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Research Paper

Incidence of postoperative nausea and vomiting following gynecological laparoscopy: A comparison of standard anesthetic technique and propofol infusion

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A R T I C L E I N F O

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A B S T R A C T

Objective: To determine the safety, efficacy, and feasibility of propofol-based anesthesia in gynecological laparoscopies in reducing incidences of postoperative nausea and vomiting compared to a standard anesthesia using thiopentone/isoflurane.
Design: Randomized single-blind (for anesthesia techniques used) and double-blind (for postoperative assessment) controlled trial.
Setting: Operation theater, postanesthesia recovery room, teaching hospital.
Patients: Sixty ASA (American Society of Anesthesiologists) I and II female patients (aged 20–60 years) scheduled for gynecological laparoscopy were included in the study.
Interventions: Patients in Group A received standard anesthesia with thiopentone for induction and maintenance with isoflurane–fentanyl, and those in Group B received propofol for induction and maintenance along with fentanyl. All patients received nitrous oxide, vecuronium, and neostigmine/glycopyrrolate. No patient received elective preemptive antiemetic, but patients did receive it after more than one episode of vomiting.
Measurements: Assessment for incidence of postoperative nausea and vomiting as well as other recovery parameters were carried out over a period of 24 hours.
Main Results: Six patients (20%) in Group A and seven patients (23.3%) in Group B experienced nausea. Two patients (6.66%) in Group B had vomiting versus 12 (40%) in Group A ($p < 0.05$). Overall, the incidence of emesis was 60% and 30% in Groups A and B, respectively ($p < 0.05$). All patients in Group B had significantly faster recovery compared with those in Group A. No patient had any overt cardiorespiratory complications.
Conclusion: Propofol-based anesthesia was associated with significantly less postoperative vomiting and faster recovery compared to standard anesthesia in patients undergoing gynecological laparoscopy.

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1. Introduction

Pain and postoperative nausea and vomiting (PONV) are two important causes of postoperative morbidity.[1–3] Essentially, these factors are interrelated.[4] Untreated postoperative pain is an important cause of PONV,[4] and use of opioids for its management also results in PONV.[5–9]

In spite of the extensive understanding of the pathophysiology of PONV and the availability of a variety of antiemetics, certain surgical procedures such as gynecological laparoscopy, are still associated with unacceptably high incidence of PONV.[10–13] PONV is frequently the cause of great distress to the patient. Excessive PONV may lead to dehydration, electrolyte imbalance, and dreaded complications such as pulmonary aspiration syndrome. There is also economic implication of PONV in day case surgeries such as gynecological laparoscopy, as it may result in prolonged hospital stay.[14]

The multifactorial nature of PONV makes it unlikely that a single therapy will be fully effective in all conditions. 5-Hydroxytryptamine-3 (5-HT_3) receptor antagonists, the most commonly used antiemetics, are very effective in chemotherapy-induced nausea and vomiting, but not as effective in opioid-induced emesis or motion sickness. It is understandable that 5-HT_3 antagonists will not be that effective as these two factors are most relevant in PONV.[15] Anesthetic drugs and techniques can also influence the occurrence of PONV.[16] Laparoscopic techniques are highly standardized; therefore, anesthetic technique remains the main variable to influence the incidence of PONV.[3]

Despite the lack of substantial evidence about the advantage of any anesthetic technique in reducing the incidence of PONV, propofol-based anesthesia has been found to be more effective for such outcomes.[6,11,16,17] Because of the high incidence of PONV in gynecological laparoscopy there is an unmet need for an ideal technique to minimize PONV. Thus, the current study aimed to compare the advantage of propofol-based anesthesia over thiopentone–isoflurane anesthesia in reducing incidence of PONV and time for postoperative recovery.

2. Materials and methods

After obtaining the approval of the institutional ethics committee and informed consent, 60 nonpregnant ASA (American Society of Anesthesiologists) I and II female patients between the ages 20 and 60 years were included in the study. The study was prospective, randomized, single blind (for anesthesia techniques used) and double blind (for postoperative assessment). However, the same anesthesiologist assessed all the postoperative variables to avoid interobserver variation. Sixty patients were randomized equally into two groups to receive either thiopentone–isoflurane (Group A) or propofol (Group B). Pregnant or nursing mothers, women in their perimenstrual period, those having a history of PONV, smokers, those with hypersensitivity to any of the study drugs, and those who have taken antiemetics within 24 hours of anesthesia were excluded from the study.

All patients were premedicated with oral midazolam (0.5 mg/kg) 2 hours prior to anesthesia. Baseline monitoring of noninvasive blood pressure (NIBP), electrocardiogram (ECG), and peripheral oxygen saturation (Spo_2) were commenced in the preanesthesia room. After adequate preoxygenation, Group A patients were induced with intravenous thiopentone (3–5 mg/kg), fentanyl (2 μg/kg), and vecuronium (0.08 mg/kg). Anesthesia was maintained with 60% nitrous oxide (N_2O) in oxygen (O_2), isoflurane, and intermittent vecuronium. The concentration of isoflurane was adjusted to maintain an adequate depth of anesthesia. Isoflurane was discontinued after termination pneumoperitoneum. Patients in Group B were induced with intravenous propofol (2–2.5 mg/kg), fentanyl (2 μg/kg), and vecuronium. Anesthesia was maintained with 60% N_2O in O_2, propofol infusion and intermittent vecuronium. A step-down propofol infusion regimen was used.[18] Infusion was started at a rate of 166 μg/kg/min and then reduced to 133 μg/kg/min after 10 minutes. Infusion was reduced further to and maintained at 100 μg/kg/min after another 20 minutes. We used this technique as compared to the effector site concentration-based technique as we did not have a state-of-the-art target control infusion pump or highly sophisticated pump. Infusion rate was adjusted in between to maintain adequate surgical anesthesia and hemodynamic stability. All patients were intubated with endotracheal tube after induction of anesthesia, and ventilation was controlled. Elective hyperventilation was used in both the groups to keep end tidal carbon dioxide ($Etco_2$) within the range of 4.5–5.3 kPa. Propofol infusion and isoflurane were discontinued after termination of pneumoperitoneum. Any elective antiemetic medication was withheld as this study was designed to estimate the effect of two anesthesia techniques on incidences of PONV.

Surgical procedures were identical in both groups. Pneumoperitoneum was created using carbon dioxide (CO_2) as insufflating gas. Intra-abdominal pressure was kept within 14 mmHg. An orogastric tube was inserted to deflate the stomach. All the port insertion sites were infiltrated with bupivacaine prior to insertion. Patients were positioned in 15° Trendelenburg with lithotomy. NIBP, ECG, Spo_2, end tidal capnography ($Etco_2$), airway, and intra-abdominal pressure were monitored in every case. In addition, inspired and expired isoflurane concentrations were monitored in Group A. At the end of the surgery, residual neuromuscular block was reversed with neostigmine (0.05 mg/kg) and glycopyrrolate (0.01 mg/kg). After achieving adequate recovery, the patients were transferred to the postanesthesia care unit (PACU).

In the PACU, basic postoperative monitoring (NIBP, ECG, and Spo_2) was continued. Assessment of PONV and recovery parameters was carried out using a predesigned scoring system (Table 1).[17] Scoring was done initially at 30-minute intervals for the first 2 hours, then every 6 hours for the following 24 hours. Thus, emesis score (ES) was recorded at each of the specified time points (0.5 hours, 1 hour, 1.5 hours, 2 hours, 6 hours, 12 hours, 18 hours, and 24 hours postoperatively) on an ordinal scale (Table 1).

Table 1
Postoperative assessment chart.

Variables	Parameters	Score
Emesis score	No nausea/vomiting	0
	Nausea	1
	Retching	2
	Vomiting	3
Recovery score	Fully awake	3
	Drowsy	2
	Arousable by shouting	1
	Not arousable	0
Ventilation score	Airway patent cough/cry present	2
	Airway patent, breathes easily	1
	Airway needs attention	0
Movement score	Purposeful and spontaneous movement	3
	Purposeful on demand	2
	Spontaneous but not purposeful	1
	No movement	0

Retching is the imminent sense of expulsion of gastric content with active sense of antiperistalsis, but without any regurgitation or expulsion of gastric content. Vomiting is the next stage of active expulsion of gastric content with massive mass reflex and antiperistalsis.
Note. From "Nausea and vomiting after laparoscopic surgery: a comparison of propofol and thiopentone/halothane anaesthesia," by A. Klockgether-Radke, V. Piorek, T. Crozier, D. Kettler, 1996, *Eur J Anaesthesiol*, 13, p. 3–9. Copyright 2016. Name of the Copyright Holder: Authors. Reprinted with permission.

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