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Research Article

Comparative Evaluation of the Influence of Intravenous Dexamethasone and Ondansetron on Postoperative Nausea and Vomiting in Patients Undergoing Laparoscopic Surgeries

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Abstract: Various studies done from time to time suggest that the incidence of post operative nausea and vomiting(PONV) after laparoscopic surgeries is very high and the prophylaxis and treatment is complex.Previous studies in this regard so far have used various drugs either alone or in combination. Therefore, we decided to compare the effect Ondansetron and Dexamethasone on PONV after laparoscopic surgeries. 60 adult ASA Grade I or II patients scheduled to undergo elective laparoscopic surgeries under general anesthesia were studied. They were randomly divided into 3 groups of 20 patients each. Group I patients served as control and received 10ml of normal saline, Group II patients received dexamethasone 0.15mg/kg diluted to 10 ml with normal saline and Group III patients received ondansetron 0.1 mg/kg diluted to 10 ml with normal saline. Postoperatively incidence of nausea and vomiting was recorded on a 3-point scale (0=none, 1= nausea, 2= vomiting) at 1 hour, 2 hours, 4 hours, 8 hours and 24 hours. Rescue antiemetic in the form of metoclopramide 0.15 mg/kg i.v was given if the patient vomited more than once or demanded treatment. Comparison of the observations among different groups was done and statistically analyzed using Fisher's exact test and Mann--Whitney-U test. It was found that there was a high incidence of PONV after laparoscopic surgeries. Dexamethasone in a dose of 0.15-mg/kg i.v and ondansetron in a dose of 0.1 mg/kg i.v were highly effective in reducing the incidence of PONV for 8 hours and 4 hours respectively after surgery. Both the drugs significantly reduced the requirement of rescue antiemetics during the 24-hour postoperative period. Prophylactic dexamethasone in a dose of 0.15mg/kg i.v is highly effective in reducing the incidence of PONV for 8 hours after surgery. Ondansetron in a dose of 0.1mg/kg i.v is highly effective in reducing the incidence PONV for 4 hours after surgery.
Keywords: Ondansetron, Dexamethasone, PONV, Laproscopic surgeries.

INTRODUCTION

Within 18 months of introduction of general anesthesia in Great Britain, John Snow in 1848 first described the phenomenon of postoperative nausea and vomiting (PONV) [1]. Over the next 150 years there has been a general trend towards a decrease in the incidence and intensity of this problem because of the identification of the predictive factors, improved anesthetic and operative techniques, and the use of less emetic anesthetic drugs etc. However in spite of these advances, PONV still occur with unacceptable frequency and the description of it as the 'Big Little Problem' [2] encapsulates much of the general perception. The incidence is quite high even after laparoscopic surgeries including gall bladder surgeries [3, 4].

PONV can increase pain, prolong the post anesthesia care unit (PACU) stay and as well as lead to unplanned hospital admission [5]. As more and more patients undergo surgery under day care, the humanitarian and economic implications of PONV are becoming increasingly important [6]. A number of pharmacological and non-pharmacological methods to reduce PONV have been tried in the past with variable success. These include acupuncture, acupressure, and drugs like droperidol, metoclopramide, atropine, hyoscine, cyclizine, and perphenazine [7], but, undesirable adverse effects such as excessive sedation , hypertension, dry mouth, dysphoria , hallucinations and extra pyramidal symptoms have been noted. Ondansetron is a highly selective 5HT3 antagonist. It has been used successfully in chemotherapy induced emesis and has also been shown to be effective in preventing and treating PONV [8]. It lacks the sedative,

dysphoretic and extrapyramidal side effects of other commonly used antiemetics [9]. The antiemetic effect of dexamethasone is reported to be equal to or better than 5HT3 antagonists. [8, 10] Also,the adverse effects of single dose of dexamethasone are extremely rare [11].

Our study was aimed to assess the magnitude of PONV after laparoscopic surgeries and to evaluate and compare the effects of ondansetron and dexamethasone on the same.

Aims and Objectives

- To assess the magnitude of PONV after laparoscopic surgeries.
- To compare the effects of dexamethasone and ondansetron on PONV after laparoscopic surgeries.

SUBJECTS AND METHODS

After approval by the Hospital Ethics Committee, the study was conducted on 60 adult ASA Grade I or II patients of either sex in the age group of 18 to 60 years who underwent elective laparoscopic surgeries under general anesthesia.

Exclusion criteria were pregnant or lactating females; patients with a history of central nervous system or neuromuscular diseases; hepatic, renal or cardio-respiratory diseases and motion sickness.

After obtaining written and informed consent**,** the patients were randomly divided into three groups of 20 patients each.

- Group I: served as control and received 10 ml of normal saline.
- Group II: received dexamethasone 0.15mg/kg diluted to 10 ml with normal saline.
- Group III: received ondansetron 0.l mg/kg diluted to 10 ml with normal saline.

On arrival to the operating room, the monitoring comprised of ECG (lead II), Noninvasive automatic blood pressure and Pulse oximetery. Baseline heart rate, blood pressure and Sp02 were recorded. A suitable peripheral vein was secured in all the patients. In all the patients,the drug under study was administered as a slow intravenous injection 10 minutes before induction.Patients were preoxygenated with 100% Oxygen. Induction was accomplished with inj. Propofol 2mg / kg body wt. and Inj. Fentanyl 1.5 mcg / kg body wt. After giving Inj. Vecuronium bromide 0.1 mg / kg body wt. and ventilating the patient with 100% O_2 for 3 minutes, intubation was done with cuffed oral endotracheal tube of appropriate size and anesthesia was maintained with Isoflurane and Nitrous oxide and oxygen 50:50 with controlled ventilation. Muscle relaxation was maintained with additional doses of vecuronium. Intra operative analgesia was supplemented with additional doses of fentanyl 0.5-1µgm/kg. A nasogastric tube was inserted after induction of anesthesia for baseline emptying of the stomach and the same was removed soon after. Standard monitoring comprising of Pulse rate, Blood pressure, ECG, Sp02, Temperature and $EtC0_2$ were carried out throughout the surgical procedure. Before closure, each laparoscopy port was infiltrated with 5ml of 0.25% bupivacaine, for postoperative analgesia. Residual neuromuscular blockade was reversed with glycopyrrolate (0.01 mg/kg) and neostigmine (0.04 mg/kg).

Postoperatively, the following parameters were recorded at l, 2, 4, 8 and 24 hours in all the patients.

- Pulse rate
- Blood pressure
- Respiratory rate
- Incidence of nausea and vomiting
- Visual analogue scale score

No distinction was made between vomiting and retching. Nausea and Vomiting were evaluated on a 3-point scale (0-none, 1-nausea, 2-vomiting). Rescue antiemetic in the form of metoclopramide 0.15-mg/kg i.v was given if the patient vomited more than once or demanded treatment. Postoperative analgesia was supplemented with intravenous diclofenac sodium, whenever VAS score was >3 or on demand.

The total amount of metoclopramide and diclofenac consumed were recorded. Side effects if any were observed and recorded.

Comparison of the observations among different groups was done and statistically analyzed using Fisher's exact test and Mann-Whitney-U test.

RESULTS

Mean age, height, weight, sex ratio, ASA class, Visual Analogue Scale scores and the duration of surgery in the three groups were statistically comparable.

PONV was assessed using a 3-point scale (0-none, 1-nausea, 2-vomiting) at 1 hour, 2 hours, 4 hours, 8 hours and 24 hours after surgery (Fig. 1).

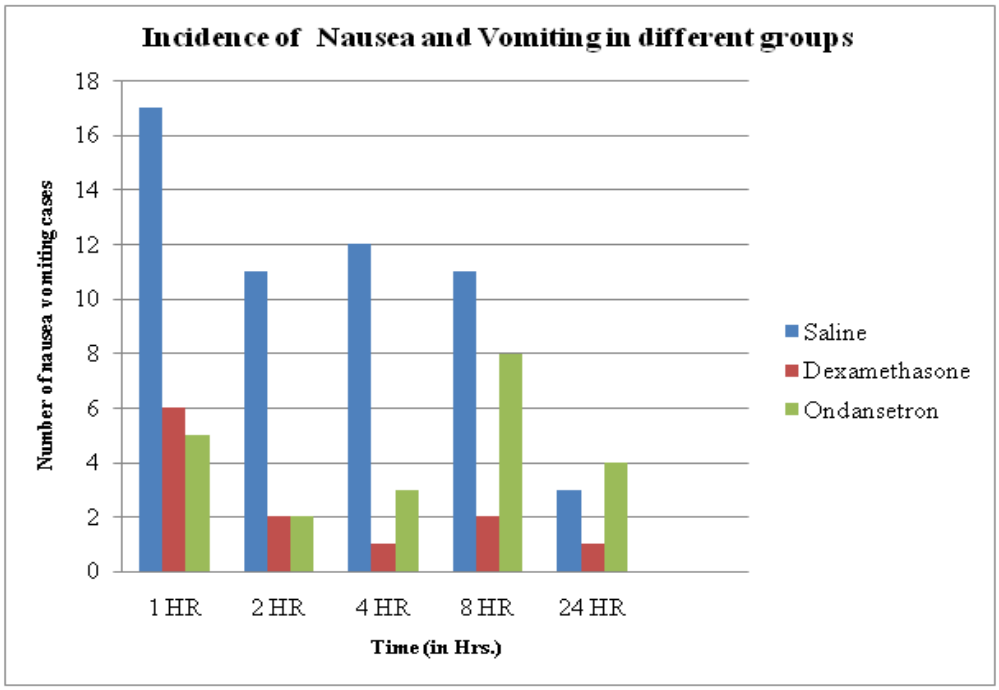

Fig. 1: Incidence of PONV in different groups

At 1 hour

The percentage of patients who had nausea was 25% in-group I, compared to 10% in-group II and 10% in-group III. The percentage of patients who had vomiting was 60% in-group I, compared to 20 % in-group II and 15% in-group III. The difference in the incidence of PONV at 1 hour was statistically very significant between group I and II ($p<0.001$) and between group I and III ($p<0.001$). The difference was not statistically significant between groups' II and III ($p=0.5$).

At 2 hours

The percentage of patients who had nausea was 20% in-group I , compared to 5% in both group II and group III. The percentage of patients who had vomiting was 35% in-group I, compared to 5 % in both group II and group III. The difference in incidence of PONV score was statistically very significant between group I and II ($p=0.002$) and between group I and III ($p=0.002$). The difference was statistically not significant between group II and group III ($p=0.7$).

At 4 hours

The percentage of patients who had nausea was 30% in-group I, compared to 0% in-group II and 5% in-group III. The percentage of patients who had vomiting was 30% in-group I, compared to 5 % in-group II and 10% in-group III. The difference in the incidence of PONV at 4hours was statistically very significant between group I and II ($p<0.001$) and between group I and III ($p=0.003$). The difference was not statistically significant between groups' II and III ($p=0.3$).

At 8 hours

The percentage of patients who had nausea was 25% in-group I, compared to 5% in-group II and 15% in-group III. The percentage of patients who had vomiting was 30% in-group I, compared to 5 % in-group II and 25% in-group III. The difference in the incidence of PONV at 8 hours was highly significant between group I and II ($p=0.002$) but not between group I and III. ($p=0.26$). The difference was also statistically significant between groups' II and III ($p=0.03$)

At 24 hours

The percentage of patients who had nausea was 0% in- group I, compared to 0% in-group II and 5% in-group III. The percentage of patients who had vomiting was 15% in-group I, compared to 5 % in-group II and 15% in-group III. The difference in the incidence of PONV at 24 hours was not of statistical significance between the groups, even though the percentage of patients who had vomiting was less in-group II.

Metoclopramide 0.15 mg/kg intravenously was used as the rescue antiemetic if the patients vomited more than once or when patient demanded. The mean amount of total metoclopramide consumed by each patient in milligrams was 7.357± 4.404 in group I, 0.987±3.040 in group II and 1.375± 3.39 in group III. The difference in the total metoclopramide consumption was statistically very significant between group I and II ($p<0.001$) between group I and III ($p<0.001$). The difference was statistically not significant between group II and III ($p=0.63$) (Fig. 2).

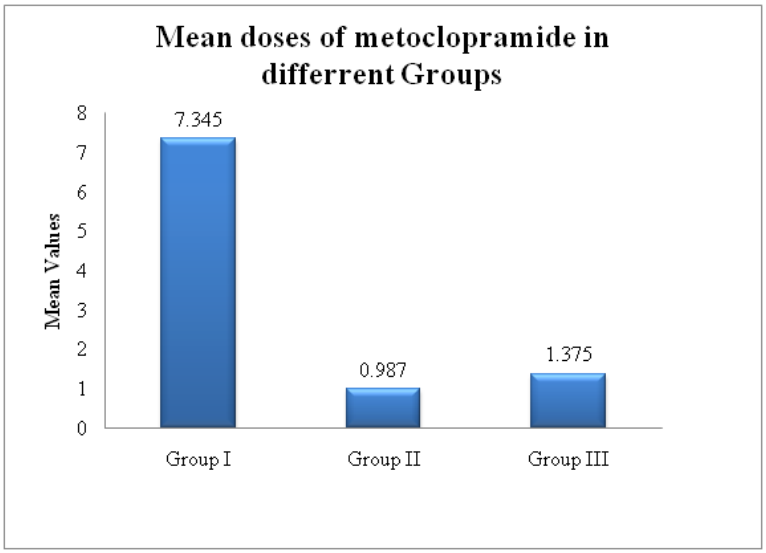

Fig. 2: Mean doses of Metoclopramide in different groups.

The proportion of patients who had nausea and vomiting were more in patients who received repeat dose of fentayl. Of the six patients who received repeat fentanyl, five had postoperative nausea and vomiting.

The nausea and vomiting was observed more in patients with past history of PONV. But the number of patients with past history of PONV (8 out of 60) was too small to reach a conclusion.

DISCUSSION

Inspite of advances in anesthesia and surgery over the last few decades, PONV still occur with significant frequency and is often regarded as the worst part of patients' 'surgical experience' [12]. It continues to be the "big little problem" for surgical patients as described in a recent editorial [2]. Studies carried out in the previous years have identified a high incidence of postoperative nausea and vomiting after laparoscopic surgeries, the proportion varying between 53-72% [3, 4, 11].The present study was undertaken to assess the magnitude of PONV after laparoscopic surgeries and to evaluate and compare the effects of intravenous ondansetron and dexamethasone on the same. We found that the total incidence of PONV was 50% in the saline group, compared to 12% in the dexamethasone group and 22% in the ondansetron group during the first 24 hours. The results are consistent with the studies conducted by Wang *et al*. in patients undergoing laparoscopic cholecystectomy [11] and tubal ligation [13]. Pearman [14] and colleagues studied the effects of single dose ondansetron (i.v) and found that it prevented PONV for 24 hours. He did his studies on females undergoing gynecological laparoscopy and males undergoing daycare surgery. Our results are not consistent with their results. This may be because of dissimilar patient populations. Thus the patients who received antiemetic prophylaxis with dexamethasone and ondansetron were much more comfortable than patients in the control group, as substantiated by the number of emetic episodes and the total amount of rescue antiemetic consumed in each group. In view of the reasons discussed above, we also support the earlier views [15, 16] that dexamethasone because of its long half-life was effective for 8 hours (in terms of incidence of PONV) and up to 24 hours (in terms of consumption of rescue antiemetic). Ondansetron as compared to dexamethasone was effective for a shorter duration, 4 hours (in terms of incidence of PONV). But like dexamethasone it also significantly reduced the consumption of rescue antiemetics during 24-hour postoperative period.

We found that neither dexamethasone nor ondansetron affected the severity of pain or the postoperative analgesic consumption. Liu, Hsu and Chia [17] in their study on the effect of dexamethasone on postoperative emesis and pain found similar results. As nausea and vomiting are distressing to the patient and increase the risk of delayed discharge from the hospital, we recommend that antiemetic prophylaxis should be given to patients undergoing laparoscopic surgeries. Patient comfort and satisfaction is one of the important outcome measures.Therefore, while supporting the earlier views that it is prudent to administer dexamethasone at the beginning of surgery [18] and ondansetron towards the end of surgery [19] for the prevention of PONV, we suggest that the combination of dexamethasone and ondansetron is likely to be a more effective prophylactic antiemetic intervention after laparoscopic surgeries.

CONCLUSION

The incidence of PONV after laparoscopic surgeries is very high. Both intravenous dexamethasone and ondansetron are safe and effective for attenuating the PONV after laparoscopic surgeries, but the duration of antiemetic action of dexamethasone is more.

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