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Prevention of nausea and vomiting following breast surgery

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Abstract

Background: The purpose of this study was to determine the rate of nausea and vomiting in women following breast surgery (PONV) under general anesthesia (GA), before and after the introduction of a standardized prophylactic anti-emetic (AE) regimen.
Methods: We performed a retrospective review of eligible patients, between July 2001 and March 2003. Patients operated on before September 2002 had standard preoperative care (old cohort [OC]); patients operated on after September 2002 were treated prophylactically with oral dronabinol 5 mg and rectal prochlorperazine 25 mg (new cohort [NC]). Data were collected from hospital records regarding age, diagnosis, comorbid conditions, previous anesthesia history, anesthesia and operative details, episodes PONV, and use of AE. The rate and severity of PONV was calculated for both cohorts.
Results: Two hundred forty-two patients were studied: 127 patients in the OC and 115 patients in the NC. The median age was 56 years (range 32 to 65). The rate of nausea and vomiting were significantly better in the patients treated prophylactically with dronabinol and prochlorperazine (59% vs. 15%, $P < .0001$ and 29% vs. 3%, $P < .0001$). Twenty patients in the OC were given some prophylactic AE treatment and 12 (60%) of them required further treatment; only 12 of 109 patients (11%) in the NC required further AE treatment ($P < .0001$).
Conclusion: PONV is a significant problem in breast surgical patients. Preoperative treatment with dronabinol and prochlorperazine significantly reduced the number and severity of episodes of PONV.

Keywords: Postoperative nausea and vomiting; Breast surgery; Ambulatory surgery

Postoperative nausea and vomiting (PONV) continues to be a vexing problem with an unacceptably high incidence. Multiple factors, including age, gender, type of surgery and anesthetic agents, intraoperative opioid use, and duration of anesthesia, have been implicated as the causes of PONV [1]. Several new drugs and anesthetic techniques have been introduced during last few decades reported to minimize PONV; however, the incidence still remains significantly high, ranging between 25% and 30% [2,3].

Persistent vomiting can cause tension on suture lines, venous hypertension, and bleeding under skin flaps, and it can expose the patient to an increased risk of pulmonary aspiration at a time when airway reflexes are depressed from residual effects of anesthetic and analgesic drugs [4]. Moreover, unrelenting nausea and vomiting may result in delayed discharge, which is particularly significant after potentially outpatient surgery [5]. Women are 2 to 3 times more susceptible to PONV than men [6,7]. Breast surgery, which is primarily done in an outpatient setting, is associated with high incidence of PONV, ranging between 15% and 84% in the absence of prophylactic treatment [8–13]. The rate of PONV varies substantially across hospitals and anesthesiologists, a difference that is not explained by a difference in case mix [6]. It has been controversial whether prophylactic or symptomatic treatment of PONV has significant impact on the eventual outcome of surgery [14,15].

The physiology of emesis involves complex receptor

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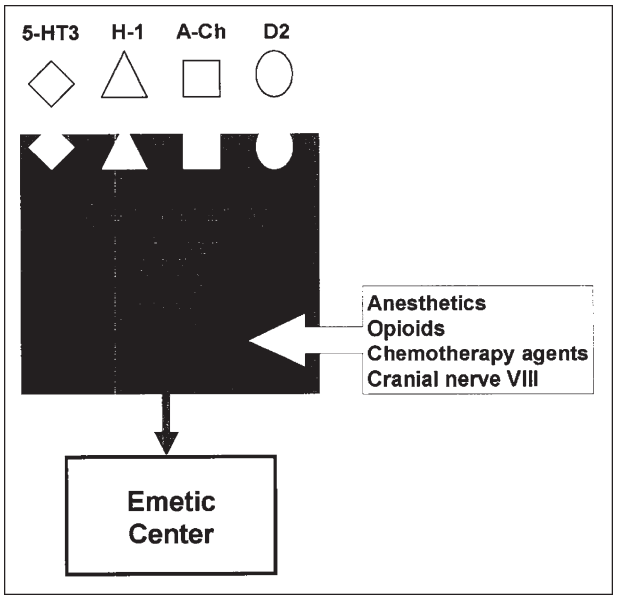

Fig. 1. The chemoreceptor trigger zone and the emetic center with receptor sites of various compounds including anesthetic and chemotherapeutic agents. 5-HT3 = serotinin; H-1 = histamine; A-Ch = acetylcholine; D2 = dopamine.

interactions at the higher cortical centers and the chemoreceptor trigger zone (CTZ) in the area postrema (Fig. 1) [1]. CTZ is rich in serotonergic, dopaminergic, muscurinic, and histaminergic receptors and their interaction is known to stimulate the emetic center in the parvicellular reticular formation. Antagonists of these receptors sites have therefore been used as anti-emetic (AE) agents. Specific receptors in the CTZ are stimulated by the chemotherapeutic agents, anesthetic agents, and opioids. Newer cannabinoid receptors have been identified in the CTZ (not shown in Fig. 1) and a combination of anticannabinoids and anticholinergic agents has been shown to significantly reduce chemotherapy-induced nausea and vomiting [16]. We hypothesized that since the emetogenic mechanism involved in chemotherapy-induced nausea and vomiting is similar to that initiated by anesthetic agents, a combination of dronabinol (anticannabinoid) and prochlorperazine (anticholinergic) should prevent PONV as well.

Methods

At the University of Arkansas for Medical Sciences (UAMS), the breast surgical practice was changed in September 2002, whereby all patients were given prophylactic oral dronabinol 5 mg (preoperatively) and rectal prochlorperazine 25 mg (after anesthesia) based on the observation of significant PONV on routine perioperative care. This study was designed to identify any change in the rate of PONV after the introduction of routine prophylaxis.

Study design

This was a retrospective review of all patients undergoing breast surgery under general anesthesia (GA) between July 2001 and November 2002. Patients with brain metastases and those pregnant at the time of surgery were excluded from the study. Patients who were operated on before September 2002 had standard preoperative care, and were designated as the "old cohort" (OC). Patients operated on after September 1, 2002 who received prophylactic AE were designated as the "new cohort" (NC). Cardiovascular and neurologic status was monitored and patients were discharged home only when they were fully awake and vitally stable. The presence or absence of any side effects was specifically documented in the NC patients. Data were collected from hospital records of all patients regarding age, diagnosis, comorbid conditions, previous anesthesia history, anesthesia and operative details, episodes of postoperative nausea (PON) and vomiting (POV), and number of postoperative AE used (AE count). All variables were coded as binary, reflecting the presence or absence of the condition, except for age (continuous), surgery duration (continuous), and AE count (an integer from 0 to 4). Additionally, because patients with POV also have PON, but not always vice versa, PON and POV were combined to create a graded response called PONV score, defined as score = 0 if no PON or POV occurred, score = 1 if PON occurred but not POV, and score = 2 if both PON and POV occurred. PON, POV, and PONV scores, and AE count were regarded as outcomes; all other variables were regarded as factors having potential influence on the outcomes.

Statistical methods

All statistical analyses were performed using SAS version 8.2 (SAS Institute, Cary, NC), and all statistical tests were 2-sided. P values less than .05 were deemed statistically significant, while P values between .05 and .10 were deemed marginally significant. Cohorts were compared for their proportion of cancer patients via the Fisher exact test. For cancer patients versus patients with benign diagnosis (ignoring cohort), the Wilcoxon rank-sum test was used to compare median ages and surgery durations, and the Fisher exact test was used to compare incidences of PON and POV.

To assess cohort balance and cohort effects on PONV and AE usage, cancer patients and those with benign diagnosis were treated as separate groups. The Fisher exact test was applied to each group to detect cohort imbalance with respect to patient characteristics and treatment factors. The Cochran-Armitage test for trend was applied to the 2 groups to detect cohort differences in the average for PONV score and postoperative AE count.

Mantel-Haenszel estimate of common odds ratio (MHCOR) with chi-square test was used to screen for univariate associations of PON and POV occurrence with cohort, comorbidities, and treatment factors for both benign and can-