Original Article

Post operative nausea and vomiting after laparoscopic cholecystectomy: comparison of prophylactic effect of dexamethasone with ondansetron

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Abstract

Background *Postoperative nausea and vomiting after laparoscopic cholecystectomy under general anaesthesia are an unpleasant,distressing effects. Prophylactic use of dexamethesone reducing this effects.*

Objective *This study was designed to compare of dexamethasone and ondansetron for prevention of postoperative nausea and vomiting after laparoscopic cholecystectomy.*

Methods *Sixty patients who underwent laparoscopic cholesystectomy were randomly allocated into two groups. Group A(n=30) patients received 8mg dexamehtasone intravenously and Group B(n=30) patients received 8mg ondansetron intravenously one minute before induction of anaesthesia. All patients received standard general anaesthesia.Perioperative vital signs and postoperative nausea and vomiting were recorded.**Results** The incidence of nausea was 13.4% in group A, 16.7% in group B(p>0.05) and vomiting was 6.6% in Group A, 13.4% in group B(p>0.05). The difference among the groups was not statistically significant.*

Conclusion *Intravenous dexamethasone was better to ondansetron in prevention of postoperative nausea and vomiting after laparoscopic cholecystectomy.*

Keywords *Dexamethasone, ondansetron,laparoscopy,cholecystectomy, postoperative.*

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Introduction

The postoperative nausea and vomiting are one of the common cause of the morbidity after anaesthesia and surgery. It is unpleasant, distressing and potentially dangerous adverse effect after anesthesia. The availability of an emesis basin for every patient in post anaesthesia recovery unit is a reflection of the limited success with the available therapeutic technique. The common factors associated with postoperative nausea vomiting are the type of surgery, anesthetic technique and the patient itself. The incidence of postoperative nausea and vomiting after anaesthesia and surgery varies from 14% to 82%. The wide variations of these results are partly due to differences in design of studies[1]. Many drugs have so far been tried to prevent or alleviate these problems. The antiemetics that are currently being used for treatment in our country are prochlorperazine, metochlopramide and promethazine. But these drugs have varying effectiveness and their use is limited because of delayed recovery, sedation and sometimes distressing side effects of extra pyramidal symptoms. Ondensetron, a 5-HT3 antagonist, has a.good safety profile but is too expensive for routine use. Recently the antiemetic effect of Dexamethasone alone was demonstrated successfully in the patient of paediatric tonsillectomy[9] and ambulatory Gynecological

procedure[7]. Dexamethasone is also found to reduce pain and swelling following extraction of third molar tooth[10].Recently a lot of patients are undergoing laparoscopic cholecystectomy in routine theatre list. Most of them are female patients who are more prone to cause postoperative nausea and vomiting. The incidence of postoperative nausea and vomiting after laparoscopic cholecystectomy is 40% to 70%[2]. Pneumoperitonium needed for Laparoscopy has got direct effect on postoperative nausea and vomiting due to retention of CO_2, which acts both centrally and peripherally[2]. Laparoscopy is a keyhole technique which causes less pain and can be done as a day case surgery[8] but their discharge from hospital is sometimes delayed due to postoperative nausea and vomiting[3]. Routine prophylactic antiemetic is not justified in each and every patient but only in those patients who are at high risk for postoperative nausea and vomiting. Ondansetron is time tested anti-emetic, it selectively blocks serotonin 5-HT_3 receptors, which are located peripherally (abdominal vagal afferents) and centrally (chemoreceptor trigger zone of the area postrema and the nucleus tractus solitarius), appear to play important role in the initiation of the vagal reflex. But only demerits is expensive. Dexamethasone is considered as one of the important anti-emetic. Adverse effects with a single dose of dexamethasone are extremely rare and generally minor. It is relatively inexpensive and easily available. The mechanism of dexamethasone-induced antiemesis is not fully understood, but central inhibition of prostaglandin synthesis and decrease in 5HT turnover in the central nervous system or changes in the permeability of the blood CSF barrier to serum proteins may be involved[6]. Surgery causes injury to the nerve endings. Pain sensitivity of the nociceptive neuron is further activated by certain peripheral chemical mediators. Among the mediators, the sensory nociceptors are mainly sensitized by prostaglandin, so drugs such as dexamethasone, which inhibit prostaglandin synthesis, may reduce inflammatory and sensory responses[11].Considering the above factors we wanted to study the effect of dexamethasone and ondansetron on postoperative nausea and vomiting after laparoscopic cholecystectomy to reduce the morbidity and improve the quality of service to this group of patients.

Methods

This prospective study was done on 60 patients of both sexes, those who were undergo routine laparoscopic cholecystectomy under general anaesthesia. The procedure of work were explained to the patient and written informed consent was obtained from each of the 60 patients. Preoperatively patients were allocated randomly into one of the two groups. Group A: 30 patients was received intravenous dexamethasone 8 mg and in Group B: remaining 30 patients was received intravenous ondansetron 8mg before induction of anaesthesia.On arrival of the patient in the operation theatre- heart rate, blood pressure, respiratory rate and oxygen saturation was recorded. Then intravenous access was obtained and Hartman's saline was started. One minute before induction, patients of group A, was received 8mg intravenous dexamethasone and group B was received 8mg intravenous ondansetron. Then the patient was premedicated with intravenous fentanyl 2 μgm/kg. The patient was preoxygenated for three minutes and induction of anaesthesia was done with thiopentone 3-5 mg/kg, tracheal intubation was facilated with suxamathonum 1.5 mg/kg. Anaesthesia was maintained with halothane 0.5% and No_2 60% in O_2. Then neuromuscular blockade was maintained with intravenous vecuronium. During surgery patients was in the reverse trendelenburg position keeping right side of the bed elevated. The abdomen was insufflated with carbon-di-oxide, maintaining intra abdominal pressure between 10-16 mm Hg. Laparoscopic cholecystectomy was performed under video guide after performing four puntures on the abdomenal wall. During operation injection ranitidine 50 mg and ketorolac tromethamine 30 mg was given intravenously. At the end of operation neuromuscular block was antagonized with injection neostigmine 0.04 mg/kg plus injection atropine 0.02 mg/kg and the endotracheal tube was extubated. During extubation adequate pharyngeal suction was completed when the patient is deeply anaesthetized.

After operation vital sign such as heart rate, blood pressure, respiratory rate and oxygen saturation

was recorded. In the post operative recovery room, post operative analgesia was provided with diclofenac suppository 50 mg twice daily for 24 hours. The incidence of nausea or vomiting and the number and time of rescue anti emetic treatment was recorded at 1 hourly interval over the first 4 hours and then 2 hourly for the next 8 hours. Intravenous metoclopramide 10 mg was given if vomiting occurs or when the patient was nauseated for 10 minutes. Nausea and vomiting was evaluated on a three point ordinal scale (scale is in data sheet). Then post operative data was collected in a prescribed data collection schedule for each patient (Data sheet is attached). Patients was carefully observed for any adverse effect like sedation (sedation score is in data sheet), drowsiness, flushing or any extrapyramidal symptoms and measures was taken accordingly. Result was expressed as mean SD. For statistical analysis students 't' test and chi square test was used where appropriate. Difference was considered statistically significant if P<0.05 (CI-95%).

Results

A total of 60 patients were enrolled for laparoscopic cholecystectomy, out of which 20 (16 in group I and 4 in group II) were male and the rest of them were female (14 in group I and 26 in group II). The mean(±SEM) age were 38.8±2.8 years and 33.5±1.4 years in group A and group B respectively. The mean(±SEM) body weight were 58.1±1.4 Kg in group A and 61.2±2.0 kg in group B. No significant difference were found between group A and group B.

Table I : *Demographic data of study groups.*

	Group A Dexamethason Mean ± SEM		Group B Ondansetron Mean ± SEM		P value
Age(yrs)	38.8 ± 2.8		33.5 ± 1.4		0.051
Weight(Kg)	58.1 ± 1.4		61.2 ± 2.0		0.203
Sex	No.	%	No.	%	P value
Male	16	53.3	4	13.3	0.001
Female	14	46.7	26	86.7	

P value considered significant p<0.05

Table II : *Changes of heart rate between study groups*

Heart rate	Group A Dexamethason Mean± SEM	Group B Ondansetron Mean± SEM	P Value
Preoperative	83.5±1.4	82.2± 1.1	0.149
Post operative	87.2±2.1	86.5± 1.8	0.859

P value considered significant p<0.05

Table shows the heart rate during preoperative and post operative and found that the preoperative mean(±SEM) heart rate was 83.5±1.4 bpm in group A and 82.2±1.1 bpm in group B. The postoperative mean(±SEM) heart rate was 87.2±2.1 bpm in group A and 86.5±1.8 bpm in group B. The mean difference were not statistically significant (p>0.05) in unpaired t-test.

Table III : Changes of systolic blood pressure between study groups**.**

	Group A Dexamethason Mean ± SEM	Group B Ondansetron Mean ± SEM	P value
Preoperative	111.4 ± 1.7	110.0 ± 3.70.74	
Post operative	122.4 ± 3.8	126.1± 2.8	0.18

P value considered significant p<0.05

Table shows the systolic BP during pre and post operative and found that the preoperative mean(±SEM) heart rate was 111.4±1.7 mmHg in group A and 110.0±3.7 mmHg in group B. The postoperative mean(±SEM) systolic BP was 122.4±3.8 mmHg in group A and 126.1±2.8 mmHg in group B.. The mean difference were not statistically significant (p>0.05) in unpaired t-test.

Table IV : *Changes of diastolic blood pressure between study groups*

	Group A Dexamethason Mean ± SEM	Group B Ondansetron Mean ± SEM	P value
Preoperative	74.7 ± 1.2	72.3 ±1.8	0.868
Post operative	75.1 ± 1.3	72.1 ±1.5	0.473

P value considered significant p<0.05

Tables shows the diastolic BP during pre and post operative period and found that the preoperative mean(±SEM) heart rate was 74.1±1.2 mmHg in

group A and 72.3±1.8 mmHg in group B. The postoperative mean(±SEM) diastolic BP was 75.1±1.3 mmHg in group A and 72.1±1.5 mmHg in group B.. The mean difference were not statistically significant (p>0.05) in unpaired t-test.

Table V : *Comparison of nausea and vomiting during post operative period between study groups.*

	Group A Dexamethason		Group B Ondansetron		P value
	No.	%	No.	%	
Nausea	4	13.4	5	16.7	0.447
Vomiting	2	6.6	4	13.4	0.553

P value considered significant p<0.05

Tables shows the nausea and vomiting during post operative period and found that 4(13.4%) and 5(16.7%) had nausea in group A and group B respectively. Vomiting was found 2(6.6%) in group A and 4(13.4%) in group B and the difference was not statistically significant (p>0.05) in chi square test.

Discussion

Nausea and vomiting are common and sometimes dangerous side effects following surgery under general anaesthesia. Most of the incidence of nausea vomiting occur during the first two hours of recovery from anaesthesia[3]. The etiology of postoperative nausea and vomiting is multifactorial, mainly associated with type of surgery (laparoscopic cholecystectomy), female patient and abdominal surgery. Incidence of nausea and vomiting is two to three times more in female due to changing endocrine environment, which sensitize the brain stem emetic mechanism[3]. During laparoscopic cholecystectomy the effect of traction gut may release of humoral substance include 5 hydroxytryptamine (5-HT). which may stimulate 5 HT3 receptor in the afferent vagus nerves triggering the emetic reflex of chemoreceptor trigger zone and pneumoperitonum are needed for laparoscopy has direct effect on postoperative nausea and vomiting play role in triggering emesis[3]. The reported overall incidence of nausea, vomiting after laparoscopic surgery is between 40% to 70%[5]. The consequences of prolonged postoperative nausea and vomiting (PONV) range from unexpected admission of day patients, with its economic implications, to physical, metabolic and psychological effects on the patients which slow their recovery and reduce their confidence in future surgery and anaesthesia. Persistent nausea and vomiting may result in dehydration, electrolytes imbalance and delayed discharge, which was described by Kapur, PONV as 'the big, little problem'[3].

In the present study, incidence of nausea and vomiting in group-A (those received dexamethasone) were 13.4% and 6.6% and in group-B (those received ondansetron) were 16.7% and 13.4%, which was statistically not significant (p>0.05). In this study patients received no rescue anti-emetic treatment as there was no intractable vomiting. So it signifies that the incidence of nausea and vomiting was less in dexamethasone group than the ondansetron group. The exact mechanism of the antiemetic action of dexamethasone is not known. However, there have been some suggestions, such as central or peripheral inhabitation of the production or secretion of serotonin[12]. Central inhabitation of the synthesis of prostaglandins[13] or changes in the permeability of the blood brain barrier to serum proteins[14]. Besides this dexamethasone has a potent anti inflammatory effect and must be beneficial for post operative pain. We know pain is also related with nausea and vomiting. Result of our study was probably related with the mechanism of action of the dexamethasone. Previous work also suggest the justification of using dexamethasone with better outcome. Adverse effects with a single dose of dexamethasone are extremely rare and generally minor. It is relatively inexpensive and easily available.

The anti-emetic effect of dexamethasone alone was demonstrated successfully in the patient of paediatric tonsillectomy[9] and ambulatory gynecological procedure[4]. Anti emetic effects of Dexamethasone had been well-established inpatient receiving cancer chemotherapy in the 1980, Mekenzie and co-workers showed that ondansetron and dexamethasone were more effective than ondansetron and saline in the prevention of postoperative nausea and vomiting[5]. Dexamethasone 20-mg IV was said to make a significant contribution to the control of nausea

and vomiting during and after chemotherapy. The 8-mg intravenous dose of dexamethasone and 8mg intravenous dose of ondansetron in our study was chosen arbitrarily. We chose single IV dose because it was more practical to give one dose in the operating room. Concluded that intravenous dexamethasone (8mg) is more effective and produce less side effect than ondansetron (8mg) in preventing post operative nausea and vomiting in case of laparoscopic cholecystectomy. Dexamethasone could be used as a prophylactic treatment for reducing postoperative nausea and vomiting in high-risk patient. However, further work is required before dexamethasone may be considered for routine prophylaxis of postoperative nausea and vomiting.

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