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A Comparative Clinical Study of Oral Aprepitant and Injection Palonosetron for Postoperative Nausea and Vomiting in Patients Undergoing Laparoscopic Cholecystectomy Under General Anaesthesia

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Abstract

Objective: Nowadays, laparoscopic procedures are carried out quite often. Patients undergoing laparoscopic cholecystectomy under general anesthesia are at a significant risk for PONV, which can occur up to 75% of the time. In patients scheduled for laparoscopic cholecystectomy under general anesthesia, the objective was to test and evaluate the effects of oral aprepitant and injectable palonosetron on the prevention of postoperative nausea and vomiting (PONV).

Method: A total of 120 laparoscopic cholecystectomy patients with ASA grades I and II were enrolled in this research. They were divided randomly into 3groups of 40 each who received 1 capsule (70 mg) aprepitant

orally 2 hrs before and 1ml of normal saline IV 11 minutes before induction in group A, or 1 capsule (70 mg) aprepitant 2 hrs before and 1ml of normal saline IV 11 minute before induction in group P and placebo 1 capsule orally 2 hrs before and 1ml of normal saline intravenous (IV) 11 minute before induction in group C. During the first 20 minutes, 50 minutes, 1 hour, 5 hours, 11 hours, and 25 hours following extubation, patients were observed and checked for nausea, retching, and vomiting.

Results: When administered before the onset of general anesthesia, palonosetron, and aprepitant are both helpful in lowering the frequency of postoperative nausea and vomiting for up to 25 hours. Palonosetron is less effective than aprepitant for reducing nausea and vomiting after surgery.

Conclusion: Even though Aprepitant and Palonosetron both have a distinct mechanism of action and few adverse effects; they are both safe. A single injection was shown to be less efficient and inferior to aprepitant 70 mg oral.

Keywords: Extubation, Nausea, Vomiting, Aprepitant, And Palonosetron

Introduction

One of the most frequent issues faced by patients in the postoperative phase is nausea and vomiting. In adult patients recovering from general anesthesia, 20–30% have emesis, and 0.1% experience severe nausea and vomiting without taking antiemetic medicine beforehand [Figure 1; 1]. It has a variety of effects on the patients, including physical, surgical, and anesthesia difficulties as well as possible psychological and financial effects. Therefore, all of these individuals require prophylactic antiemetic medication [2].

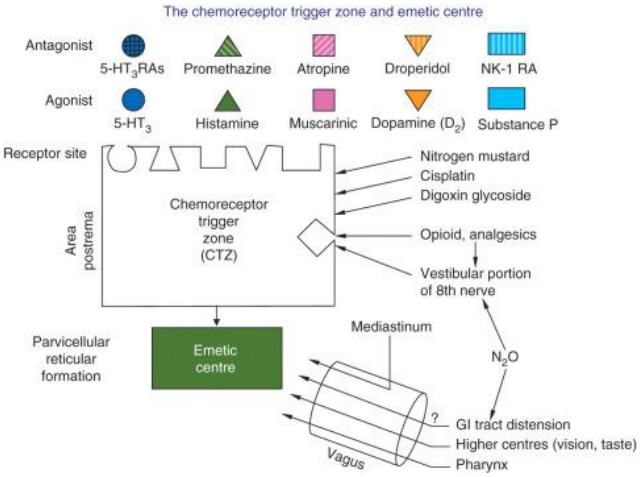


Figure 1: Multimodal therapies in Post-operative nausea and vomiting.

Because of the delay in hospital release, nausea, and vomiting are more upsetting after ambulatory surgery and minor surgery. Several variables increase the risk of PONV in patients, including female sex, obesity, anxiety, a history of motion sickness or postoperative vomiting, gastroparesis, abdominal surgery, opiate usage, etc. [3]. Laparoscopic surgery is more likely to cause postoperative nausea and vomiting because the pneumoperitoneum stimulates the gut's mechanoreceptors [4]. Palonosetron is a second-generation drug with a lengthy half-life. The 5HT3 receptor antagonist has the greatest binding affinity and an elimination half-life of around 40 hours [5].

By specifically inhibiting these receptors, 5HT3 antagonists were shown to be effective in the treatment of PONV. The first NK-1 receptor antagonist approved for use in clinical antiemetics is aprepitant. With a lengthy half-life of 9 to 12 hours and preclinical effectiveness against opioids-induced emesis, it is a highly selective, brain-penetrating NK-1 antagonist [6].

To avoid postoperative nausea and vomiting (PONV), it was important to test and assess how oral aprepitant and injectable palonosetron were performed in this regard.

Methods

Study Design: This was a cross-sectional study carried out at Shaheed Nirmal Mahto Medical College & Hospital, Dhanbad within a year.

Methodology: Using the closed envelope approach, patients with ASA grades I, II, and III were randomly split into 3 groups (n=40 each). Two hours prior, Group A was given 1 capsule (70 mg) of aprepitant orally, and 1 cc of sterile saline intravenously. Group "P" got 1 capsule (70 mg) of aprepitant orally 1 hour before induction and 1 ml of normal saline intravenously (IV) 11 minutes before induction, while Group "C" received a placebo of 1 capsule orally 2 hours before induction and 2 ml of normal saline intravenously (IV). All the patients were fasted for the whole night. Every subject got the same premedication of 0.1 mg of glycopyrrolate intramuscularly. 20 minutes before the start of the anesthetic induction.

When the patient entered the operating room, a 17G cannula was used to establish intravenous access. The infusion of 400 ccs of crystalloid was started. The following hemodynamic measurements were tracked and recorded: heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), and oxygen saturation (Spo2). According to the research's protocol, the study medication was taken orally three hours before the onset of anesthesia and administered intravenously slowly 20 minutes beforehand.

After 11 minutes, provide pentatonic 0.2-0.5 mg/kg IV, then thiopentone sodium 2-4 mg/kg BW intravenously, and finally IV. It was administered succinylcholine 1-1.4 mg/kg BW. IPPV at 100% was performed for 50 seconds, followed by a laryngoscopy and endotracheal intubation using a cuffed endotracheal tube of the appropriate size. N2O 65%, O2 32%, intermittent isoflurane, and controlled breathing were used to maintain anesthesia. Atracurium, a nondepolarizing muscle relaxant, was injected in boluses of 0.24 mg/kg BW and maintenance doses of 0.2 mg/kg BW. Glycopyrrolate 0.4 mg and neostigmine 2.0 mg were administered intravenously after the surgical operation to counteract the muscle relaxant's lingering effects.

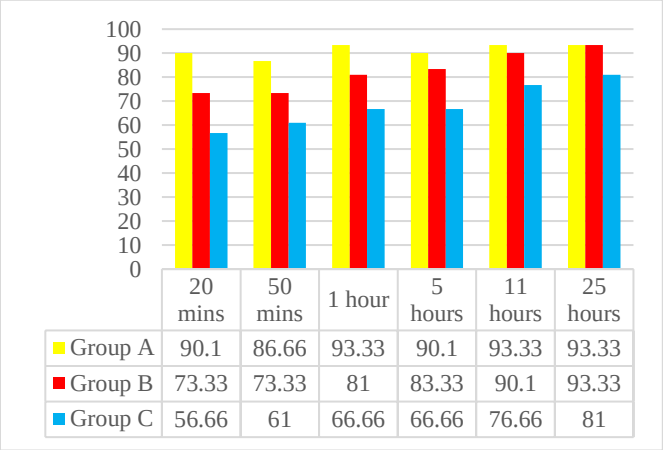
Patients were oxygenated for a further five minutes after being extubated, and they were then moved to the postoperative ward once they had fully recovered. Each patient in the post-operative ward had nausea, retching, and vomiting observed for 20 minutes, 50 minutes, an hour, an hour and a half, a day and a half, and 25 hours. If the patient experienced more than one episode of vomiting or retching, or if their nausea lasted longer than 14 minutes, rescue antiemetic metoclopramide 11 mg IV slowly was administered.

Sample Size: 120 patients were randomly divided into 3 groups of 40 patients each.

Statistical analysis: Using the statistical program Epi.info version 7-0, the collected data were tabulated and put through statistical analysis.

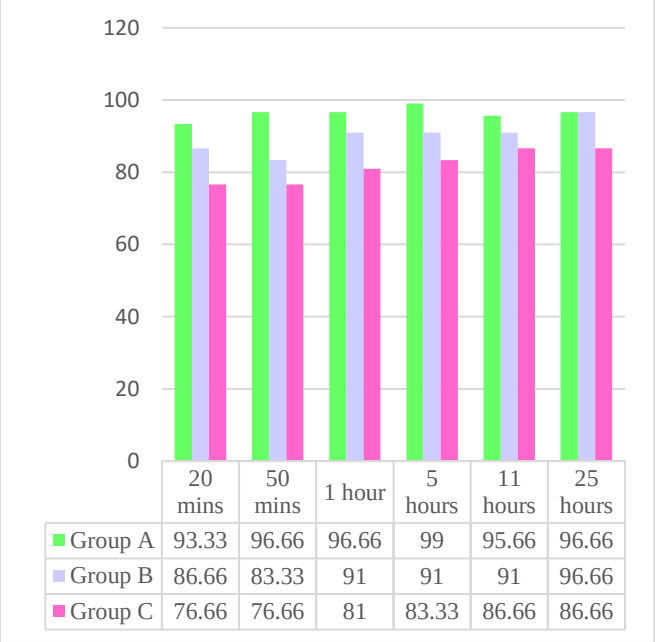
Results

According to **Figures 2 and 3**, group A [P=0.91, P=0.8, respectively] experienced the greatest drug response in avoiding nausea and vomiting, followed by Group B [P=0.20, 0.87, respectively], while Group C [P=0.32, P=0.96, respectively] experienced the least drug response. Patients were increasingly reporting nausea and vomiting-free, reaching a peak 25 hours following surgery.



	20 mins	50 mins	1 hour	5 hours	11 hours	25 hours
Group A	90.1	86.66	93.33	90.1	93.33	93.33
Group B	73.33	73.33	81	83.33	90.1	93.33
Group C	56.66	61	66.66	66.66	76.66	81

Figure 1: Drug response in people who do not experience nausea.



	20 mins	50 mins	1 hour	5 hours	11 hours	25 hours
Group A	93.33	96.66	96.66	99	95.66	96.66
Group B	86.66	83.33	91	91	91	96.66
Group C	76.66	76.66	81	83.33	86.66	86.66

Figure 2: Patients in various groups who did not vomit.

Due to a considerably lower incidence of PONV with Aprepitant ($p < 0.04$) over the course of the full observation period (1–25 hours), Aprepitant was determined to be more effective than Palonosetron in preventing PONV. However, there was no distinction between the two medications' rescue drug requirements. During the observation period, the proportion of patients in groups A, B, and C who needed rescue medication was 66.1%, 23.33%, and 13.33%, respectively.

Discussion

The frequency of PONV, which still occurs often and is upsetting following laparoscopic cholecystectomy, ranges from 60% to 71% [7]. Inputs from several places, including the higher cortical centers, cerebellum, vestibular apparatus, glossopharyngeal, and vagal afferent nerve, are what cause the very complicated emetic reaction in PONV. These signals are mediated by several neurotransmitter and receptor systems, such as the histaminergic, cholinergic, dopaminergic, neurokininergic, and serotonergic. Competitive 5-HT3 antagonists have been used extensively to stop PONV [8]. Peripheral 5-HT3 receptors are found in vagal terminals that are connected to the vomiting center, and they can stop the vomiting reflex from being triggered at these locations.

Ondansetron, Granisetron, and palonosetron have all been tested for their ability to reduce PONV with or without dexamethasone, with varying degrees of success [9,10]. For the prevention of PONV, aprepitant, a selective NK-1 receptor antagonist with a 9 to 14-hour half-life period, has been examined. It works by obstructing substance P's emetic effects in the gastrointestinal tract and the nucleus tractus solitaries of the brain [14]. Studies focusing on chemotherapy CINV in conjunction with other antiemetics have shown that aprepitant has a long half-life and is effective against nausea and vomiting [11,12]. In this double-blind, randomized clinical investigation, we assessed the responsiveness and effectiveness of a single IV dosage of the 5HT3 receptor antagonist palonosetron for the treatment of PONV and compared it to oral Aprepitant.

Since we used a placebo in this study and age, obesity, female sex, duration of surgery, etc. are all known risk factors for PONV, patients with high-risk factors were

not given priority in our study. Instead, the mean age, sex, weight, and mean duration of surgery for each group were comparable in our study. The Aprepitant group saw the greatest medication response in avoiding nausea and vomiting, followed by the Palonosetron group. The percentage of patients who reported being nausea and vomiting-free increased and peaked at 25 hours following surgery, but it was statistically insignificant ($p>0.04$). Since the incidence of PONV was considerably lower with aprepitant ($p<0.04$) over the whole observation period (1–25 hours), aprepitant was shown to be more effective than palonosetron in preventing PONV. No distinction between the two medications' rescue drug requirements, nevertheless, was discovered. An investigation [13] challenges this. In which they compared the effectiveness of Palonosetron and Aprepitant in preventing PONV.

This discrepancy in findings between the two studies may be explained by a few factors: First, our trial employed a greater dosage of aprepitant (70 mg), whereas theirs used 30 mg. This disagreement is caused by two factors: first, they employed propofol for induction whereas we utilized thiopentone sodium; and second, the optimal dose of aprepitant, adequate to prevent PONV, has not yet been determined and supported by additional research [14,15]. Due to its serotonergic antagonistic action, which improves Palonosetron's antiemetic function synergistically, Propofol has already been shown to have antiemetic efficacy [16,17].

The adverse effects of aprepitant and palonosetron were brief and mild, and patients in groups A and B most frequently reported headaches and constipation. Each of the three groups had one patient report experiencing dizziness. These negative consequences had no clinically significant effects. Therefore, it is easy to conclude that both medications are typically free of adverse effects.

Conclusion

Palonosetron and Aprepitant both have a particular action and few adverse effects, making them both safe and effective. A single injection of Palonosetron was shown to be less efficient and inferior than 70 mg of aprepitant taken orally.

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