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The use of droperidol decreases postoperative nausea and vomiting after gynecological laparoscopy

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Abstract
We evaluated whether or not routine prophylaxis with 2.5 mg of droperidol would efficiently prevent postoperative nausea and vomiting (PONV). Fifty-two patients scheduled for elective gynecological laparoscopic surgery were eligible for this study. Anesthesia was induced using propofol, fentanyl, and vecuronium, and maintained with sevoflurane in nitrous oxide, fentanyl, and vecuronium. Patients were randomized to one of two groups: group 1 patients (n = 23) received 2.5 mg droperidol intravenously when the surgery was started, while group 2 patients (n = 29) did not receive any droperidol. At the conclusion of the surgery, the patient was extubated on satisfactory emergence from general anesthesia. Any episodes of nausea and vomiting, rescue medications, and adverse effects were recorded until the next morning after the surgery. There were no differences in the duration of anesthesia on surgery between the groups, but the total fentanyl dose in group 1 was higher than that in group 2. Episodes of nausea and vomiting and the need for metoclopramide in group 1 were lower than in group 2, though the total fentanyl dose in group 1 was higher than in group 2. There were no differences in the need for analgesics between the groups. The use of 2.5 mg droperidol safely decreased PONV after gynecological laparoscopy.

Key words Droperidol · Postoperative nausea and vomiting · Gynecological laparoscopy

Introduction

Postoperative nausea and vomiting (PONV) is clinically important and a frequent postoperative complication. PONV, with an incidence of around 20%–30%, may evoke substantial patient discomfort and possibly prolong the hospital stay [1].

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Female patients undergoing gynecological laparoscopy are at a high risk of PONV [1,2]. Recently, prophylactic doses and timing of antiemetic administration in adults have been reported [3]. Droperidol is widely used in conjunction with anesthesia for both the prophylaxis and treatment of PONV [4]. Therefore, we evaluated whether or not routine prophylaxis with 2.5 mg droperidol would efficiently prevent PONV.

Patients, materials, and methods

After ethics committee approval and informed consent, 52 patients were studied from January 2003 through December 2004. All patients scheduled for elective gynecological laparoscopic surgery requiring general anesthesia were eligible for this study.

All patients received an intramuscular injection (midazolam, 1.5–2.5 mg, and atropine, 0.5 mg) 30 min prior to the induction of general anesthesia. Anesthesia was induced using propofol (1–2 mg·kg^{-1}), fentanyl (1–2 μg·kg^{-1}), and vecuronium bromide (0.1 mg·kg^{-1}). After tracheal intubation, sevoflurane in nitrous oxide (60%) and oxygen (40%) was used to maintain the general anesthesia. Additional vecuronium bromide was titrated to maintain an adequate level of muscle relaxation. Fentanyl was titrated to maintain an adequate level of anesthesia per the anesthesiologist's considerations. Patients were randomized to one of two groups: group 1 patients (n = 23) received 2.5 mg droperidol intravenously when the surgery was started, while group 2 patients (n = 29) did not receive any droperidol. At the conclusion of the surgery, sevoflurane and nitrous oxide were discontinued, the neuromuscular blockade was reversed using atropine (1.0 mg) and neostigmine (2.0–2.5 mg), and the patient was extubated on satisfactory emergence from general anesthesia. All anesthetics were administered by six staff anesthesiologists.

After being discharged to the ward, the patients received diclofenac sodium, 50 mg per anum or pentazocine 15 mg and hydroxyzine 25 mg intramuscularly as required for pain relief, and metoclopramide 10 mg intravenously for the treatment of nausea and vomiting.

Any episodes of nausea and vomiting, rescue medications, and adverse effects were recorded until the next morning after the surgery by nurses who had not been informed of this study. Both patients and nurses were unaware of the anesthetic technique.

Nausea was defined as the feeling that a patient had when they thought they were going to vomit, and vomiting was defined as ejecting gastric juice from the stomach through the mouth. Retching was included as nausea.

Values for demographic and anesthetic data were expressed as means and SD. Demographic and anesthetic data were analyzed by Student's *t*-test. The presence of nausea and vomiting was considered an emetic sequela, and the presence of either symptom was included as an endpoint for the analysis. χ^2 analyses of contingency tables were used to analyze differences in frequencies of symptoms between groups.

A P value of less than 0.05 was considered significant.

Results

The demographics of the two groups were well matched, as shown in Table 1. There were no differences in the duration of anesthesia or surgery between the groups, but the total fentanyl dose in group 1 was higher than that in group 2 (Table 2).

Episodes of nausea and vomiting and the need for metoclopramide in group 1 were lower than in group 2 (Table 3), though the total fentanyl dose in group 1 was higher than in group 2. There were no differences in the need for analgesics between the groups (Table 3).

There were no side effects from having used droperidol, such as a delayed awakening from the anesthesia, severe hypotension, or extrapyramidal reactions.

Discussion

PONV remains one of the most common and distressing complications after surgery, resulting in pain, hematoma, and wound dehiscence, which require additional resources and may delay discharge [2]. The risk factors for PONV are patient-specific, anesthetic, and surgical [3]. Patient-specific risk factors are female sex, nonsmoking status, and history of PONV/motion sickness.

Table 1. The demographics of the two groups

	Group 1: droperidol 2.5 mg	Group 2: droperidol 0 mg	
Age (years)	32.4 ± 8.9	29.5 ± 4.6	NS
Height (cm)	159.2 ± 4.8	161.4 ± 5.6	NS
Weight (kg)	53.9 ± 8.8	52.4 ± 6.5	NS

The groups were well matched

Table 2. Duration of anesthesia and surgery, and total fentanyl dose

	Group 1: droperidol 2.5 mg	Group 2: droperidol 0 mg	
Duration of anesthesia (min)	142.2 ± 38.9	138.1 ± 32.8	NS
Duration of surgery (min)	98.5 ± 38.8	90.9 ± 28.3	NS
Total fentanyl dose ($\mu g \cdot kg^{-1}$)	4.9 ± 1.4	3.8 ± 1.1	$P < 0.05$

There were no differences in the duration of anesthesia or surgery between the groups, but the total fentanyl dose in group 1 was higher than that in group 2

Table 3. Episodes of nausea and vomiting, need for metoclopramide and need for analgesics

	Group 1: droperidol 2.5 mg	Group 2: droperidol 0 mg	
No nausea (*n*)	19	13	$P < 0.05$
Nausea (*n*)	2	10	
Vomiting (*n*)	2	6	
Need for metoclopramide (*n*)	3	14	$P < 0.05$
Need for analgesics (*n*)	25	19	NS

Episodes of nausea and vomiting and the need for metoclopramide were lower in group 1 than in group 2. There were no differences in the need for analgesics between the groups

Anesthetic risk factors are the use of volatile anesthetics within 0 to 2 h of their administration, the use of nitrous oxide, and the use of intraoperative and postoperative opioids. Surgical risk factors are the duration and type of surgery (laparoscopy, ear-nose-throat, neurosurgery, breast, strabismus, laparotomy, and plastic surgery). Therefore, patients undergoing gynecological laparoscopy have a high risk of PONV, a condition that must be prevented after they have undergone this procedure.

Droperidol is a potent neuroleptic which also has an antiemetic effect mediated via dopamine receptor antagonism [4]. Prophylactic doses of droperidol are effective for the prevention of PONV [5–7].

Several studies have recommended doses of 2.5 mg droperidol to prevent PONV [8,9]. So we chose a dose of 2.5 mg droperidol, although recent data have suggested that a dose of 20 $\mu g \cdot kg^{-1}$ [10] or lower [7] might also be effective. In this study, group 1 patients received droperidol at the start of surgery to avoid any delayed awakening from the anesthesia, although droperidol is most effective when administered at the end of surgery [7]. We were thus able to decrease PONV until the next morning following the surgery without causing delayed awakening from the anesthesia, severe hypotension, or extrapyramidal reactions. In this study, the incidence of PONV was 17% after using 2.5 mg droperidol. It has been reported that the incidences of PONV were 37% after using 0.625 mg droperidol and 31% after using 1.25 mg droperidol [6]. With increasing doses, droperidol's anti-vomiting efficacy improved considerably, although doses beyond 2.5 mg did not further increase efficacy [7]. So the use of 2.5 mg droperidol may be the optimal dose to prevent PONV after gynecological laparoscopy.

Opioids such as fentanyl are used extensively before, during, and after anesthesia to augment the effects of the anesthetic agents and to control noxious inputs. Opioids stimulate nausea and vomiting by their action on the chemoreceptor trigger zone in the area postrema [4]. In the present study, PONV and the need for metoclopramide in group 1 were lower than in group 2, though the total fentanyl dose in group 1 was higher than that in group 2. The level of postoperative pain in group 1 may have been lower than that in group 2, although there were no differences in the need for analgesics between the two groups. The use of droperidol, while using fentanyl, decreased PONV.

This study was not a randomized, double-blind, placebo-controlled study, and the doses of fentanyl were not standardized. It will be necessary to examine the optimal dose of droperidol (0.625 mg, 1.25 mg, or 2.5 mg) in a randomized, double-blind, placebo-controlled study with a standardized protocol.

The FDA has issued a "black box" warning about droperidol. The warning states that droperidol may cause death or life-threatening events associated with QT prolongation and torsades de pointes. This warning is based on ten reported cases in association with droperidol use over the approximately 30 years that the agent has been available on the market [11]. But there have been no such reports in Europe or elsewhere, and the panel of authors of consensus guidelines for managing postoperative nausea and vomiting has expressed considerable concerns about the quality and quantity of the evidence and the validity of the FDA conclusion [3]. In the present study, QT prolongation and torsades de pointes did not appear in any of the patients and droperidol was able to be used safely.

In conclusion, the use of 2.5 mg droperidol safely decreased PONV after gynecological laparoscopy.

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