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Dexamethasone and Ondansetron for Post-Operative Nausea and Vomiting (PONV) Following Laparoscopic Cholecystectomy A Randomised Control Study

KEYWORDS: Dexamethasone, Ondansetron, PONV and laparoscopic cholecystectomy

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ABSTRACT ***Introduction****: Post-operative nausea and vomiting still occur with unacceptable frequency and the description of it as the 'Big Little Problem' encapsulates much of the general perception. The incidence is quite high even after laparoscopic surgeries including gall bladder surgeries.*
Aims & Objectives: *To assess the level of PONV following laparoscopic cholecystectomy and the effect of dexamethasone and ondansetron, individually on PONV following laparoscopic cholecystectomy.*
Materials & Methods*: 60 patients presenting for elective laparoscopic cholecystectomy were randomised to 3 groups. Group 1 as control, group 2 received dexamethasone and group 3 received ondansetron for PONV prophylaxis. All three groups were evaluated for incidence of post-operative nausea and vomiting. Comparison of the observation among different groups was done and statistically analyzed using Fisher's exact test and Mann-whitney-U test.*
Results*: The incidence of PONV was 50% in the control group, compared to 12% in the dexamethasone group and 22% in the ondansetron group during the first 24 hours. At 1 hour the total incidence of PONV was 85% in control group, 30% in dexamethasone group and 25% in ondansetron group. At 2 hours the total incidence of PONV was 55% in the control group, 10% in dexamethasone group and 10% in ondansetron group. At 4 hours the total incidence of PONV was 60% in control group, 5% in dexamethasone group and 15% in ondansetron group. The incidence of PONV at 8 hours was 55% in control group, 10% in dexamethasone group and 40% in ondansetron group.*
Conclusion*: The incidence of PONV following laparoscopic cholecystectomy is high and both dexamethasone and ondansetron effectively reduce the incidence of PONV in these patients.*

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, postoperative nausea and vomiting still occur with unacceptable frequency and the description of it as the 'Big Little Problem' encapsulates much of the general perception(2). 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 can cause unplanned hospital admission (5). As more and more patients undergo surgery under day case, the humanitarian and economic implications of postoperative nausea and vomiting are becoming increasingly important (6).

A number of pharmacological and nonpharmacological 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 2014 recommendation Ondansetron is a highly selective 5HT3 antagonist (7). It has been used successfully in chemotherapy-induced emesis, is also shown to be effective in preventing and treating PONV (8). Although it lacks the sedative, dysphoretic and extrapyramidal side effects of other commonly used antiemetics, its cost is substantial(9). The antiemetic effect of dexamethasone is reported to be equal to or better than 5HT3 antagonists, also adverse effects of single dose of dexamethasone are extremely rare(10,11,12).

Although various studies have proved the antiemetic efficacy of dexamethasone, not much work has been done to assess the effect of dexamethasone on PONV after laparoscopic cholecystectomy. Also the studies carried out so far on PONV after laparoscopic cholecystectomy have used various drugs either alone or in combination but the comparison of ondansetron and dexamethasone on the same surgical population has not been reported.

present study is aimed to assess the magnitude of PONV after laparoscopic cholecystectomy and to evaluate and compare the effects of ondansetron and dexamethasone on the same.

Aims & Objectives:

We aimed to assess the magnitude of PONV after laparoscopic cholecystectomy, and also to evaluate the effect of dexamethasone and ondansetron on PONV after laparoscopic cholecystectomy. We compared the effects of dexamethasone and ondansetron used for PONV prophylaxis in laparoscopic cholecystectomy patients.

Materials and Methods:

We recruited 60 adult ASA Grade I or II patients of age groups 18 to 60 admitted to a tertiary hospital in India, who underwent elective laparoscopic cholecystectomy under general anesthesia. Patients with history of motion sickness, pregnant and lactating patients, those with hypersensitivity to ondansetron or dexamethasone were not included in the study. Patients who were on steroid therapy or had received antiemetics or drugs known to produce emesis within 48 hours before surgery were also excluded.

All patients were shown the Visual Analogue Scale and were appraised about the same during a pre-operative visit one day prior to surgery. An informed consent was taken

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from all the patients. The patients were asked to restrict oral intake overnight or at least six hours before surgery.

The patients were randomly divided into three groups of twenty patients each. Group I: patients in this group served as control and received 10ml of normal saline. Group 2: patients in this group received dexamethasone 0.15mg/kg diluted to 10 ml with normal saline. Group 3; patients in this group received ondansetron 0.1mg/kg diluted to 10 ml with normal saline.

Pre anesthetic medication consisting of oral diazepam 10 mg was given to all patients on the night before surgery. On arrival to the operating room, the monitoring gadgets comprising of ECG (lead II), noninvasive automatic blood pressure monitor and pulse oximeter were applied to all the patients. Baseline heart rate, blood pressure and spO2 were recorded. A suitable peripheral vein was secured in all the patients 10 minutes prior to induction of anesthesia. In all the patients drug under study was administered as a slow intravenous injection in a double blind fashion 10 minutes before induction.

Induction was accomplished by thiopentone sodium (2.5%) 3-5mg/kg and fentanyl 2 microgm/kg followed by vecuronium 0.1 m/kg to facilitate tracheal intubation. Ventilation was controlled to maintain EtCO2 of 35-40 mmHg. Anesthesia was maintained with isoflurane (0.5%) with 66%N2O in O2. muscle relaxation was maintained with additional doses of vecuronium. Intra operative analgesia was supplemented with additional doses of fentanyl 1-2 microgm/kg, if blood pressure and heart rate rose by 30% from the base line, after excluding other causes of tachycardia and hypertension. 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, SpO2 and EtCO2 were carried out through out the surgical procedure. Before closure, each laparoscopy port was infiltrated with 5 ml of 0.25% bupivacaine, for postoperative analgesia. Residual neuromuscular blockade was reversed with glycopyrrolate and neostigmine.

Postoperatively pulse rate, blood pressure, respiratory rate, incidence of PONV and visual analogue scale score were recorded at 1,2,4,8 and 24 hours in all the patients. 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 intramuscular diclofenac sodium, whenever VAS score was more than 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 observation among different groups was done and statistically analyzed using Fisher's exact test and Mann-whitney-U test.

Results

The three groups were comparable with respect to their age, weight and duration of surgery and did not differ statistically. The sex ratio of the patients, in all the three groups was also comparable.

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

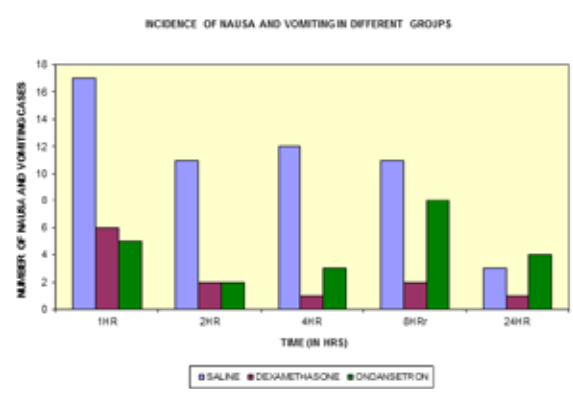
At 1 hour, the percentage of patients who had nausea was 25% in-group 1 compared to 10% in-group 2 and 10% in-group 3. The percentage of patients who had vomiting was 60% in group 1, compared to 20 % in-group 2 and 15% in-group 3. The difference in the occurrence of PONV at 1hour was statistically very significant between group 1 and 2 ($p<0.001$) and between group 1 and 3 ($p<0.001$). The difference was not statistically significant between groups 2 and 3 ($p=0.5$).

At 2 hours, the percentage of patients who had nausea was 20% in-group 1 compared to 5% in both group 2 and 3. The percentage of patients who had vomiting was 35% in-group I compared to 5% in both group 2 and 3. The difference in incidence of PONV score was statistically very significant between group 1 and 2 ($p=0.002$) and between group 1 and 3 ($p=0.002$). The difference was statistically not significant between group 2 and 3 ($p=0.7$).

At 4 hours, the percentage of patients who had nausea was 30% in group 1 compared to 0% in group 2 and 5% in group 3. The percentage of patients who had vomiting was 30% in group 1, compared to 5 % in group 2 and 10% in group 3. The difference in the occurrence of PONV at 4hours was statistically very significant between group 1 and 2 ($p<0.001$) and between group 1 and 3 ($p=0.003$). The difference was not statistically significant between 2 and 3 ($p=0.3$).

At 8 hours, the percentage of patients who had nausea was 25% in-group 1 compared to 5% in group 2 and 15% in group 3. The percentage of patients who had vomiting was 30% in group 1, compared to 5 % in group 2 and 25% in group 3. The difference in the occurrence of PONV at 8 hours was highly significant between group 1 and 2 ($p=0.002$) but not between group 1 and 3 ($p=0.26$). The difference was also statistically significant between groups 2 and 3 ($p=0.03$).

At 24 hours, the percentage of patients who had nausea was 0% in group 1 compared to 0% in group 2 and 5% in group 3. The percentage of patients who had vomiting was 15% in group 1, compared to 5 % in group 2 and 15% in group 3. The difference in the occurrence 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 2.



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

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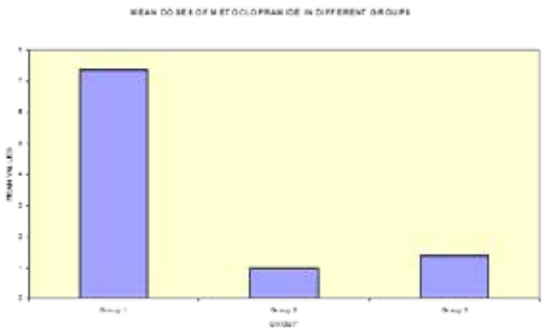
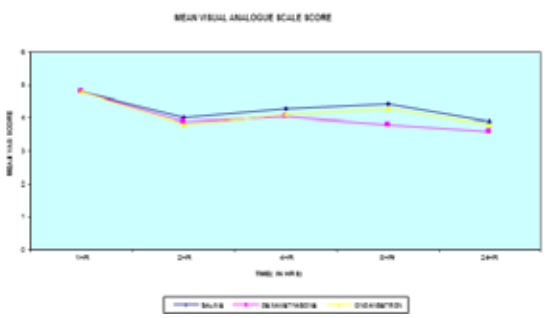
meoclopramide consumed by each patient in milligrams was 7.357±4.404 in group 1, 0.987±3.040 in group 2 and 1.375± 3.391 in group 3. The difference in the total metoclopramide consumption was statistically very significant between group 1 and 2 (p<0.001) between group 1 and 3 (p<0.001). The difference was statistically not significant between group 2 and 3 (p=0.63).

Total dose of metoclopramide consumed

	Group 1	Group 2	Group 3
MEAN	7.345	0.987	1.375
S.D	4.404	3.040	3.391



Visual analogue scale scores were comparable in the different groups at different hours of observations.



In the 24hours after operation, patients in all groups made a comparable number of the demands and consumed similar amounts of diclofenac intramuscularly. The proportion of patients who had nausea and vomiting were more in patients who received repeat dose of fentanyl. Of the six patients who received repeat fentanyl, five had postoperative nausea and vomiting. PONV was 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. There was no constant relationship observed between the phases of menstrual cycle and PONV.

Conclusion

Post-operatively 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 iv was given if the patient vomited more than once or demanded treatment. Postoperative analgesia was supplemented with intramuscular diclofenac sodium, whenever VAS score was more than 3 or on demand. Total amount of metoclopramide and diclofenac consumed was recorded.

It was found that there was a high incidence of postoperative nausea and vomiting after laparoscopic cholecystectomy. Both intravenous dexamethasone and ondansetron were effective in reducing the postoperative nausea and vomiting. 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. We did not observe any untoward effects with the use of either of the drugs. Postoperative pain scoring and consumption of rescue analgesic were similar in all the three groups.

In conclusion, the results of our study indicate that, the incidence of postoperative nausea and vomiting after laparoscopic cholecystectomy is very high. Prophylactic dexamethasone in a dose of 0.15mg/kg i.v is highly effective in reducing the incidence of postoperative nausea and vomiting for 8 hours after surgery and it significantly reduced the requirement of rescue antiemetics during the 24-hour postoperative period. Ondansetron in a dose of 0.1mg/kg i.v is highly effective in reducing the incidence of postoperative nausea and vomiting for 4 hours after surgery and it also significantly reduced the consumption of rescue antiemetics during the 24-hour postoperative period. Both intravenous dexamethasone and ondansetron are safe and effective method for attenuating the postoperative nausea and vomiting after laparoscopic cholecystectomy, but duration of antiemetic action of dexamethasone is more.

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