ORIGINAL ARTICLE

Factors Affecting Postoperative Nausea and Vomiting in Surgical Patients

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Purpose: *This study was to identify factors affecting postoperative nausea and vomiting (PONV) and to investigate the incidence of PONV for the first 24 hours after operation.*
Design: *The prospective research was performed in an 1,100-bed university hospital, from April to December, 2011. The sample consisted of 609 patients with elective surgery.*
Methods: *Factors affecting PONV were identified by multiple logistic regression.*
Findings: *Incidence of PONV was 27.1% for the first postoperative 24 hours. Insertion of nasogastric tube (OR, 4.54,* P = *.002), history of PONV (OR, 3.24,* P < *.001), general anesthesia (OR, 2.76,* P = *.002), history of motion sickness (OR, 2.33,* P < *.001), and female sex (OR, 2.05,* P = *.004) were high risk factors of PONV. The nonadministration of antiemetics during operation (OR, 1.70,* P = *.014) and nonuse of intravenous patient-controlled analgesia (OR, 1.54,* P = *.038) increased PONV during the first postoperative 24 hours.*
Conclusions: *Patients of female gender, history of motion sickness and PONV, general anesthesia, and nasogastric insertion are more likely to experience PONV.*

Keywords: *postoperative nausea and vomiting (PONV), postoperative care, risk factor.*

POSTOPERATIVE NAUSEA AND VOMITING (PONV) is a common perioperative complication of surgery under anesthesia, which occurs within the first 24 hours postoperatively.[1] PONV is a secondary discomfort related to surgical procedures followed by postoperative pain.[2] PONV can lead to postoperative complications that include fluid and electrolyte imbalances, suture tension, esophageal tear, abdominal wound dehiscence, and increased intracranial pressure.[3] The incidence of PONV ranges from 25% to 30% during the first postoperative 24 hours[4-6] and PONV lasts more than 3 days after surgery.[7]

The risk factors of PONV include female gender, age less than 50 years, pregnancy, history of motion sickness or PONV, body mass index less than 25 kg/m^2, nonsmoking status, surgery related to laparoscopic procedures, duration of surgery ≥ 1 hour,[8-11] and type of surgery.[12-14] PONV seems related to general anesthesia, use of intravenous patient-controlled analgesia (IV-PCA), and inhalation anesthetics

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including enflurane or nitrous oxide, administration of cholinergics, or opioids.[13,15-17] The administration of intraoperative or postoperative opioids is associated with a two-fold to four-fold increased incidence of PONV.[10] Providing multimodal analgesia that minimizes the use of opioids is helpful to decrease the risks for PONV. The incidence of PONV seems to increase exponentially as the number of risk factors of PONV increases.[18] Therefore, individual risk factors for PONV should be considered primarily in nursing care of surgical patients under general or spinal anesthesia.

Although risk factors of PONV for Koreans have been identified, some points of view need to be considered. First, current risk factors of PONV for Koreans are needed because those studies were performed over 10 years ago.[5,6] Second, although enflurane and isoflurane have been replaced with desflurane or sevoflurane, fewer studies have examined PONV in surgical patients with desflurane or sevoflurane. Third, there is discrepancy of PONV risk factors such as age, smoking, or duration of surgery.[13,18] This prospective, observational study investigated factors affecting PONV during the first 24 hours after surgery and incidence of PONV for the first 48 hours postoperatively.

Methods

Research Subjects

Subjects who had been scheduled for elective surgery under anesthesia were recruited from September 2010 to May 2011 at Eulgi University Hospital, an 1,100-bed general hospital in Daejeon, Korea. Inclusion criteria were adults more than 18 years, conscious state, class I or II in American Society of Anesthesiologist Physical Status Classification System denoting a healthy person or those with mild systemic disease, and surgical patients under general or spinal anesthesia. All patients had to be communicative and scheduled for either gastrointestinal, orthopaedic, or gynecological surgery. Pregnant patients were excluded before actual recruitment, and the patients who received preoperative antiemetics (n = 4) or enflurane for inhalation anesthetics (n = 14) were withdrawn from the study later (Figure 1). In addition, the surgical patients (n = 3) who were transferred to the intensive care unit postoperatively, or had duration of surgery less than 1 hour were excluded from the study.

Setting and Samples

This study was approved by the Ethics and Research Committee of Eulgi University Hospital (IRB No: 10-08). Patients were recruited by a nurse anesthetist as a convenience sample from the surgery wards at the preanesthesia visit after admission. The patients were fully informed about the purpose, design, duration of this study, and ability to withdraw from the study at any time. After participation was accepted, each subject signed a study consent form, and the written consent form was obtained from each participant. Based on the previously reported PONV incidence and odds ratio (OR),[12,15,18] the incidence of PONV was determined as 36% for this study and the OR of PONV as 1.82. Given these values, an alpha of 0.05, and a power of 0.95, a total of 600 subjects were needed through G-power 3.1 for multiple logistic regression analysis. Considering a 5% dropout rate, we recruited 630 participants.

Anesthetic Technique

General and spinal anesthesia were performed with a standardized technique. General anesthesia was induced by an intravenous administration of 1.5 mg/kg propofol, 1 mg/kg rocuronium, and 10 mcg alfentanil, and an endotracheal tube was inserted in the trachea. According to patient's condition and anesthesiologist's preference, inhalation anesthesia was maintained with one of the three inhalation anesthetics (1.5% to 2% isoflurane, 5% to 7% desflurane, and 1.5% to 3% sevoflurane). At the commencement of skin suture, the neuromuscular blockade was reversed with neostigmine (1.0 mg) and atropine (1.0 mg). In spinal anesthesia, lumbar puncture was performed through an interspace (L_{3-4} or L_{4-5}). A 23-gauge Quincke needle was inserted using a midline approach at L_{3-4} or L_{4-5}.

All patients were hydrated with 8 mL/kg body weight Ringer's lactate solution before anesthesia. IV-PCA was provided for patients who wanted a PCA at the completion of skin suture in the operating room. The IV-PCA regimen typically consisted of morphine (15 mcg/kg/mL), ketorolac (25 mcg/kg/mL), and ondansetron 4 mg plus normal saline (total volume of 100 mL), and was administered through a pump, programmed to deliver 2 mL/hour as a background infusion and