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Dexamethasone Versus Ondansetron In Preventing Postoperative Nausea and Vomiting in Laparoscopic Surgery

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ABSTRACT

Objective: To compare the efficacy of dexamethasone 8mg versus ondansetron 4mg in preventing postoperative nausea and vomiting (PONV) in patients undergoing laparoscopic cholecystectomy

Methodology: This quasi-experimental study was conducted at the Department of Anaesthesia and Intensive Care, Holy Family Hospital from 29th July 2018 to 28th January 2019. Anesthesia was induced with propofol (2mg/kg IV) and Atracurium (0.5 mg/kg IV) was given to facilitate tracheal intubation. Nalbuphine (0.2mg/kg) was used as analgesic.Patients were randomly divided into two groups. Patients in Group A received 4mg ondansetron at end of surgery and Group B received 8mg dexamethasone at induction.

Results: A total of 90 patients were included according to the inclusion criteria of the study. The mean age (years) in the study was 37.11+10.60 years. Frequency and percentage of nausea (up to 24 hours) among both the groups was 28 (62.2) and 28 (62.2) respectively (p-value = 1.0) while the frequency and percentage of vomiting (within 24 hours after extubation) was 28 (62.2) and 27 (60.0) respectively (p-value = 0.829)

Conclusion: The study concluded that there was no significant difference dexamethasone and ondansetron in preventing postoperative nausea and vomiting.

Keywords: Laparoscopic Cholecystectomy, Postoperative Nausea and Vomiting (PONV)

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Introduction

Postoperative nausea and vomiting is unwanted side effect following surgery leading to anxiety, loss of water and nutrients, prolonged hospital stay, and wound dehiscence. The incidence of postoperative vomiting in a population undergoing surgery without anti emetic prophylaxis is 30 %.[1] Postoperative nausea and vomiting can occur in up to 80% of patients in high-risk patient populations or during high-risk surgical procedures.[2] There are few patient related risk factors for postoperative nausea and vomiting like female gender, non-smoker status, history of motion sickness as well as some surgery related like laparoscopic surgery, ENT surgeries, and gynaecologic procedures. Additional perioperative risk factors for PONV include the duration of surgery, the use of inhalational anaesthetics, such as nitrous oxide, and perioperative opioid administration.[3]

Different pharmacological approaches have been found effective to decrease the incidence of postoperative vomiting in the surgical population like the use of benzamides, serotonin receptor antagonists, steroids, phenothiazine's and steroids.[4] A meta-analysis done in 2015 analyzing available data on Asian population concluded dexamethasone to be as effective as ondansetron in preventing postoperative nausea and vomiting (PONV) (RR, 0.91; 95 % CI, 0.73-1.13; P = 0.39).[5] Another meta-analysis published in 2016 established that dexamethasone is a better option in preventing PONV in the early postoperative period i.e, 6-24 hr period (p=0.04; OR 0.49, 95% CI 0.24–0.98, M-H fixed).[6] Overall incidence of vomiting in a study by

Chatterjee A et al was 56.11% in dexamethasone and 27.2% in ondansetron group.[7]

Postoperative nausea and vomiting remains a readily over looked but important aspect in the recovery of patients following an otherwise satisfactory surgical experience. Management of PONV has become a much more essential component of enhanced recovery pathways. This is mirrored in the American Society for Enhanced Recovery's (ASER) Expert Opinion Statement, which states that all patients undergoing surgery should receive PONV prophylaxis. The number of drugs used for prevention and prophylaxis should be determined by the number of modifiable and unmodifiable risk factors; medications should be drawn from a variety of pharmacological groups and have a variety of mechanisms of action to maximize multimodal advantage.[8]

In perioperative medicine, dexamethasone and ondansetron are the two most frequently used medications for PONV prophylaxis.[9] There is still no medication that provides complete PONV prophylaxis. Numerous trials have compared ondansetron and dexamethasone in the prevention of PONV following laparoscopic surgery. Their findings are inconsistent, and there is no agreement on which drug is superior for PONV prophylaxis. Although literature proves dexamethasone efficacy comparable to ondansetron for prevention of PONV, studies carried out in Pakistani population are quite a few. The primary aim of this study will be to compare the efficacy of dexamethasone and ondansetron in preventing PONV. Moreover, it would help providedata for Pakistani population in this regardas well as providing a cost-effective means in government setups to deal with this issue with evidence.

Methodology

This quasi-experimental study was conducted at the Department of Anaesthesia and Intensive Care, Holy Family Hospital from 29th July 2018 to 28th January 2019. After obtaining approval from the hospital ethical committee and written informed consent from the patients, 90 patients were recruited according to a predefined inclusion and exclusion criteria. Inclusion criteria was all patients between age 18-50 years of either gender (ASA class I and II) undergoing laparoscopic cholecystectomy. Patients with prior history of gastroesophageal reflux disease, diabetes, smoking, antiemetic use in the last 24 hours, and refusal to give consent were excluded from the study.

All patients were assessed a day before surgery for preoperative evaluation. Patients were prepared by fasting (8 hours for solid foods, 2 hours for clear fluids). Patients were randomly divided into two groups by computer-generated random numbers.

1. Group A received 4mg ondansetron at end of surgery
2. Group B received 8mg dexamethasone at induction.

Upon arrival in the operating room, an electrocardiogram leads, pulse oximeter and noninvasive blood pressure cuff was attached. Anesthesia was induced using propofol (2mg/kg IV) as hypnotic agent and Atracurium (0.5 mg/kg IV) was used as a muscle relaxant after which direct laryngoscopy was done and Tracheal intubation was performed. Nalbuphine (0.2 mg/kg IV) was given as analgesic and anaesthesia was maintained with 50% oxygen, 50% air and isoflurane 1-1.2 %. End tidal CO2 levels were maintained at 35-45mmHg. Bupivacaine 0.5 % 5-6 ml was infiltrated at port sites before suturing them. At the end of surgery, after confirming adequate and regular sponatnaeous breathing, neostigmine 0.05 mg/kg and glycopyrrolate 0.001 mg/kg was given. Inhaled anaesthetics were then discontinued. ETT was removed after return of sufficient spontaneous breathing, gag reflex, and purposeful motor movements. When spontaneous breathing with airway patency without assistance was confirmed, patient was transferred to PACU (Post Anesthesia Care unit). In PACU patient was observed by a postgraduate trainee, who was blinded to group allocation, for any episode of vomiting in postoperative period every 6 hours up till 24 hours.

Data was collected on a well-structured performa and SPSS version 21.0 was used to analyze data. Mean ± S.D was calculated for quantitative variables like age, weight, BMI, duration of surgery in both study groups. Frequency & percentages were presented for qualitative variables like nausea, vomiting and history of motion sickness in patients of both groups. Chi-square test was used to compare the proportion of vomiting between both groups. A P value <0.05 was considered statistically significant

Results

Total of 90 patients were included according to the inclusion criteria of the study. Patients were randomly divided into two groups. The mean age (years) in the

study was 37.11±10.60 years. Mean weight and mean height was 70.30±11.11 Kg and 5.57±0.38 inches respectively. Mean BMI was 28.34±3.97 kg/m^2. The mean duration of surgery was 56.16±1.65 minutes.

Frequency and percentage of nausea (upto 24 hours) among both the groups was 28 (62.2) and 28 (62.2) respectively which shows that there is no difference among both the groups, as shown in Table I whereas the frequency and percentage of vomiting was 28 (62.2) and 27 (60.0) respectively, as shown in Table II (p-value 0.829).

Effect modifier like body mass index (BMI) and duration of surgery were controlled through stratification and post stratification chi square test was done. In patients with BMI ≥ 30, the frequency and percentage of vomiting (within 24 hours after extubation) was 11 (57.9) and 4 (50.0) respectively, as shown in Table III. In patients with duration of surgery <60 minutes, frequency and percentage of vomiting (within 24 hours after extubation) was 26 (61.9) and 27 (61.4) respectively, as shown in Table IV.

Table No I: Comparison of Nausea among both the groups.

		Two groups		Total	P-value
		Group A (ondansetron)	Group B (dexamethasone)		
Nausea	Yes	28	28	56	1.000
		62.2%	62.2%	62.2%	
	No	17	17	34	
		37.8%	37.8%	37.8%	
Total		45	45	90	

Table No II: Comparison of Vomiting among both the groups.

		Two groups		Total	p-value
		group A (ondansetron)	group B (dexamethasone)		
Vomiting (24)	Yes	28	27	55	0.829
		62.2%	60.0%	61.1%	
	No	17	18	35	
		37.8%	40.0%	38.9%	
Total		45	45	90	

Table No III: Effect modifier like Body Mass Index (BMI) tratification with comparison of Vomiting among both the groups.

Body Mass Index (BMI)	Vomiting	Two groups		Total	P-value
		group A (ondansetron)	group B (dexamethasone)		
< 30	Yes	17	23	40	0.794
		65.4%	62.2%	63.5%	
	No	9	14	23	
		34.6%	37.8%	36.5%	
≥ 30	Yes	11	4	15	0.706
		57.9%	50.0%	55.6%	
	No	8	4	12	
		42.1%	50.0%	44.4%	

Table No IV: Effect modifier like Duration of Surgery stratification with comparison of Vomiting among both the groups.

Duration of surgery (min)	Nausea	Two groups		Total	p-value
		group A (ondansetron)	group B (dexamethasone)		
< 60	Yes	26	27	53	0.959
		61.9%	61.4%	61.6%	
	No	16	17	33	
		38.1%	38.6%	38.4%	
≥ 60	Yes	2	1	3	0.505
		66.7%	100.0%	75.0%	
	No	1	0	1	
		33.3%	0.0%	25.0%	

Discussion

Postoperative nausea and vomiting (PONV) is the second most often reported complication, after pain.[10] Despite decades of research, the occurrence of PONV remains unacceptably high, owing to the complicated process of PONV pathogenesis and a relative lack of concern about this problem. PONV continues to be a major issue in contemporary anaesthetic practice due to its adverse effects, which include prolonged recovery, unexpected hospitalisation, delayed return to function for ambulatory patients, aspiration of gastic contents, wound dehiscence, and dehydration.[10] Given the growing need for ambulatory surgery, a systematic approach to preventing PONV should be attempted prior to and during surgery. Thus, the aim of PONV prophylaxis is to reduce the prevalence of PONV, and thus patient anxiety, while also lowering health care costs.

It is a particularly distressing and painful symptom that greatly impairs patient satisfaction after emergence from anaesthesia. Although PONV is typically transient, frequent nausea, vomiting, or retching may result in more severe and undesirable outcomes such as dehydration, electrolyte imbalance, increased sense of pain, aspiration of gastric contents, suture dehiscence, and oesophageal perforation. Although such severe complications are uncommon, PONV causes dysphoria, dissatisfaction, and an overall negative association with surgery and anaesthesia. While nausea and vomiting occurred in 20%–30% of all surgical patients, laparoscopic surgery, especially laparoscopic cholecystectomy, dramatically increased the incidence of PONV to as high as 50%.[11]

Female gender, non-smoker status, history of motion sickness, and use of postoperative intravenous (IV) opioid all contribute 20% to the occurrence of PONV, according to Apfel's condensed risk ranking. Thus, where all four risk factors are present, the incidence of PONV will reach up to 80%.[12] A recent Cochrane review concluded that there was high-certainty evidence that five single drugs (aprepitant, ramosetron, granisetron, dexamethasone, and ondansetron) reduce vomiting, and moderate-certainty evidence that two other single drugs (fosaprepitant and droperidol) probably reduce vomiting, compared to placebo.[13]

Wang et al[5] in a recent meta-analysis concluded that there was no significant difference between dexamethasone and ondansetron in regards to the incidence of PONV or postoperative anti-emetics used during the first 24 h after laparoscopic surgery. Similarly, we found out no significant difference in the incidence of nausea and vomiting between the two groups (p-value 1.0 and 0.829 respectively). This is in contrast to the findings of Haider et al[14] who found a significantly lower rate of PONV in the dexamethasone group as compared to the ondansetron group, PONV occurred in 11 (22%) patients in the DEX group and 21(42%) patients in ondansetron group. The difference could be explained by the fact that they recorded the occurrence of nausea and vomiting only during the first 6 hours after the surgery whereas we included the data up to the first 24 hours after the surgery. Yuksek et al[15] on the other hand reported that in gynaecological laparoscopic procedures, ondansetron was superior to dexamethasone (incidence of PONV 35% vs. 55%, respectively), with a major difference occurring only in the first 3 hours postoperatively when used for PONV prophylaxis after induction. Sridharan et al[16] remarked that dexamethasone and ondansetron have the best evidence as stand-alone options for PONV prophylaxis and the combination is preferred in high-risk category. Maitra et al[4] conducted a meta-analysis which found out that dexamethasone is superior to ondansetron in reducing postoperative nausea after 4–6 h of laparoscopic surgeries. However, both the medications are of similar effectiveness in reducing postoperative vomiting up to 24 h after surgery. Therefore, dexamethasone being cheaper and easily available can be considered in the prevention of PONV in resource-limited settings.

Conclusion

The study concluded that there was not a difference observed between the efficacy of dexamethasone and ondansetron in preventing postoperative nausea and vomiting which is an important aspect in the recovery of patients. Future multicenter large scale studies are warranted to compare the effectiveness of both drugs for PONV prophylaxis, thus helping in the provision of data in Pakistani setups. Furthermore, dexamethasone can be used as a cost-effective alternative to ondansetron for PONV prophylaxis in resource-limited settings as the two drugs are comparable in terms of their effectiveness in reducing PONV.

Disclosure: This study is of the dissertation of the principal investigator, Dr. Anum Malik for FCPS Anesthesiology, and was approved by CPSP in December 2019.

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