A Review of the Incidence, Causes, Consequences, and Management of Gastrointestinal Effects Associated With Postoperative Opioid Administration

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Opioid analgesics are commonly used to manage moderate to severe postoperative pain. Classic mu-opioid receptor agonists, such as morphine, meperidine, and fentanyl, provide excellent analgesia. However, their use in the postoperative setting is often limited by adverse effects such as nausea, vomiting, and reduced gastrointestinal motility. Clinicians who care for postoperative patients need to be aware of the incidences, causes, risk factors, consequences, and management of these adverse effects. If these effects are not managed effectively, opioid-related complications may significantly increase patient morbidity, have a negative impact on patient outcomes, and increase the burden on the nursing staff. Strategies are available to minimize and treat opioid-related adverse effects. Implementation of these strategies should result not only in increased patient comfort and satisfaction, but also in decreases in lengths of stay, more effective nursing care, and decreases in associated hospital costs.

Keywords: *postoperative pain, patient satisfaction, opioids, nausea, vomiting, constipation, postoperative ileus.*

OPIOID ANALGESICS are commonly used to manage moderate to severe postoperative pain.[1,2] Classic mu-opioid receptor agonists like morphine, meperidine, fentanyl, and hydromorphone provide excellent analgesia. However, their clinical utility is often limited by adverse effects, including nausea and vomiting and reduced gastrointestinal (GI) motility.[3,4] The purpose of this paper is to describe the incidence, causes, consequences, and management of opioid-related GI adverse effects (ie, nausea, vomiting, constipation). Emphasis is placed on the impact of these adverse effects on patient outcomes and nursing care. Researchers have shown that in addition to causing patient discomfort and dissatisfaction, opioid-related adverse effects in the postoperative period can result in significant increases in length of hospital stay, with an associated increase in hospital costs.[5,6] Opioid-related adverse effects increase the need for nursing care, which is also associated with increased costs.[7] This burden can be reduced if the health care team develops a systematic approach to assess for opioid-related adverse effects and undertakes the appropriate interventions to prevent or minimize these effects.[8]

Nausea and Vomiting

Incidence, Causes, and Consequences

Postoperative nausea and vomiting (PONV) is a common symptom after surgery and arises from multiple causes in the postoperative period. Certain types of surgery are associated with a higher incidence of PONV: craniotomy; ear, nose, and throat procedures; major breast procedures; strabismus surgery; laparoscopy; and laparotomy.[9] Anesthesia used during surgery can also cause PONV, with nitrous oxide, volatile inhalational anesthetics, and

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opioids being highly emetogenic.[9] PONV is estimated to occur in 30% of postoperative patients,[9,10] with a higher prevalence seen in high-risk patients.[9] For example, a study[11] of more than 2,700 patients showed that (1) female gender, (2) a history of motion sickness or PONV, (3) nonsmoking status, and (4) use of postoperative opioids were the most predictive risk factors for PONV. The incidence of PONV increased as the number of these risk factors increased, such that the incidence of PONV was 10%, 21%, 39%, 61%, and 79%, with the presence of zero, one, two, three, or all four of these risk factors, respectively.[9,11] In addition, pain, anxiety, and dehydration are risk factors for PONV.[12]

Improvement in the perioperative management of PONV requires an understanding of these causes and risk factors.[13] Preoperative screening is a key component of recent guidelines published by ASPAN for the prevention and/or management of PONV to improve health outcomes in surgical patients.[13] Preoperative assessment should include a clear protocol that incorporates a risk assessment tool to identify patients at high risk for PONV, so that prophylactic steps can be taken to reduce the possibility of its occurrence.[8] Use of a simplified risk score-dependent prophylactic antiemetic strategy (ie, classifying patients into low-, medium-, or high-risk groups according to how many risk factors they have and then treating them with corresponding levels of antiemetic prophylaxis) has been shown to significantly reduce the overall rate of PONV and shorten the average length of stay in the PACU.[14]

The use of opioids during and after surgery is generally acknowledged as a risk factor for the development of PONV.[7,10,15] Postoperatively, the use of opioids for pain relief can contribute to nausea and vomiting by three different mechanisms, all of which ultimately stimulate the brain's physiologic emetic center in the medulla that mediates nausea and vomiting. First, opioids stimulate the chemoreceptor trigger zone in the brainstem, which in turn directly activates the emetic center of the brain through the release of dopamine and serotonin. Second, opioids cause reduced GI motility; this visceral stimulus leads to a release of dopamine and serotonin from afferent visceral fibers that activate the medullary vomiting center. Third, opioids cause enhanced sensitivity of the middle ear to movement, which activates the medullary vomiting center through a release of histamine and acetylcholine from vestibular fibers.[8,16-18]

In a systematic retrospective study[10] of patients who had undergone orthognathic surgery, PONV occurred at a 2.7-fold higher frequency among those treated with opioids compared with those who did not receive postoperative opioids. Wadlund[19] has reported that opioids are associated with an approximately four-fold increase in PONV. Notably, a strong dose-response relationship was observed between opioid use and PONV in one study[20] of 193 surgical patients, with a greater incidence of PONV seen in patients who were receiving higher doses of opioids compared with patients who received lower doses of opioids. Route of administration can also influence the incidence and severity of PONV. Use of patient-controlled opioid analgesia or epidural opioid analgesia is associated with a significantly higher incidence of postoperative vomiting than other routes of administration.[20]

PONV can have a negative impact on patient outcomes. Although PONV is usually not life threatening, potential adverse consequences of persistent PONV include dehydration, esophageal rupture, wound dehiscence, bleeding, hematoma, and aspiration of gastric contents (Table 1).[8] Patients who have PONV may require prolonged hospitalization or unanticipated hospital readmission, with a subsequent increase in health care costs.[10] Furthermore, PONV can have a significant impact on patient satisfaction. In a survey of outcomes of postoperative anesthesia that should be avoided, Macario and colleagues[21] found that patients considered vomiting as the most undesirable postoperative outcome, followed by gagging on the tracheal tube, incisional pain, nausea, and recall without pain. In another study,[22] Gan and colleagues demonstrated that patients would be willing to pay more for surgery if PONV could be prevented.

Management

Reduction of PONV is an important goal for both patients and clinicians.[23] Prophylactic management of PONV (Fig 1) typically includes the administration at the end of surgery of antiemetics such as serotonin receptor antagonists (eg, ondansetron, dolasetron, granisetron, tropisetron).[7] These antiemetics block the input from the chemoreceptor trigger zone of the brain to the emetic center.[9] Another antiemetic therapeutic option is dexamethasone,

Table 1. Possible Consequences of PONV

Obstruction of airway
Aspiration of vomitus, which can lead to aspiration pneumonia
Complications following maxillofacial/plastic/ocular surgery
Possible wound disruption
Raised intracranial pressure in neurosurgical patients
Dehydration and electrolyte imbalances
Increased pain, discomfort, and distress
Problems with pain control if opiates are the cause
Delay in giving oral analgesia and other medication
Exhaustion
Interference with nutrition
General delay in mobilization and recovery

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