONV for the first time in her anesthetic history.

CASE DISCUSSION Mechanism of Nausea and Vomiting

The chemoreceptor trigger zone (CRTZ), located at the caudal end of the fourth ventricle in the area postrema, and the nucleus tractus solitarius (NTS), are centrally-located structures in the brain responsible for nausea and vomiting. The CRTZ receives input from the GI tract via vagal afferents. It can also detect emetogenic toxins from blood and CSF. It lacks blood brain barrier. The CRTZ projects neurons to the NTS, which receives input from vagal afferents and the limbic system. NTS triggers vomiting by stimulating the rostral nucleus, the nucleus ambiguus, the ventral respiratory group, and the dorsal motor nucleus of the vagus.¹

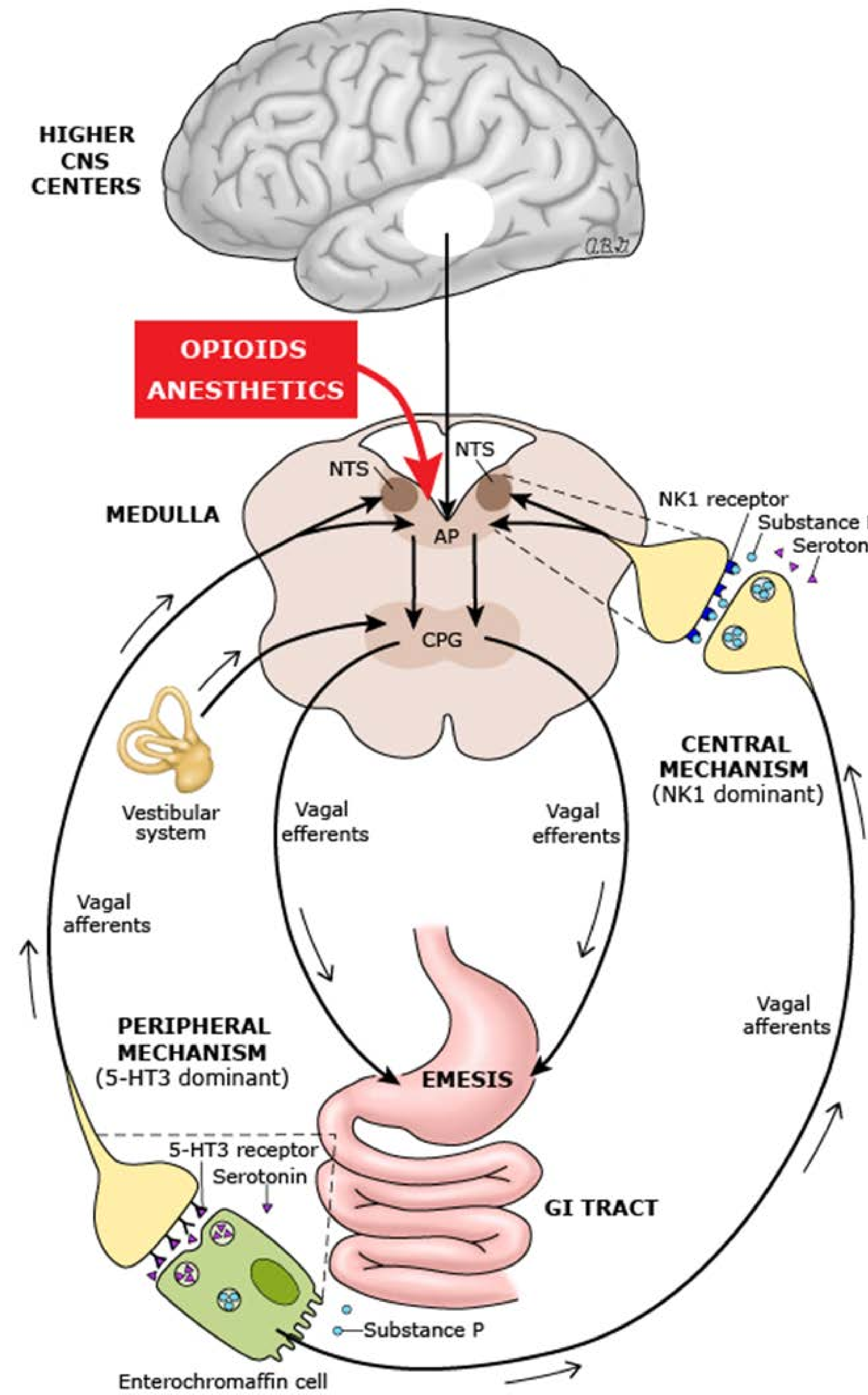


Figure 16: Postoperative nausea and vomiting may occur via multiple peripheral and central mechanisms, mediated by a variety of neurotransmitters and receptors. NTS: nucleus tractus solitarius; AP: area postrema; CPG: central pattern generator; NK1: neurokinin 1; 5-HT3: 5-hydroxytryptamine (serotonin); GI: gastrointestinal; CNS: central nervous system. [Feinleib, et al. UpToDate, Copyright 2017.]

CONCLUSION

Patients with PONV often exhibit nausea, gagging and vomiting for the first two days post-surgery. Since PONV is a high contributor to patient dissatisfaction, it is highly important to take preventive measures against it. While it may be difficult to eliminate PONV, it is essential to reduce it.

Female patients are more susceptible to experiencing PONV compared to male patients.⁴ Additionally, patients who are younger, abstain from smoking, and have a past history of motion sickness are more subject to suffer from PONV.⁴ Preoperative opioid use, nitrous oxide, and volatile anesthesia can significantly increase the risk of PONV, as can certain surgical procedures, including laparoscopic, gynecological and abdominal surgery.

Hydrating the patient^{5,6}, limiting nitrous oxide and volatile anesthetic use, and using propofol for induction and maintenance, can prevent PONV. Studies have shown that high IV fluids therapy (30mL/kg) is associated with less emesis, however there is no significant difference between crystalloid vs. colloid fluids.⁵ Additionally, regional rather than general anesthesia can significantly reduce PONV. Therapies combining antiemetic prophylaxis with multimodal strategies for non-opioid postoperative pain control, such as regional anesthesia, acetaminophen, and NSAIDs, may reduce the risk of PONV. Acupressure wristbands used before emetic stimulus exposure (i.e. anesthetic agents) for short surgeries have also proved a beneficial preventative measure.⁶

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Risk Factors for PONV¹

Patient-related:	Female gender; children; past history of PONV; motion sickness; nonsmoking status
Surgery-related:	Eye surgery (Strabismus surgery); ENT surgery; gynecological surgery; thyroid surgery; surgery duration >1 hour
Anesthesia-related:	Volatile anesthetic agents; opiates; nitrous oxide

The use of the volatile anesthetic agent is a main risk factor for PONV. Incidence of PONV depends on duration and the concentration of volatile anesthetic agent used.² There is no difference in incidence between sevoflurane, desflurane and isoflurane.^{2,3}

Pharmacological Antiemetic Prophylaxis

- ✓ Serotonin antagonists (5-HT₃): Ondansetron
- ✓ Corticosteroids: Dexamethasone
- ✓ Anticholinergic agents: Transdermal scopolamine
- ✓ Dopaminergic antagonists (D₂): Haloperidol, Metoclopramide
- ✓ Antihistaminic agents: Diphenhydramine
- ✓ Neurokinin 1 receptor antagonists: Aprepitant, Rolapitant