

# Preoperative Dexamethasone Reduces Nausea and Vomiting After Laparoscopic Cholecystectomy

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## ABSTRACT

Laparoscopic cholecystectomy (LC) is one of the most common, popular and accepted procedure for the patients with symptomatic cholelithiasis. Although serious adverse events are uncommon after Laparoscopic Cholecystectomy, 50% to 75% of patients experience postoperative nausea or vomiting (PONV). Several randomized controlled trials have shown that single preoperative dose of Inj. dexamethasone is effective in reducing postoperative nausea and vomiting and antiemetic requirement after laparoscopic cholecystectomy , as it is freely available, economical and the single dose is not associated with any significant side effects, it should, therefore, be used more frequently in the patients undergoing laparoscopic cholecystectomy.

**Key words:** Laparoscopic cholecystectomy, dexamethasone, nausea & vomiting.

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## INTRODUCTION

Laparoscopic cholecystectomy (LC) is one of the most common, popular and accepted procedure for the patients with symptomatic cholelithiasis<sup>1</sup> due to many advantages like small wound size, better cosmetic results, short postoperative hospital stay , decreased morbidity, cost effective and early return to job. Although serious adverse events are uncommon after Laparoscopic Cholecystectomy, 50% to 75% of patients experience postoperative nausea or vomiting (PONV)<sup>2,3,4</sup>.

The origin of postoperative nausea and vomiting after laparoscopic cholecystectomy is not entirely clear. Female sex, prolonged carbon dioxide insufflation, length of procedure, use of nitrous oxide, the utilization of slightly hypoxic mixtures during anaesthesia and postoperative opioid administration have been suggested as potential risk factors<sup>1,2</sup>. PONV can lead to serious complications such as aspiration, dehydration, electrolyte disturbances and disruption of incision site. It can also lead to increase cost of treatment. Another impact of PONV, is the effect on patient, some regard it as more disabling than the operation itself<sup>3</sup>.

Glucocorticoids are well known for their analgesic, anti-inflammatory, immune-modulating, and antiemetic effects, although the mechanisms by which glucocorticoids exert their action are far from clarified<sup>8</sup>. Several randomized, clinical trials in many different major and minor surgical procedures have been conducted to examine the effects of a perioperative single dose glucocorticoid

administration on surgical outcome<sup>9</sup>. The overall results on postoperative outcome have either been positive in favor of the glucocorticoid group or without differences between study groups, with postoperative nausea and vomiting and pain as outcome parameters most significantly improved<sup>10</sup>. Data from LC have shown questionable effects in pain, nausea, and vomiting, but with higher satisfaction and shorter stay in the day - care unit<sup>11</sup>.

The aim of this randomized, double-blind, placebo-controlled trial was to investigate whether a single dose of dexamethasone before surgery would improve nausea, vomiting and pain in patient undergoing laparoscopic cholecystectomy.

As Inj. Dexamethasone is freely available, economical and the single dose is not associated with any significant side effects, it should, therefore, be used more frequently in the patients undergoing laparoscopic cholecystectomy<sup>12</sup>.

## OBJECTIVES

The objective of the present study is to investigate the outcome in terms of Post operative nausea and vomiting within 24 hours in patients undergoing Laparoscopic Cholecystectomy receiving preoperative dexamethasone and those not receiving.

## MATERIAL AND METHODS

**Setting:** This study will be conducted at North Surgical Unit I, Mayo Hospital, Lahore.

**Study design:** Randomized, Placebo-controlled, Double blind study.

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**Duration of study:** Study was conducted from 1<sup>st</sup> Jun 2011 to 31<sup>st</sup> June 2012 for one year period.

**Sample size:** 100 patients; 50 in each group with 80% power of study, 5% significance level and taking percentages of vomiting and nausea in both Dexamethasone and placebo groups, i.e., 14% and 46% respectively<sup>8</sup>.

**Sampling technique:** Non-probability purposive sampling

**Inclusion criteria:**

1. Patients being operated for laparoscopic cholecystectomy.
2. Age between 13-60 years.
3. American Society of Anesthesiology class I & II.

**Exclusion criteria:**

1. Previous history of postoperative nausea and vomiting, motion sickness or vertigo.
2. Patients who had received an antiemetic within 48 hours before surgery.
3. American Society of Anesthesiology class III & IV.
4. Age over 65 years.
5. Treatment with steroids.

**Data collection procedure:** The patients fulfilling inclusion & exclusion criteria were enrolled from outpatient department. They were assessed on history, clinical examination, baseline investigations and an informed consent was taken about the purpose, procedure, risk and benefits of the surgery. 100 patients were randomized in two equal groups using random number of tables i.e., either Saline (S group) or Dexa (D group). Each of the group received either saline (2ml) intravenous (Group S) as placebo or dexamethasone (8mg) intravenous (Group D). These drugs were prepared by the staff nurse on duty and given by the doctor on duty, two hours before the start of the operation.

The degree of post-operative nausea and vomiting was evaluated for first 24 hours after operation. The number of nausea and vomiting episodes was also recorded. A sample size of 109 patients was predetermined with an alpha error of 0.05 and a beta error of 0.95. Episodes of nausea and vomiting will be registered by the doctor on duty in first 24 hours after operation.

**RESULTS**

Six patients (11%) in the treatment group and 17(30%) in the control group had postoperative nausea (P=0.028) (Table 3); the mean (s.d.) visual analogue scale score were 4(1.4) and 4.4(1.9), respectively (P=0.247). Six patients (11%) treated with dexamethasone had vomiting as opposed to 17(30%) receiving placebo (P=0.028) (Table 3). The absolute risk reduction (ARR) for both nausea and

vomiting was 0.19 (95%) i.e., 0.04 to 0.33). Nausea and vomiting were significantly reduced during the entire observation period compared with placebo: in particular, eleven patients (21%) in the treatment group had postoperative nausea and vomiting versus 29(52%) in the placebo group (P=0.001) (Table 2). The ARR for postoperative nausea and vomiting was 0.32 (95% i.e., 0.15 to 0.49).

Sixteen patients (30%) receiving dexamethasone and seven (13%) receiving placebo required postoperative deep I/M Inj. Diclofenac Sodium during hospital stay (P=0.056). Nine patient (17%) in the treatment group and 28(50%) in the placebo group received intravenous Inj. Metoclopramide during their hospital stay (P=0.001) (Table 2), ARR 0.34 (95% i.e., 0.18 to 0.50).

Table 1: Gender distribution

Gender	D-Group (n=53)		S-Group (n=56)	
	Frequency	%age	Frequency	%age
Male	7	13.2	5	8.9
Female	46	86.7	51	91

Table 2: Demographic data

Group	D Group	S Group
Age (years)	42.3(13) {mean (s.d.)}	42.6(14) {mean (s.d.)}
Male/ Female)	7/46	5/51
ASA (I-II)	49-4	50-6
Duration of surgery (Mins)	65(35-95)	64(38-110)
Duration of Anaesthesia(minutes)	75(50-165)	77(60-170)

Table 3: Effect of 8mg dexamethasone given 2 hours before surgery in patients undergoing laparoscopic cholecystectomy

	D Group (n=53)	S Group (n=56)	P
Nausea	06(11%)	17(30%)	0.028
Vomiting	06(11%)	17(30%)	0.028
Postoperative nausea and vomiting	11(21 %)	29(51%)	0.001
Metoclopramide required	09(17%)	28(50%)	<0.001
Diclofenace Sodium required	16(30%)	07(13%)	0.058

Table 4: Postoperative nausea and vomiting (D Group, n=53)

Parameters	Yes	No
Post operative nausea and vomiting	11(21%)	42(79%)

Table 5: Postop nausea & vomiting (S Group, n=56 )

Parameters	Yes	No
Postop nausea and vomiting	29(51%)	27(49%)

Table 6: Postoperative nausea and vomiting (n=109)

Parameters	Yes	No	Total
PONV (D Group)	11(21%)	42(79%)	n=53
PONV (S Group)	29(51%)	27(49%)	n=56
	40	69	n=109

No side effects of dexamethasone were observed.

No conversion in either group to open procedure was made.

## DISCUSSION

Nausea and vomiting are human protective reflexes against the absorption of toxins, as well as responses to certain stimuli<sup>13</sup>. These symptoms are frequently listed by patients as their most important perioperative concern. PONV can lead to serious complications such as aspiration, dehydration, electrolyte disturbances and disruption of incision site. It can also lead to increase cost of treatment, especially in outpatient surgical setting and unplanned hospital admission<sup>14</sup>.

Nausea and vomiting are among the most unpleasant experiences associated with surgery and one of the most common reasons for poor patient satisfaction rating in the postoperative period<sup>15</sup>. The causes of PONV are multiple, including pharyngeal stimulation, gastrointestinal distention, abdominal distention, abdominal surgery, anaesthetic agent, pain, opioids, hypoxia, hypotension, vestibular disturbances and psychological factors. There are certain factors which can predispose patient to postoperative nausea and vomiting, like age (more in children), gender (female), history of previous nausea and vomiting, history of motion sickness, long-duration of operation and depth of anaesthesia, carbon dioxide retention, rough handling, lack of anaesthetist's skill, type of surgical procedure and number of visitors during recovery<sup>16</sup>.

PONV is multifactorial during laparoscopic cholecystectomy and none of the available antiemetic can antagonize all neurotransmitter system. A combination of different classes of antiemetics are, therefore, preferred to control PONV in high risk surgical patients<sup>17,18</sup>. In this study postoperative nausea and vomiting was high i.e., 51% in control group who received normal saline as placebo.

Among the antiemetics currently prescribed for PONV, serotonin subtype 3 antagonists (e.g., ondansetron and granisetron) are expensive<sup>19,20,21,22</sup>. Other currently used, lower-cost antiemetics (e.g., anticholinergics, antihistamines and dopamine receptor antagonists) have side effects, such as sedation, dry mouth, restlessness, changes in arterial blood pressure, and extrapyramidal symptoms. Dexamethasone, a corticosteroid, is an inexpensive

and effective antiemetic drug, with minimal side effects after a single-dose administration<sup>23,24,25</sup>. It was first reported in 1981 as an effective antiemetic in patients receiving cancer chemotherapy. Dexamethasone also reduces the incidence of PONV<sup>29</sup>. Dexamethasone 8 mg is also effective for PONV after LC. However, a smaller dose has not yet been evaluated. In this study Inj. Dexamethasone 8mg IV was used as it is cheap, easily available in hospital, safe to administer and easy to prepare the injection.

Following the successful use of dexamethasone in the prevention and treatment of chemotherapy induced emesis, this agent has been evaluated and found to be effective for the management of PONV. First, corticosteroids may reduce levels of 5-hydroxytryptophan in neural tissue by depleting its precursor tryptophan. Second, the antiinflammatory properties of corticosteroids may prevent the release of serotonin in the gut. Third, dexamethasone may potentiate the main effect of other antiemetics by sensitizing the pharmacological receptor.

Studies have shown that substituting propofol for a volatile anesthetic reduces the risk of postoperative nausea and vomiting by about 19%, whereas substituting nitrogen for nitrous oxide reduces the risk by about 12%. In this study PONV was high in control group i.e., 51% as Inj. Pentothal and Isoflurane was used to facilitate induction of anaesthesia.

Generally, the biological action of glucocorticoids begins 1–2 h after administration, so in this trial dexamethasone was administered 120 min before skin incision. Probably, the effects are centrally mediated through the inhibition of both prostaglandin synthesis and endogenous opioid release. No impaired wound healing, postoperative infection or other complications were associated with the use of dexamethasone in this trial. These results are similar to others reported in the literature. In the current study, a single dose of 8mg dexamethasone did not cause wound infection or delay wound healing. In addition, no other side effects were found after the usage of a single dose of dexamethasone.

## CONCLUSION

Dexamethasone improves the surgical outcome by reducing disabling symptoms of nausea and vomiting without apparent side effects. However, there is no evidence in reduction of postoperative pain or analgesic requirements in this trial. So preoperative dexamethasone 8mg may be used as a routine in patients two hours before undergoing elective laparoscopic cholecystectomy.

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