International Journal of Surgery Open 10 (2018) 15–20

Contents lists available at ScienceDirect

International Journal of Surgery Open

journal homepage: www.elsevier.com/locate/ijso

Research Paper

Effect of sub-hypnotic dose of propofol on prevention of postoperative nausea and vomiting as part of multimodal antiemetic in patients undergoing open abdominal surgery: A prospective cohort study, Gondar University Hospital, Northwest Ethiopia, 2016

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ARTICLE INFO

Article history:
Received 11 November 2017
Received in revised form
14 November 2017
Accepted 15 November 2017
Available online 6 December 2017

Keywords:
Propofol
Nausea
Vomiting
Postoperative
Open abdominal surgery
General anaesthesia

ABSTRACT

Background: Postoperative nausea and vomiting (PONV) is one of the most common and unpleasant symptoms affecting patients undergoing abdominal surgery under general anaesthesia. It is also associated with complications such as gastric aspiration, bleeding, dehydration, wound dehiscence and delayed hospital discharge.

Objective: The aim of this study was to assess the effect of a sub hypnotic dose of propofol on the occurrence and severity of PONV after open abdominal surgery under general anaesthesia.

Materials and methods: A series of 72 adult (age ≥18) ASA class I or II patients, scheduled for open abdominal surgery were divided into a control group (n = 36) and a propofol group (n = 36). The propofol group was given 30 mg of 1% propofol IV bolus after skin closure. All episodes and severity of PONV during the first 24 h after anaesthesia were evaluated.

Results: The overall incidence of PONV was significantly lower in propofol group than the non-propofol group during the first six postoperative hours (30.6% versus 66.7% respectively; p = 0.002). There was a significant reduction in number of patients needing rescue anti-emetic during the first six postoperative hours in propofol group when compared with none-propofol group [5 (13.9%) and 15 (41.7%) respectively, (p = 0.009)]. There were no significant differences between the groups with regard to their haemodynamic parameters and manifestations of respiratory depression.

Conclusion and recommendation: Administration of a sub hypnotic intravenous dose of propofol was effective in reducing the incidence and severity of PONV, and the need for rescue anti-emetic during the first six postoperative hours in patients undergoing open abdominal surgery under general anaesthesia. We recommend the use of 30 mg propofol at the end of open abdominal surgery as part of multimodal approach for PONV.

1. Introduction

Open abdominal surgery under general anaesthesia is one of the most common operations in developing countries. In our hospital, a tertiary referral hospital, more than 5000 surgical cases are completed per year. Of these approximately 2000 are open abdominal procedures, with the majority being emergencies. Postoperative nausea and vomiting (PONV) is a common perioperative complication observed associated with this technique [1].

PONV is an unpleasant, and unfortunately common symptom affecting patients undergoing surgery [1]. The incidence of PONV is

Abbreviations: ASA, American Society of Anesthesiology; GCS, Glasgow Coma Scale; hr, Hour; NIBP, Non-invasive blood pressure; RCT, Randomized clinical trial; PACU, post-anaesthesia care unit; Spo2, peripheral oxygen saturation; PONV, Postoperative Nausea and Vomiting; mg, milligram.

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https://doi.org/10.1016/j.ijso.2017.11.008

reported around 30%, increasing to about 70% of those with certain risk factors [2–5]. Patients undergoing surgery on the bowel are at a higher risk. The overall prevalence of PONV in our hospital is reported to be 36.2% [6].

Associated morbidity with PONV includes decreased patient satisfaction, delayed hospital discharge, and unexpected hospital readmission. It can also contribute to wound dehiscence, bleeding, pulmonary aspiration, oesophageal rupture, and fluid and electrolyte disturbances.

PONV is associated with several risk factors including age, gender, history of previous PONV or motion sickness, smoking, obesity, surgical and anaesthetic related factors, patient and parental anxiety [7–10]. The pathophysiology of PONV is multifactorial; multiple pathways, neurotransmitters and risk factors are involved, therefore a multimodal approach is the optimal strategy for management of PONV. However, whether prophylaxis or treatment is more effective in reducing the incidence remains controversial [11].

Propofol is a novel total intravenous anaesthetic, that has been shown to possess antiemetic properties when administered in sub-hypnotic doses as part of combination therapy. However, the exact mechanism by which Propofol acts as an antiemetic remains unclear. It has been postulated that its antiemetic effects may be as an antagonist at the 5-HT3 receptor [12].

Sub-hypnotic doses of Propofol have been associated with a lower incidence of PONV compared with placebo for lower abdominal surgery [13], and metoclopramide or placebo for middle ear surgery [14]. A study by Shinn et al. showed that the incidence of PONV during the first 24 postoperative hours was significantly lower in patients anaesthetized with Propfol compared to Sevoflurane [3].

While studies show that propofol at a sub-hypnotic dose may reduce the incidence of PONV, the optimum dose to be used is debatable. 30 mg intravenous propofol has been shown in several studies to reduce the incidence of PONV without any significant side effects [15–17]. It has been also used successfully at dose range of 0.5 mg/kg/h to 1 mg/kg/h for the prevention and treatment of chemotherapy induced emesis [12,18]. However, Shi JJ et al. [19] reported no reduction in emesis in patients with a bolus injection of low dose (10 mg) propofol in patients undergoing caesarean delivery under spinal anaesthesia.

The efficacy of propofol is currently not clear. In our hospital propofol is a commonly available drug, and less expensive than ondansetron. Therefore, the objective of the present study was to observe the effect of propofol on the occurrence and severity of PONV after general anaesthesia in patients undergoing abdominal surgery.

2. Methods and materials

2.1. Study design and patients

A single Centre hospital based prospective observational cohort study was conducted from 15th January to March 15, 2016 in Gondar University Hospital. Ethical approval was obtained from the University of Gondar College of Medicine and Health Sciences ethics committee, and patients gave their informed consent. Patients with an ASA I and II physical status, aged ≥18 undergoing abdominal surgery under general anaesthesia during study period were recruited into the study. The anaesthetic management were chosen at the discretion of the attending anaesthetist. 30 mg of propofol intravenously were given at the end of skin closure as part of multimodal antiemetics at the discretion of the attending anaesthetist. Patients who did not have 30 mg of propofol via intravenous route at the end of skin closure were considered as non-propofol (usual-care) groups. The exclusion criterion included patients with co-existing diseases (ASA III or IV), GCS < 15, patients induced and maintained with propofol, haemodynamic instability, and positive history of drug allergies.

2.2. Study variables and sample size

The primary endpoint was the occurrence of postoperative nausea and/or vomiting, its severity, and the need for rescue antiemetic. Secondary endpoints were any documented complications.

A recent study shows that the overall 24 h incidence of nausea and or vomiting after general anaesthesia for abdominal surgery ranges from 30% to 70% when no prophylactic antiemetic is given [2]. Therefore, sample size was determined by considering the median incidence of PONV without any prophylaxis as 50%, based on another recent study when 0.5 mg/kg propofol is given for abdominal surgeries the average incidence is approximately 20% [13,14]. P1 was defined as the incidence of PONV in the non-propofol group; taken as 50%, P2 was defined as the incidence of PONV in the propofol group; which was taken as 20% with an alpha error of 0.05 at a power of 80%, and [f (a, β) = 7.85]. Applying this, the total sample size was calculated using the following formula. The number of patients in the propofol group and non-propofol group was 36 respectively.

The number of patients in the propofol

$$= \frac{p_1(1-p_1)+(1-p_2)}{(p_2-p_1)^2} \times f(\alpha,\beta)$$

Given:

P1: 0.5
P2: 0.2, 80% power, 5% significance [f (a, β) = 7.85]
Ratio of exposed to unexposed (1:1)

$$n = \frac{0.5(1-0.5)+0.2(1-0.2)}{(0.2-0.5)^2} \times 7.85$$

n = 35.76~36. Therefore, total sample of 72 patients or 36 patients per group will be required.

Since RCT was not yet allowed in our university, the patients were not randomized. Rather, patients were classified as propofol group (n = 36) and non-propofol (usual-care) group (n = 36) based on the responsible anesthetists' independent decision to give 30 mg of 10% propofol at the end of skin closure. Those patients who received 30 mg of 10% propofol at the end of skin closure were considered as propofol group. The non-propofol(usual-care) group was defined, in this study, as those patients who did not received 30 mg of 10% propofol at the end of skin closure but all perioperative cares like prophylaxis anti-emetics, and analgesics was given according to our local protocol. Induction of anaesthesia was carried out with ketamine (2 mg/kg) or thiopental sodium (5 mg/kg) and 0.1 mcg/kg fentanyl based on the choice of the responsible anaesthetist. Intubation of the trachea was facilitated by 2 mg/kg of Suxamethonium. Intraoperatively anaesthesia was maintained with vecuronium and halothane, with or without morphine 0.1 mg/kg for intraoperative analgesia. Reversal of neuromuscular blockade was achieved by neostigmine 0.05 mg/kg and atropine 0.01 mg/kg at the time of last surgical suture.

2.3. Data collection

One of the data collectors recorded intraoperative information. On arrival in the recovery room patients were observed by data collectors and questioned on the outcome variables such as nausea, vomiting, rescues antiemetic request as well as severity of nausea on numerical rating scale by another data collector who was